



Human capital inequalities : family structure matters

Hélène Le Forner

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UNIVERSITÉ PARIS 1 PANTHÉON SORBONNE

ÉCOLE D'ÉCONOMIE DE PARIS

T H È S E

pour l'obtention du titre de Docteur en Sciences Économiques

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Human Capital Inequalities: Family Structure Matters

Préparée sous la direction d'Hippolyte D'ALBIS et Arnaud LEFRANC

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L'Université Paris 1 Panthéon Sorbonne n'entend donner aucune approbation, ni improbation aux opinions émises dans cette thèse ; elles doivent être considérées comme propres à leur auteur.

"Dans le bureau de mon grand-père, il y en avait partout [des livres] ; défense était faite de les épousseter sauf une fois l'an, avant la rentrée d'octobre. Je ne savais pas encore lire que, déjà, je les révérais, ces pierres levées ; droites ou penchées, serrées comme des briques sur les rayons de la bibliothèque ou noblement espacés en allées de menhirs, je sentais que la prospérité de notre famille en dépendait."

Sartre, *Les mots*, 1964.

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Présentation de la thèse en français (Summary in French)

Spence, prix de la Banque de Suède en mémoire d'Alfred Nobel en 2001, n'hésite pas à qualifier de toxiques les inégalités : “Les inégalités fondées sur la recherche réussie de rentes et sur un accès privilégié aux ressources et aux opportunités de marché est hautement toxique pour la cohésion et la stabilité sociales – et par conséquent pour les politiques en faveur de la croissance”¹. Dans son ouvrage, *Théorie de la justice* (1971) [113], Rawls déclare que la justice doit assurer l'égalité des opportunités. En plus d'être injustes, les inégalités sont profondément inefficaces. En effet, si l'accès à certaines professions est limité par des ressources économiques, sociales ou culturelles, celle-ci risque d'être davantage déterminée par le milieu familial de l'individu plutôt que son talent. Le millionnaire Warren Buffet résume très bien cette inefficacité : “Je ne pense pas qu'il faille recruter notre future équipe des Jeux Olympiques parmi les petits fils de notre équipe actuelle”. Ce qui paraît inacceptable en sport, est par ailleurs largement répandu dans la société. On estime que 40 à 60% de la variation des années d'étude est attribuée au milieu familial et au voisinage (Björklund et Salvanes (2010) [118]), celle-ci déterminerait également entre 20 et 45% de la variation des salaires (Björklund et al. (2002) [26]).

Qu'est-ce qui explique une si grande importance du milieu familial dans des sociétés où les privilèges ont été abolis depuis bien longtemps ? Les chercheurs en sciences sociales ont œuvré à comprendre l'influence du milieu familial sur la situation des individus. Si les effets de l'éducation ou des salaires des parents ont été largement étudiés, l'effet de la structure familiale a encore été peu exploré. Ces dernières décennies, la famille a connu des changements majeurs. D'une part, on observe une large diminution du taux de fécondité ; d'autre part, le nombre de séparations a largement augmenté. Cette thèse s'intéresse à l'effet de ces changements sur le capital humain des individus.

Dans ce résumé, nous définirons d'abord ce qu'est le capital humain et présenterons ses déterminants, notamment comment la structure familiale peut constituer un déterminant du capital humain. Dans un second temps, nous nous intéresserons aux nouvelles formes familiales et à leurs origines. La troisième partie explique dans quelle mesure les inégalités liées à la structure familiale sont injustes. Cette partie dresse également un panorama des différentes politiques familiales mises en place et des inégalités d'opportunités dans les trois pays étudiés dans cette thèse : la France, le Royaume-Uni, les Etats-Unis ; la Suède

¹Spence, “Bonne et Mauvais Inégalités”, *Project Syndicate*, 2014

est également incluse pour un point de comparaison scandinave. Enfin, nous terminerons par un aperçu de chaque chapitre et des contributions de cette thèse.

1 Capital Humain, sa fonction de production et ses déterminants

1.1 Capital humain : un concept utile mais controversé

Le capital humain recouvre l'ensemble des capacités d'un individu, sous toutes ses formes : capacités cognitives, capacités non-cognitives recouvrant ses capacités socio-émotionnelles ou même sa santé. Pour Becker (1982) [12], l'un des pionniers de la théorie du capital humain, les individus et leurs parents investissent en temps ou en argent pour se constituer un capital, dit humain. Cet investissement est supposé rationnel et analogue à l'investissement d'une entreprise, il suit ainsi une fonction de production. Un niveau de capital humain plus élevé se traduit par une productivité plus importante qui se reflète elle-même par des salaires plus élevés. Cette analogie au capital tangible permet de rendre compte du processus d'accumulation des capacités de l'individu, expliquant l'efficacité des programmes ayant lieu pendant l'enfance (Cunha et Hackman 2007 [47]). Cela permet également de rendre compte de sa dépréciation : la courbe des salaires en fonction de l'âge suit une relation concave, indiquant un rendement décroissant. Néanmoins, considérer les investissements en capital humain comme un processus de décisions rationnelles a été très controversé. Bowls et Gintis (1975) [70] critiquent l'absence de considération de la reproduction sociale : l'investissement n'est pas uniquement rationnel mais dépend largement du milieu familial. La théorie du capital humain a maintenant dépassé cette critique et considère toutes sortes de déterminants, admettant que certains d'entre eux sont socialement déterminés.

1.2 Les mesures du capital humain

La quantité de capital humain est difficile à mesurer. Les chercheurs en sciences sociales ont longtemps considéré les salaires ou le niveau de diplôme comme des mesures indirectes du capital humain. Les Economistes ont toujours reconnu le rôle des capacités cognitives pour expliquer les niveaux de salaire ; mais plus récemment, de nombreuses études ont souligné l'influence des capacités non-cognitives, au moins tout aussi importante que celle des capacités cognitives. Selon Linqvist et Vestman (2011) [99], une augmentation d'un écart type des capacités non-cognitives permet de prédire une augmentation de 6,9% des salaires, et ceci est encore plus vrai pour les ouvriers non qualifiés et les managers.

Néanmoins, nous savons encore peu de choses sur leurs déterminants.

1.3 Les déterminants du capital humain

Les chercheurs en sciences sociales ont considéré un large spectre des déterminants du capital humain. Nous retenons ici trois catégories : l'école, les effets de pairs, et les ressources familiales. Supposé universel, plusieurs études ont néanmoins mis en lumière l'existence de disparités dans le milieu scolaire. Elles proviennent de différences entre les professeurs et leurs méthodes pédagogiques ou leur expérience (Rockoff 2004 [115], Hanushek et Rivkin 2010 [77], Chetty et al. (2014) [40], Flèche [63]) ; ou de ressources financières à travers la taille des classes par exemple (Piketty 2004 [110]). Le milieu familial inclut tout autant les ressources économiques, sociales ou culturelles des parents pour suivre la classification de Bourdieu. Les effets de pairs font aussi des facteurs déterminants du capital humain, que ce soit à travers le voisinage (Goux et Maurin (2007) [73]) ou à l'école (Hoxby 2000 [82]).

Dans cette thèse, nous nous intéressons plus particulièrement aux ressources familiales, et notamment à l'effet de la structure familiale sur celles-ci. Nous considérons ainsi deux changements de la structure familiale : la séparation parentale et la naissance d'un nouvel enfant dans la famille. Ces changements peuvent être assimilés à des chocs sur les ressources familiales. D'une part, si les ressources familiales sont divisées entre chacun des enfants, une augmentation du nombre d'enfants dans la famille implique un montant de ressources plus restreint par enfant, se traduisant par un investissement moindre dans leur capital humain (voir Becker 1994 [14]). D'autre part, la séparation parentale peut également constituer un choc économique pour les parents. En se séparant, ces derniers perdent tous les gains liés à la vie de couple et doivent dupliquer tous leurs biens (maison, voiture, machine à laver, etc...). Cela peut se traduire par une baisse des ressources économiques disponibles pour l'investissement dans le capital humain de l'enfant. De plus, pour faire face à la perte d'un salaire, le parent qui a la garde peut être amené à augmenter son nombre d'heures, et cela peut se traduire par moins de temps pour s'occuper de l'enfant (voir Becker et al. 1976 [15], Becker et Tomes 1979 [17], 1994 [14]).

Ces dernières décennies, la famille a connu des changements majeurs qui ont pu affecter les ressources parentales : d'une part, la taille de la famille s'est réduite, d'autre part, les séparations ont augmenté. Dans la prochaine section, nous présentons ces changements de l'institution familiale et leurs origines.

2 Les nouvelles formes familiales et leurs origines

2.1 La structure familiale et ses changements à travers le temps

Le débat et les manifestations autour du mariage homosexuel en France en 2013 ont montré l'absence de consensus quant à une définition de la famille. Pour certains, la famille est "naturelle", constituée d'un père et d'une mère mariés. Pour d'autres, ni le mariage, ni la différence des sexes ne sont des éléments constitutifs de la famille (De Singly 2017 [53]). En droit, la famille se définit comme un groupe de personnes vivant dans le même ménage, partageant des ancêtres ou étant liés par le mariage. La structure caractérise le système de relations entre différents individus. Ainsi, la structure familiale se définit par le nombre d'individus et les relations qui les lient les uns aux autres.

La structure familiale a connu deux changements majeurs ces dernières décennies. D'abord, la plupart des pays de l'OCDE ont achevé la troisième phase de la transition démographique, le nombre d'enfants par femme a diminué, se traduisant par une réduction de la taille des familles. D'autre part, la famille considérée comme "naturelle" a décliné, laissant place à de nouvelles formes familiales², telles que les familles monoparentales et les familles recomposées. Le nombre d'enfants vivant avec seulement l'un de leurs parents est passé de 13% en 1968 à 25% en 2017 pour les Etats-Unis³, et de 8% en 1990 à 21% en 2009 pour la France⁴. Quelles sont les origines de ces changements ?

2.2 Les origines de la famille contemporaine

Dans son ouvrage, *Sociologie de la famille contemporaine* (2017) [53], François de Singly analyse l'émergence des nouvelles formes familiales. Selon lui, la famille contemporaine est basée sur l'importance des relations, émotions et affections entre ses membres, à la fois entre les parents et les enfants, mais également entre les parents eux-mêmes.

Pour l'historien, Philippe Ariès, la réduction de la taille de la famille provient tout autant de l'évolution des conditions objectives comme la baisse de la mortalité infantile, que de l'importance croissante donnée à l'enfant. La réduction de la taille de la famille reflète le besoin des parents de concentrer leurs investissements, mais également du désir de meilleures relations (Ariès 1960 [9]). On retrouve également cette idée d'arbitrage qualité / quantité chez Gary Becker (Becker et Tomes 1976 [15]).

²Certains anthropologues contestent cette vision évolutionniste de la famille. Lallemand (1993) [92] déclare que les familles recomposées ont toujours existé dans d'autres cultures et d'autres sociétés. Dans la préface de l'ouvrage *Histoire de la famille (Tome 1)* (1986) [101], Claude Lévi-Strauss écrit que toute modalité de l'institution familiale a déjà été vue (François De Singly 2017 [53])

³Source : Pew Research Center analysis of Current Population Survey March Supplement

⁴Source : Chardon et al., 2008 [39]

Par ailleurs, l'importance croissante donnée à l'amour dans le mariage peut être, paradoxalement, à l'origine de l'augmentation de la montée des séparations. Dans son livre *L'Amour et l'Occident* (1939) [51], Denis de Rougemont écrit :

“Si donc l'on s'est marié à cause d'une romance, une fois celle-ci évaporée, il est normal qu'à la première constatation d'un conflit de caractères ou de goûts, l'on se demande pourquoi suis-je marié ? Et il est non moins naturel qu'obsédé par la propagande universelle pour la romance, l'on admette la première occasion de tomber amoureux de quelqu'un. Et il est parfaitement logique que l'on décide aussitôt de divorcer pour trouver le nouvel "amour" qui entraîne un nouveau mariage, une nouvelle promesse de bonheur ; les trois mots sont synonymes.” ⁵.

François de Singly (1992) [52] ironise la description des media du "chaos" des familles contemporaines, et défend l'idée que l'augmentation des séparations est due à l'importance croissante du sentiment amoureux ; rappelant que la liberté du choix et la possibilité de la séparation sont deux conditions nécessaires à la formation du couple.

La transformation de la famille trouve également sa source dans le mouvement de libération des femmes qui ne veulent plus être uniquement considérées comme des épouses ou des mères. Les femmes deviennent plus indépendantes, ce qui leur confère plus de liberté quant à la possibilité de divorcer. Ce mouvement peut également expliquer la baisse de la fécondité. Les femmes ayant un niveau d'éducation plus élevé ont un meilleur accès à la contraception. De plus, la participation croissante des femmes au marché du travail et l'accès à de meilleures professions avec un salaire plus élevé, augmente le coût d'opportunité d'avoir un enfant (Berrington 2004 [20]). Regardons maintenant de plus près les faits.

2.3 Les changements majeurs de la structure familiale : faits stylisés

Le premier fait est la baisse du taux de fécondité dans la majorité des pays de l'OCDE. Ici, nous nous concentrons sur les trois pays étudiés dans cette thèse : la France, le Royaume-Uni, et les Etats-Unis, ainsi que la Suède pour donner un point de comparaison parmi les pays scandinaves. Le graphique 1 montre l'évolution du taux de fécondité dans ces pays, depuis 1970 jusqu'à aujourd'hui. Nous observons une baisse importante jusqu'aux années 1980. Aux Etats-Unis, au Royaume-Uni et en France, le

⁵Cité par François de Singly, 2017 [53]

taux de fécondité passe ainsi de 2,5 en 1970 à 1,8 en 2017, malgré une reprise dans les années 1990 aux Etats-Unis et au début des années 2000 en France et au Royaume-Uni. La Suède suit une évolution différente.

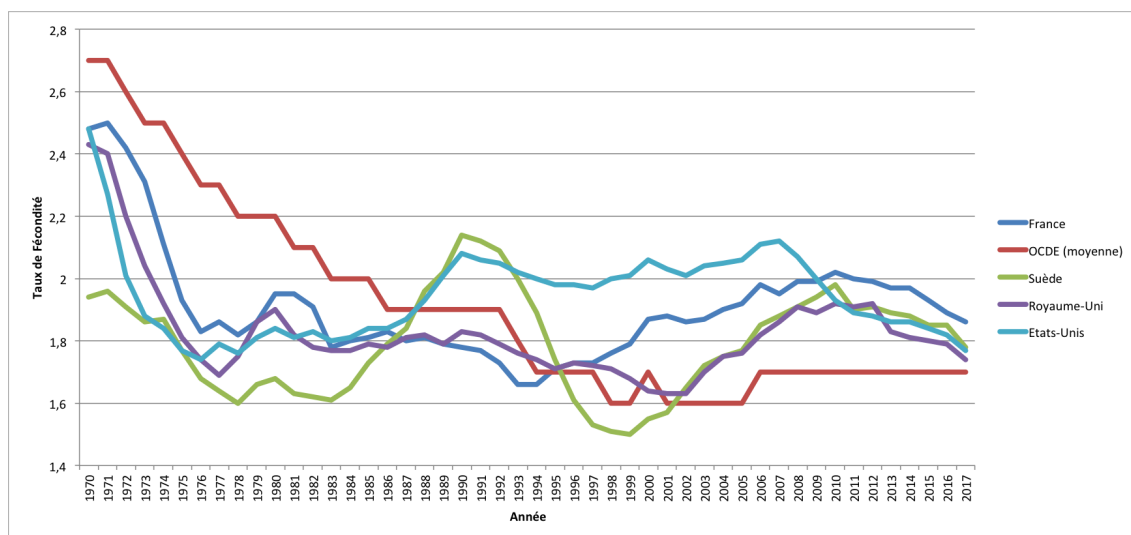


FIGURE 1 – Taux de fécondité en France, aux Etats-Unis, au Royaume-Uni et en Suède

Le deuxième fait est l'augmentation du divorce et des séparations, donnant lieu à une augmentation du nombre d'enfants vivant dans des familles monoparentales. Ainsi, au Royaume-Uni, la part des personnes divorcées passe de 0,7‰ en 1965 à 1,8‰ en 2016, avoisinant les 3‰ dans les années 1990. Sur la même période, en Suède, cette part passe de 1,2‰ à 2,4‰ (voir Figure 2). On observe une augmentation continue jusque dans les années 1980, puis cela se stabilise. Pour la France et les Etats-Unis, les données ne sont disponibles qu'à partir des années 1990, rendant l'analyse moins pertinente. Bien sûr, ce taux de divorce brut ne prend pas en compte la baisse du taux de mariage.

Un fait corollaire est l'augmentation du nombre d'enfants qui vivent dans des familles monoparentales. Nous nous concentrons ici sur la France. Le graphique ci-dessous montre la part des individus dont les parents sont séparés ou divorcés à la date de l'enquête. Ceci a été calculé à partir des vagues 2003 et 2014 de "Formation et Qualification Professionnelle" de l'INSEE.⁶ La Figure 3 montre que parmi les individus nés en 1946, 4% ont leurs parents séparés à la date de l'enquête ; contre 15% pour ceux nés en 1980. Le seuil des 10% est franchi pour la génération née dans les années 1970 ; cette part a fortement augmenté chez les générations nées en 1965 et 1970. Cette cohorte a pu être davantage touchée par la loi de 1975 qui a simplifié la procédure de divorce pour leurs parents.

⁶Ces données sont disponibles pour les pays de l'OCDE, mais uniquement à partir de 2004, c'est pourquoi nous nous concentrons ici sur la France.

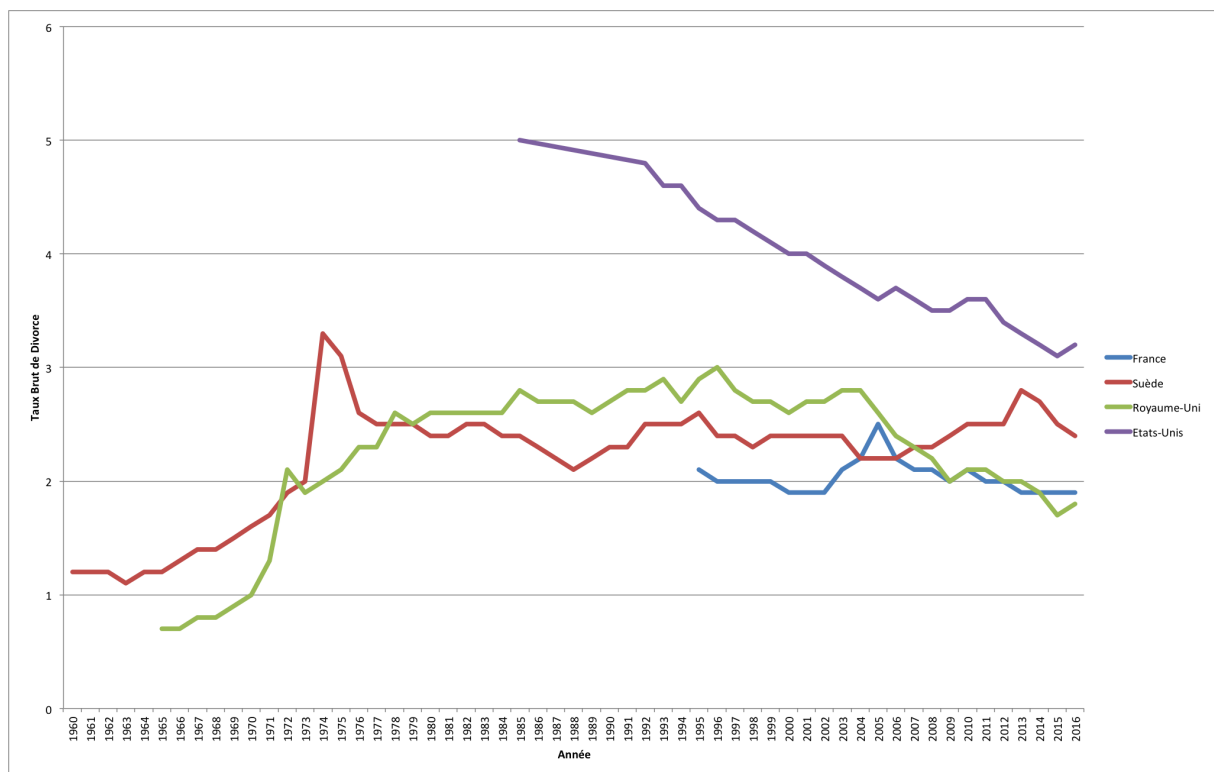


FIGURE 2 – Taux de divorce (brut) en France, aux Etats-Unis, au Royaume-Uni et en Suède

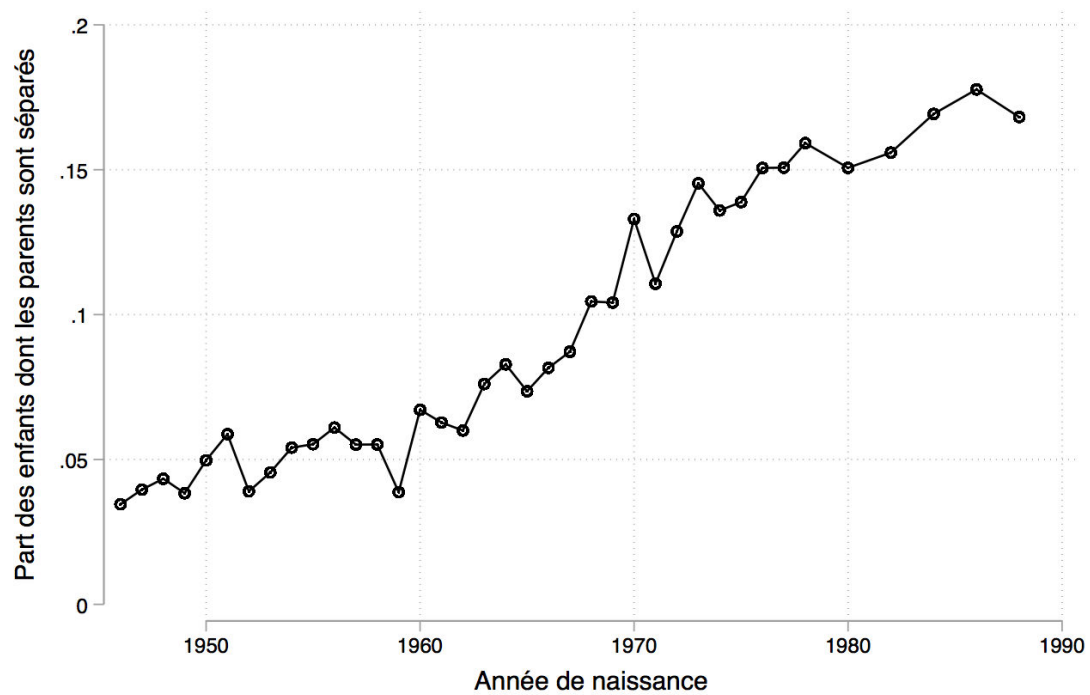


FIGURE 3 – Part des enfants dont les parents sont séparés en France

Cette section a mis en lumière les changements majeurs qu’a connus la famille ces dernières décennies. Comme mentionné précédemment, un changement de la structure familiale risque d’affecter la disponibilité des ressources des parents, et ainsi affecter le capital humain de l’enfant. De plus, puisque c’est indépendant du choix de l’individu, cela devrait être considéré comme une circonstance, au sens de la théorie de l’égalité des opportunités; et par conséquent, cela devrait faire l’objet d’une compensation. La partie suivante présente la théorie de l’égalité des opportunités en mettant l’accent sur la structure familiale.

3 La structure familiale, par le prisme de la théorie de l’égalité des opportunités

3.1 La théorie de l’égalité des opportunités, structure familiale et responsabilité

Rawls est l’un des premiers à questionner le caractère acceptable et inacceptable des inégalités. Il déclare que la justice doit assurer que nul ne soit avantagé ou désavantagé par la chance ou la contingence des circonstances sociales (Rawls 1971 [113]). Dworkin (1981) [57] défend la thèse selon laquelle les individus ne devraient pas recevoir de compensation pour quelque chose dont ils peuvent être tenus responsables. Roemer (1993) [116] défend le principe selon lequel pour qu’il y ait égalité d’opportunité, les individus qui exercent un même degré de responsabilité doivent avoir les mêmes résultats, en dépit des différences de circonstances. Il formalise cette idée et distingue deux types de déterminants : ceux pour lesquels la responsabilité de l’individu est engagée (l’effort) et ceux qui sont indépendants de la responsabilité de l’individu (les circonstances). Les premiers ne devraient pas être compensés selon le principe de récompense naturelle, alors que les seconds devraient être compensés selon le principe de compensation. ⁷.

Si l’on applique cette théorie à la structure familiale, on peut d’abord penser que la séparation ou les décisions de fertilité relèvent de la responsabilité des individus. Néanmoins, on pourrait opposer à cette vision l’influence du milieu familial sur ces décisions. Ainsi, certaines études montrent qu’il existe une transmission intergénérationnelle du divorce (Traag et al. 2000 [127]) et de la taille de la famille (Axinn et al. 1994 [11]). Cependant, les enfants ne peuvent pas être tenus responsables de la séparation des parents ou de leur nombre de frères et sœurs. La séparation parentale et le nombre de frères et

⁷Voir Roemer et Trannoy (2016) [117] pour une revue de littérature de la théorie de l’égalité des opportunités

sœurs devraient donc être considérés comme des circonstances. Ainsi, selon la théorie de l'égalité des opportunités, les possibles effets négatifs de la structure familiale sur la réussite de l'enfant devraient être compensés. La plus grande difficulté de cette compensation est de cibler les enfants. Trannoy (2016) [128] discute la possibilité de vouchers ciblant ainsi directement des biens destinés à l'enfant, mais cette politique serait trop paternaliste.

La question de l'enfant est centrale dans de nombreux pays. Un grand nombre de pays a ainsi signé la Convention des Nations Unies pour les Droits de l'Enfant (1989). Cette convention confère le droit de l'enfant à avoir une relation avec ses deux parents, même s'ils sont séparés. Les Etats ont une variété d'outils pour aider les familles et assurer l'égalité d'opportunité. La prochaine partie dresse ainsi un panorama des différentes politiques familiales dans les trois pays étudiés dans cette thèse, la France, les Etats-Unis, le Royaume-Uni et la Suède, qui offre un point de comparaison pour les pays scandinaves.

3.2 Les politiques familiales en France, aux Etats-Unis, au Royaume-Uni et en Suède

Les allègements fiscaux et les prestations sociales aux familles représentent environ 3,5% du PIB en 2015 en France, au Royaume-Uni et en Suède, tandis que cela ne représente du 1,12% aux Etats-Unis⁸. Cependant, un même montant peut être alloué de façon très différente à travers les pays. Olivier Thévenon (2011) [124] distingue ainsi plusieurs groupes de pays selon leurs politiques familiales en utilisant une analyse en deux composantes principales. La première composante qui apparaît considère le soutien fourni aux parents actifs ayant des enfants en bas âge ; la seconde composante considère la durée et la générosité du congé parental. Cinq groupes de pays apparaissent. Les pays scandinaves se distinguent par la durée et la générosité des congés parentaux, ainsi que par un soutien important à la petite enfance. Les pays anglo-saxons se caractérisent davantage par leur soutien aux familles pauvres et aux familles monoparentales, mais les congés parentaux y sont plus courts. Les pays d'Europe continentale (France, Allemagne, Luxembourg) allouent une part importante de leur PIB aux prestations sociales et aux allègements fiscaux, mais elle se concentre moins sur les familles pauvres. Un certain conservatisme perdure ; ainsi, les familles où seulement l'un des deux travaille bénéficient d'un taux d'imposition moins élevé que les couples bi-actifs, désincitant ainsi l'emploi des femmes⁹. Les politiques familiales des pays d'Europe de l'Est sont en transition, les prestations et la garde d'enfants sont encore peu développées, mais les congés parentaux sont longs. Enfin, le Japon, la Corée, les pays d'Europe du Sud ont peu de politiques familiales en place.

⁸Données de l'OCDE

⁹voir aussi Stancanelli 2009 [123]

Les différentes politiques familiales sont résumées dans le tableau 1. La Suède et la France ont ainsi des congés parentaux plus longs que le Royaume-Uni ou les Etats-Unis. Néanmoins, une information manquante ici est le nombre de semaines effectivement prises par les pères, qui est bien moins important en France qu'en Suède. Les crèches sont également plus développées dans ces deux pays, couvrant environ 30% des enfants de 0-2 ans. La maternelle est très développée en France, en Suède et au Royaume-Uni, ainsi la quasi-totalité des enfants est dans un établissement préscolaire, tandis que cette part n'est que de 65,6% aux Etats-Unis. Son coût est en revanche bien plus faible en Suède et en France. A revenu comparable, les familles monoparentales bénéficient d'un coût plus faible en France et au Royaume-Uni, comparé aux familles biparentales.

TABLEAU 1 – Politiques Familiales en France, en Suède, aux Etats-Unis et au Royaume-Uni.

	Suède	France	Royaume-Uni	Etats-Unis	OCDE
Congés parentaux (payés) 2016					
Durée du congé paternité et des congés parentaux (payés) en semaines	14	28	2	0	
Durée du congé maternité et des congés parentaux disponibles pour les mères (payés) en semaines	56	42	39	0	
Crèche 2016					
Nombre d'heures moyen par semaine (pour les enfants de 0-2 ans)	30,2	33	18,3	29,5	
Part des enfants allant à la crèche ou en maternelle (0-2 ans) :	46,5	56,7	31,5	28	
Coût net de la crèche pour les couples bi-actifs	3,9	9,8	40,8	22,5	12,9
Coût net de la crèche pour les familles monoparentales	3,4	3,2	23,3	57,1	15,5
Part des enfants allant en maternelle (pour les enfants de 3-5 ans)	96	100	100	65,6	

La Figure 4 compare les différentes allocations et allègements d'impôts, ainsi que le revenu après impôt selon la structure familiale. Le graphique du haut reporte ces statistiques pour ceux qui gagnent 20% du revenu moyen, et celui du bas pour ceux qui gagnent 100% du revenu moyen. Les politiques familiales des quatre pays visent à aider les familles les plus pauvres, c'est néanmoins le Royaume-Uni qui est le plus généreux, faisant ainsi

monter leur revenu net à 60% du revenu moyen. La France arrive juste après ; la Suède et les Etats-Unis sont proches, et le revenu net des familles biparentales est légèrement plus élevé que celui des familles monoparentales dans ces deux pays. Les politiques familiales ne semblent donc pas viser les familles monoparentales pour cette population, néanmoins, cela n'est pas le cas pour les familles qui ont un salaire égal au salaire moyen.

Chez ceux qui gagnent le salaire moyen, le revenu net est plus élevé aux Etats-Unis, ceci est dû aux faibles taux d'imposition, tandis que les couples Suédois sont les plus taxés, leur revenu net atteint ainsi 80% du revenu moyen. Il existe des différences entre les familles monoparentales et biparentales. C'est en Suède et en France que cette différence est la plus importante, tandis que cette différence est moindre dans les pays anglo-saxons.

En définitive, le statut familial ne joue pas sur les aides faites aux familles modestes, le Royaume-Uni semble avoir la politique familiale la plus généreuse avec les familles modestes. Pour les classes moyennes, les politiques familiales et fiscales françaises et suédoises favorisent sensiblement les familles monoparentales, tandis qu'elles ne sont pas ciblées dans les pays anglo-saxons. La France et la Suède visent également davantage la petite enfance à travers des congés parentaux plus longs et un plus grand développement des crèches. Dans la partie suivante, nous regardons comment ces politiques influent sur le niveau d'inégalités des chances de chaque pays.

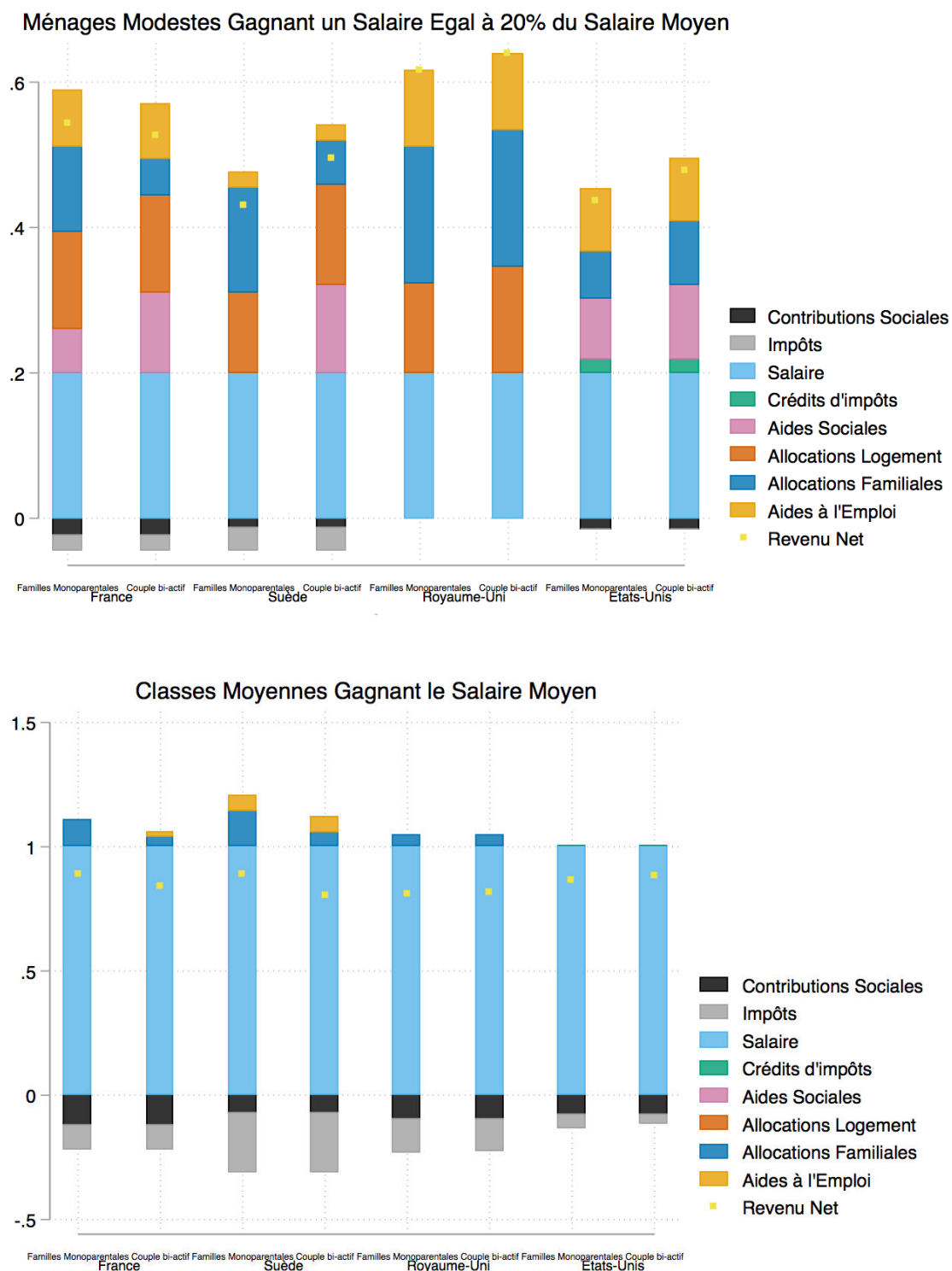


FIGURE 4 – Politiques Familiales en France, en Suède, aux Etats-Unis et au Royaume-Uni, selon la situation familiale.

3.3 Egalité d'opportunités à travers les pays

Nous prenons trois indicateurs d'inégalités des chances : la corrélation entre frères et sœurs, la corrélation intergénérationnelle et l'élasticité intergénérationnelle, pour l'éducation et les salaires¹⁰. Nous nous basons ici sur des résultats de la littérature existante. La corrélation entre frères et sœurs mesure la part de variation due à des variables communes entre les frères et sœurs. Concernant l'éducation, le niveau des inégalités d'opportunités est plus faible en France, tandis qu'il est le plus élevée aux Etats-Unis. Concernant les salaires, les résultats sont différents, c'est la Suède qui assure le niveau le plus faible d'inégalités, tandis que les Etats-Unis apparaissent encore comme le pays le plus inégalitaire. En France, l'égalité en terme de niveau d'éducation ne semble pas se traduire par une égalité de salaires.

L'élasticité intergénérationnelle (IGE) mesure le degré de transmission des avantages économiques, culturels ou sociaux des parents transmis aux enfants à travers leur éducation ou leurs salaires. C'est un indicateur de la persistance de l'éducation ou des salaires à travers les générations, entre un père et son fils ou sa fille par exemple. Elle s'estime à partir de l'équation suivante :

$$Y_i^C = \beta_0 + \beta_1 Y_i^P + \epsilon_i,$$

où Y_i^C est le revenu de l'individu, et Y_i^P , celui de son père. La corrélation intergénérationnelle (IGC) mesure la part des inégalités entre les individus au sein d'une génération qui a été transmise par la génération précédente, ainsi, elle n'est pas sensible à l'évolution du niveau d'inégalités *au sein* des générations entre deux dates données. La relation entre l'élasticité intergénérationnelle et la corrélation intergénérationnelle est la suivante :

$$IGE(= \beta_1) = IGC \frac{\sigma_{Y^C}}{\sigma_{Y^P}}.$$

D'après cette équation, si le niveau d'inégalités (au sein des générations) augmente (*i.e.* le rapport $\frac{\sigma_{Y^C}}{\sigma_{Y^P}}$), l'élasticité intergénérationnelle augmente, tandis que la corrélation intergénérationnelle est insensible à ce changement.

¹⁰Ces indicateurs reflètent également la transmission génétique, néanmoins, les frères et sœurs ne partagent que 50% de leurs gènes, et ceci n'est pas un problème pour la comparaison des pays.

TABLEAU 2 – Aperçu des inégalités d’opportunité à travers trois indicateurs

		Etats-Unis	Royaume-Uni	France	Suède
Corrélation entre "siblings"^a ^aentre frères et soeurs	Education	0,60 ^b	?	0,3 ^e	0,46-0,48 ^b
	Revenus	0,45 ^a	?	0,4 ^e	0,22 ^a
Corrélation	Education	0,46 ^c	0,31 ^c	?	0,40 ^c
Intergénérationnelle	Revenus Père - Fils	0,52 ^d	0,31 ^d	0,55-0,65 ^f	0,26 ^d
	Père - Fille	0,28 ^d	0,33 ^d	?	0,19 ^d
Elasticité	Revenus Père - Fils	0,36 ^d	0,20 ^d	0,4-0,6 ^f 0,4 ^g	0,14 ^d
Intergénérationnelle	Père - Fille	0,16 ^d	0,14 ^d	0,3 ^g	0,10 ^d

^a : Björklund et al. (2002) [26]^b : Björklund and Salvanes (2010) [118]^c : Hertz et al. (2007) [80]^d : Jäntti et al. (2006) [88]^e : Lecavelier and Lefranc (2018) [95]^f : Lefranc (2018) [96]^g : Lefranc and Trannoy (2005) [97]

Concernant l'éducation, c'est le Royaume-Uni qui semble le pays le plus mobile selon l'élasticité intergénérationnelle ; mais si l'on considère la corrélation intergénérationnelle, c'est la Suède qui est tête. Cela suggère une différence de ratio $\frac{\sigma_{YC}}{\sigma_{YP}}$ entre ces deux pays, révélant une évolution différente des inégalités au sein des deux générations dans ces deux pays.

Concernant les salaires, la persistance entre un père et sa fille est plus faible qu'entre un père et son fils dans la plupart des pays, ce qui peut être dû aux rôles genrés présents dans la population. Selon les résultats de Jäntti et al. (2006) [88], le pays le plus mobile est la Suède, et ce, peu importe l'indicateur utilisé, suivi du Royaume-Uni ; les Etats-Unis apparaissent toujours comme le pays le moins mobile. La France n'apparaît pas non plus très mobile. Cependant, les données et la méthode utilisée ne sont pas forcément comparables entre les différentes études. Si l'on compare ces estimations à celles de Björklund et Jäntti (1997) [23] qui utilisent la même méthode que Lefranc et Trannoy (2005) [97], la France apparaît comme plus mobile que les Etats-Unis (0,58), et moins mobile que la Suède (0,28).

En comparant les différentes politiques familiales et les indicateurs de mobilité intergénérationnelle, il apparaît que le pays qui investit le moins dans les politiques familiales, les Etats-Unis est aussi celui qui a le niveau d'inégalités d'opportunité le plus élevé. Les inégalités sont moins élevées en Suède et au Royaume-Uni. Si trois indicateurs ne suffisent pas à donner de véritables conclusions, cela suggère néanmoins que le financement des crèches et de la petite enfance, associée à des congés parentaux plus élevés et une politique fiscale progressive permet de contenir les inégalités d'opportunités. Une politique familiale ciblée sur les familles pauvres, comme au Royaume-Uni, semble néanmoins permettre de contenir les inégalités d'opportunité en terme d'éducation. Néanmoins, ces politiques familiales permettent-elles de contenir l'effet de la structure familiale sur le capital humain de l'individu ? Cette thèse vise à estimer l'effet de la séparation parentale et de la taille de la famille sur le capital humain des enfants.

4 Contributions de la thèse

Les contributions de cette thèse sont de trois ordres.

Tout d'abord, cette thèse vise à éclairer la compréhension des déterminants du développement non-cognitif des enfants, notamment leur développement socio-émotionnel. Si l'importance des capacités cognitives sur la réalisation individuelle est depuis longtemps reconnue, des études récentes montrent que les capacités non-cognitives jouent également un rôle important. Cependant, nous ne savons que peu de choses quant à leur formation.

Cette thèse étudie cette question, notamment en s'intéressant à l'influence de la structure familiale.

Deuxièmement, tandis que la littérature théorique a toujours discuté de l'importance du temps passé avec les parents pour le développement de l'enfant, il existe peu d'études empiriques sur le sujet. Cette thèse propose de considérer les temps parentaux comme un déterminant du capital humain de l'enfant, en considérant le capital cognitif et non-cognitif de l'enfant. De plus, nous considérons également le temps passé avec le père et avec les deux parents comme des facteurs à part entière, encore très peu explorés. Nous proposons de considérer l'hétérogénéité entre les différents temps parentaux : passer du temps avec ses deux parents a-t-il le même effet que passer du temps avec un seul de ses parents ? A notre connaissance, c'est la première étude à analyser cette question.

Cela nous permet d'explorer sous un nouvel angle les mécanismes expliquant les effets de la structure familiale. Les ajustements du temps passé avec chacun des parents sont ainsi envisagés comme un canal de transmission de l'effet de la séparation parentale. Ils sont également considérés comme vecteur possible de l'effet de la taille de la famille.

Le reste de la section s'organise de la façon suivante : nous présentons d'abord les bases de données utilisées dans cette thèse, ainsi que les difficultés rencontrées et les solutions apportées ; nous donnons ensuite un aperçu des contributions et résultats de chaque chapitre.

4.1 Méthode et données

4.1.1 Bases de données et mesures du capital humain

Les données

Cette thèse utilise des données françaises, américaines, et britanniques de deux types différents : des données rétrospectives et des données longitudinales. Les données rétrospectives françaises nous permettent d'étudier l'effet de la structure familiale sur la réussite scolaire et professionnelle des individus à l'âge adulte, tandis que les données longitudinales renseignent de façon plus détaillée les conditions sociales et la situation familiale pendant l'enfance.

Les données de l'INSEE "Formation et Qualification Professionnelle" sont utilisées dans le premier chapitre. Il s'agit de données transversales qui offrent un échantillon représentatif de la population âgée entre 18 et 65 ans qui vit en France au moment de l'enquête. Nous utilisons les deux dernières vagues, ayant lieu en 2003 et 2014. Nous utilisons ces données pour la précision de l'information renseignée pour un frère ou une sœur de l'individu, nécessaire pour la méthode que nous utilisons. Ces données offrent

également des informations détaillées sur les conditions sociales pendant l'enfance, et notamment nous pouvons savoir si les parents de l'individu se sont séparés et à quelle date.

Dans les deux chapitres suivants, nous utilisons des données longitudinales, comportant un ensemble très riche d'informations sur l'enfant. Le chapitre 2 utilise ainsi les données américaines *Child Development Supplement - Panel Study of Income Dynamics (CDS-PSID)*. 2650 enfants sont interviewés en 1997, et suivis en 2002 et 2007. Ces données offrent ainsi l'occasion de regarder en détail l'allocation du temps de l'enfant, collectées par la méthode du "carnet". Les enfants doivent ainsi renseigner l'organisation de leur temps pour deux journées entières, l'une en semaine, l'autre le week-end, en indiquant l'activité, le lieu, la durée, et qui était présent ou faisait l'activité avec eux. Cela nous permet de distinguer le temps de présence du parent, du temps qu'il passe à réaliser une activité avec l'enfant. Il n'existe que deux bases de données de la sorte dans le monde, il s'agit de celle que nous utilisons et de la base de données australiennes *Longitudinal Survey on Australian Children (LSAC)*. Cependant, la base de données australiennes ne fait pas de distinction entre le temps passé avec le parent et le beau-parent, une information clé pour mener à bien l'étude réalisée dans le Chapitre 2. La base de données *Child Development Supplement - Panel Study of Income Dynamics (CDS-PSID)* a aussi l'avantage de renseigner le développement cognitif et non-cognitif de l'enfant.

La dernière base de données utilisée est une base de données britanniques *Millennium Cohort Study*, elle rassemble des données très détaillées sur 20 000 enfants, telles que leur développement cognitif, non-cognitif, leur milieu familial et social.

Mesurer le capital humain

Dans le premier chapitre, nous considérons la réussite scolaire et professionnelle des individus comme une mesure indirecte du capital humain. Nous prenons deux mesures de l'éducation : le nombre d'années d'étude et le rendement scolaire, c'est-à-dire le salaire supplémentaire que l'on obtient en ayant eu un certain diplôme, comparé à quelqu'un qui n'a pas de diplôme. Cette dernière mesure rend compte de la qualité du diplôme, ainsi, les diplômes issus des "Grandes Ecoles" sont mieux évalués selon cette échelle que selon le nombre d'années d'étude. La réussite professionnelle est mesurée à partir du salaire moyen à diplôme et profession donnés.

Dans les deux chapitres suivants, nous considérons la formation du capital humain pendant l'enfance en nous intéressant aux capacités non-cognitives ainsi qu'aux capacités cognitives dans le second chapitre. Comme mentionné précédemment, des études récentes ont montré l'importance des capacités non-cognitives sur la réussite individuelle. Les me-

sures des capacités non-cognitives sont collectées à partir d'un questionnaire auprès du responsable principal de l'enfant, cela peut donc être sujet à des erreurs de mesure, mais les modèles utilisés permettent de les traiter. Le développement non-cognitif de l'enfant est mesuré par le *Behaviour Problem Index (BPI)* "Indice de Problèmes Comportementaux" dans la base de données américaines et par le *Strength and Difficulties Questionnaire (SDQ)* "Questionnaire de Forces et de Difficultés" dans la base de données britanniques. Ces deux mesures peuvent se décomposer en une mesure du développement comportemental et une mesure du développement émotionnel.

Dans le chapitre 2, nous regardons également le développement cognitif, à partir des tests *Woodcock Johnson Revised Tests of Achievements (WJ-R)*. Le questionnaire part de la question la plus facile jusqu'à la plus difficile, cela évite d'avoir des mesures délimitées par un score maximum. Les capacités en lecture sont mesurées par un test d'identification de lettre et de mot, disponible à partir de 3 ans et d'un test de compréhension de texte, disponible à partir de 6 ans. Les capacités en mathématiques sont mesurées par un test de problèmes appliqués, disponible à partir de 3 ans. Nous utilisons les résultats standardisés sur la moyenne nationale par âge.

4.1.2 Difficultés rencontrées et méthodes employées

La première difficulté rencontrée dans cette thèse tient à l'estimation de l'effet de la structure familiale sur le développement de l'enfant. En effet, la structure familiale est potentiellement une variable endogène, c'est-à-dire une variable corrélée à des variables inobservées qui sont elles-mêmes susceptibles d'influencer le capital humain de l'individu, même en l'absence de changement dans la structure familiale.

Le principal exemple d'endogénéité de la séparation parentale est sa corrélation avec le conflit parental, qui agit probablement sur le capital humain de l'individu, même en l'absence de séparation. Que se passe-t-il en cas de non-séparation pour des enfants qui doivent rester dans une famille conflictuelle? Le risque ici est de mesurer un effet de la séparation parentale qui ne refléterait que l'effet du conflit parental. Les informations sur les frères et sœurs disponibles dans la base "Formation et Qualification Professionnelle" de l'INSEE, nous permettent d'utiliser un modèle à effet fixe familial, c'est-à-dire de contrôler pour toutes les variables, observées ou non, communes aux frères et sœurs. Ainsi il est possible de raisonner, toutes variables familiales égales par ailleurs. Dans le second chapitre, ce sont les observations répétées pour chaque individu qui nous permettent de pallier à l'endogénéité de la séparation parentale. En effet, nous pouvons ainsi utiliser un modèle à effet fixe individuel qui élimine toute l'endogénéité liée aux variables omises qui sont fixes dans le temps.

Par ailleurs, les décisions de fertilité sont aussi très surement corrélées à des caractéris-

tiques inobservées des parents. Si la thèse d'Ariès, mentionnée précédemment, est vraie à l'échelle individuelle, cela voudrait dire que ceux qui font le choix d'avoir moins d'enfants font le choix d'avoir de meilleures relations avec chacun d'eux. On peut également penser que seuls ceux qui bénéficient d'un contexte favorable (meilleure santé émotionnelle, meilleure situation professionnelle...) et sont heureux décident d'avoir d'autres enfants. Là encore, si nous ne prenons pas en compte cette endogénéité, nous risquons de mesurer un effet qui n'est pas celui du nombre de frères et sœurs, mais le reflet d'autres variables inobservées. Dans le troisième chapitre¹¹, pour pallier à ce problème, nous instrumentons les décisions de fertilité par le sexe des deux premiers enfants, exploitant la préférence des parents pour avoir des enfants de sexes différents. Cela permet de mesurer l'effet d'avoir un petit frère ou une petite sœur en exploitant une source exogène de la taille de la famille.

La seconde difficulté rencontrée dans cette thèse tient à l'estimation des fonctions de production des capacités cognitives et non-cognitives puisque nous ne pouvons pas observer toutes les capacités de l'enfant. Là encore, ce peut être une source d'endogénéité. Pour pallier à ce problème, nous utilisons un modèle de valeur ajoutée qui contrôle pour les capacités à la période précédente, cela permet de capturer les capacités non observées. Un modèle à effet fixe individuel permet également de résoudre ce problème. Cependant, ces modèles reposent sur l'hypothèse que les fonctions de production des capacités cognitives et non-cognitives sont les mêmes quelque soit l'âge de l'enfant. Cette hypothèse est relâchée dans un modèle cumulatif de valeur ajoutée qui prend en compte les déterminants passés des capacités cognitives et non-cognitives. Enfin, il est possible que les enfants avec des facilités apprennent également plus vite; dans ce cas, la vitesse d'apprentissage de l'enfant risque d'être corrélée avec les investissements considérés dans la fonction de production (comme le temps passé avec les parents). Par exemple, il est possible que les parents qui observent que leur enfant apprend plus vite se désinvestissent de son éducation s'ils jugent qu'il n'en a pas besoin; réciproquement, les parents observant que l'apprentissage de leur enfant a tendance à ralentir s'investiraient davantage. C'est ce que Del Bono et al. (2016) [55] appellent des "effets retours". Un modèle de méthode généralisée des moments (*Generalized Method of Moments - GMM*) permet de rendre compte de ces "effets retours".

Une troisième difficulté rencontrée tient à la mesure du développement non-cognitif, renseignée par le responsable principal de l'enfant. Ces mesures pourraient être sujettes à une erreur de mesure tenant à la subjectivité du parent, et par conséquent être endogènes. Un modèle à effet fixe individuel ou un modèle à valeur ajoutée permet de prendre en

¹¹Ce chapitre est basé sur un travail co-écrit avec Simon Briole et Anthony Lepinteur

compte ce biais de mesure s'il est constant dans le temps. Dans le Chapitre 3¹², nous contrôlons pour le développement initial de l'enfant afin de capturer cette potentielle erreur de mesure.

Le reste de cette partie dresse un aperçu de chaque chapitre.

4.2 Chapitre 1 : Age à la séparation parentale et réussite professionnelle des individus.

Ce premier chapitre s'intéresse à l'effet de la séparation parentale sur le développement de l'enfant. Nous considérons trois mesures de la réussite de l'individu : le nombre d'années d'étude, le rendement scolaire, c'est-à-dire le gain moyen de salaire associé à chaque diplôme relativement à ne pas avoir de diplôme, et la position sociale mesurée par le salaire moyen pour une profession et un niveau d'étude donnés. A partir des données "Formation et Qualification Professionnelle" de l'INSEE, nous exploitons la différence d'âge de chacun des frères et sœurs au moment de la séparation de leurs parents. Cela permet de rendre compte de la sélection des familles séparées. Les résultats suggèrent que les individus dont les parents se séparent font en moyenne un semestre d'étude en moins, ont également des diplômes associés à des salaires plus faibles, et des positions sociales associés à un salaire de 4% à 9% moins élevé que les individus dont les parents sont encore ensemble. Ces effets demeurent significatifs et négatifs lorsque les variables communes aux frères et sœurs sont contrôlées.

La contribution de ce chapitre tient à l'analyse d'hétérogénéité de la séparation parentale à travers différents groupes. Les résultats suggèrent que la séparation parentale a des effets plus importants sur l'éducation des garçons. Lorsque l'effet fixe familial est contrôlé, les individus avec des mères avec un niveau d'étude moins important apparaissent comme les plus affectés par la séparation parentale. Ces mères peuvent être plus vulnérables, si la société est homogame, leurs pères sont également plus à même d'être pauvres et de ne pas payer leurs pensions alimentaires. Les individus avec des beaux-parents sont aussi plus affectés, cependant, il n'est pas possible de contrôler pour un effet fixe famille dans ce cas. Nous ne trouvons pas d'effet de la garde alternée, cependant elle était très peu développée pour ces cohortes. L'étude ne révèle aucun effet de stigmatisation.

Ces effets négatifs, en dépit des politiques familiales françaises visant les familles monoparentales nous conduisent à considérer le temps passé avec les parents comme l'un des mécanismes à l'œuvre. C'est ce que nous considérons dans le chapitre 2.

¹²Ce chapitre est basé sur un travail co-écrit avec Simon Briole et Anthony Lepinteur

4.3 Chapitre 2 : Les temps parentaux, vecteurs de l'effet de la séparation parentale sur le développement de l'enfant

Plusieurs études montrent un effet négatif de la séparation parentale sur le capital humain de l'individu. Pourtant, les mécanismes de cet effet demeurent encore peu explorés. Ce chapitre se concentre sur les temps parentaux comme mécanisme de transmission de l'effet de la séparation parentale sur le capital humain de l'individu.

Premièrement, nous étudions l'effet de la séparation parentale sur l'allocation du temps de l'enfant et le temps passé avec ses parents. A cause de données limitées, les études passées n'ont pu étudier que le temps passé avec la mère, omettant ainsi deux composantes clés : le temps passé avec le père, et le temps avec les deux parents. Le *Child Development Supplement - PSID* nous permet de pallier à cette lacune. De plus, en utilisant un effet fixe individuel, nous pouvons contourner le problème de sélection dû à des variables fixes dans le temps. Nous trouvons qu'être dans une famille monoparentale (avec sa mère) conduit à une baisse de 30% d'un écart-type du temps passé avec au moins un parent *présent*. Toutes les activités, sauf les loisirs actifs, sont concernées. Le temps passé avec le parent non gardien et le temps passé avec les deux parents est largement affecté, malgré une compensation du parent gardien. Cette baisse du temps passé avec au moins un parent *présent* ne se traduit en revanche pas par une baisse du temps passé avec un parent *impliqué* dans l'activité.

Deuxièmement, nous nous demandons si cela a un effet sur le développement de l'enfant. En utilisant un modèle à valeur ajoutée, les résultats suggèrent que le temps passé avec les deux parents ou avec le père a un effet différent de celui passé avec la mère. En utilisant un modèle généralisé de la méthode des moments (*Generalized Method of Moments GMM*), les résultats suggèrent l'existence d' "effets retours", cela signifie que les parents adaptent le temps passé avec l'enfant à sa vitesse d'apprentissage. Les différences d'effets entre les temps parentaux sont encore plus évidentes dans ce modèle. C'est à notre connaissance, la première étude à mettre en lumière l'hétérogénéité des temps parentaux sur le développement de l'enfant.

Enfin, cela nous permet d'explorer les mécanismes de l'effet de la séparation parentale. Nous trouvons que 30% de l'effet de la séparation parentale sur le développement non-cognitif est expliqué par la baisse du temps passé avec au moins un parent. Le changement de la composition des temps parentaux ne semble en revanche pas être un mécanisme en jeu.

Jusqu'ici nous n'avons considéré qu'un seul aspect de la structure familiale : le nombre de parents vivant avec l'enfant. Dans la partie suivante, nous considérons le nombre de frères et sœurs.

4.4 Chapitre 3 : Les effets d’avoir un petit frère ou une petite soeur sur le développement non-cognitif des enfants

Ce chapitre est basé sur un travail co-écrit avec Simon Briole et Anthony Lepinteur.

Dans ce chapitre, nous montrons de nouveaux résultats sur l’effet de la taille de famille sur le développement non-cognitif de l’enfant. Pour prendre en compte l’endogénéité des décisions de fertilité, nous appliquons une méthode instrumentale bien connue qui s’appuie sur la préférence des parents pour avoir deux enfants de sexe différent. Ainsi, les parents ayant deux filles ou deux garçons sont plus susceptibles d’avoir un troisième enfant. En utilisant des données britanniques, nous montrons la validité de notre instrument : les familles qui ont deux enfants de même sexe ne diffèrent en rien des familles qui ont deux enfants de sexe opposé au début de l’enquête. De plus, nous ne trouvons aucun effet direct de vivre avec un enfant de même sexe, être dans une fratrie du même sexe n’affecte pas l’enfant par un autre moyen que la taille de la famille.

Nous montrons qu’avoir un frère ou une soeur affecte négativement le développement non-cognitif de l’enfant. En faisant une analyse de l’hétérogénéité de l’effet, nous montrons l’existence de période “sensibles” voire “cruciales” pour le développement de l’enfant ; en effet, avoir un frère ou une soeur n’a d’effet qu’avant 5 ans. Aînés et cadets sont affectés de la même façon. Un résultat intéressant est la différence de l’effet selon le genre. En effet, l’effet moyen masque un effet beaucoup plus important chez les filles, tandis que les garçons ne sont aucunement affectés.

Nous étudions deux mécanismes potentiels pour expliquer cet effet genré : le temps passé avec les parents, et le temps passé à exécuter des tâches ménagères. Il apparaît que les parents ont tendance à passer plus de temps avec les garçons suite à l’arrivée d’un troisième enfant, tandis que le temps passé avec les filles reste inchangé. Par ailleurs, l’arrivée d’un troisième enfant augmente le temps que les filles passent à faire des tâches ménagères, tandis que cela n’a pas d’effet sur les garçons. Cela peut être dû au fait que l’arrivée d’un enfant augmenterait la répartition genrée des tâches entre les parents, et cela se transmettrait à l’échelle de l’enfant. Bien que ces effets ne soient pas significatifs, ils sont une piste intéressante pour expliquer cet effet genré de l’arrivée d’un troisième enfant. Enfin, cet effet paraît persister dans le temps, même trois périodes après l’arrivée d’un troisième enfant.

General introduction

Spence, laureate of the 2001 Nobel Memorial Prize in Economic Sciences, does not hesitate to qualify as toxic the inequalities based on “successful rent seeking and privileged access to resources and market opportunities [...] with respect to social cohesion and stability”¹³. In his book *A theory of justice* (1971) [113], Rawls has pointed out that justice should ensure opportunity equality. Besides being unfair, inequalities are highly inefficient. Indeed, if the access to good positions is limited by economic, social or cultural resources, individual’s family background is more likely to determine their position, no matter their talent. During an interview at CNBC, Warren Buffet summarizes this inefficiency quite well: “I don’t think we should have our Olympic team 20 years from now be the eldest sons of the Olympic team currently”. What seems unacceptable and highly inefficient for sports is however largely spread in the society: at least 40 to 60% of the variation in years of schooling is attributable to family and community background (Björklund and Salvanes (2010) [118]), and about 20 to 45% (Björklund et al. (2002) [26]) of the variation of earnings.

What can explain such large shares in societies where privileges are abolished for centuries? Social researchers seek to understand how family background affects individual outcomes. If the effect of parents’ education or earnings on individuals’ achievement has been widely studied, much less is known about the effect of family structure. Family has known great transformations in the last decades. On one hand, fertility rates have decreased in a large number of OECD countries. On the other hand, the number of separations has increased sharply in a large number of OECD countries since the 1970’s. This thesis asks whether these changes of family structure affect child’s human capital.

In the present introduction, I first define human capital and analyze its determinants, explaining how family structure is one of those. Second, I present the new forms of family and its origins. The third part discusses why inequalities generated by family structure should be considered as unfair, I also give an overview of existing family policies and opportunity inequalities in the three countries studied in this thesis: France, the United Kingdom, the United States, along with Sweden for a Scandinavian benchmark. Finally, I give an overview of the thesis and its contributions.

¹³Spence, “Good and Bad Inequalities”, *Project Syndicate*, 2014.

1. Human Capital, its production function and inputs

1.1. Human Capital, a useful but controversial concept

Human capital is defined as a large set of skills and abilities of different kinds: cognitive skills, non-cognitive skills or health. For Becker (1962) [12], one of the pioneers of this theory, individuals or their parents invest in money or time, to increase their human capital. This investment is rational and analogue to the firm investment, following a production function. A higher human capital induces in a higher productivity, resulting in higher earnings. This analogy with tangible capital has the advantage to shed light on the accumulation process of individuals' skills, explaining the efficiency of childhood investments (Cunha and Heckman (2007) [47]). It also enables to account for the depreciation of individual's skills: typically, earnings increase with age at a decreasing rate. Nevertheless, considering investments as rational decisions is highly controversial, the opponents of this theory pointed out the absence of social reproduction (Bowles and Gintis 1975 [70]): investment is not only rational but determined by social background. The human capital theory now embodies this critic, and considers all kinds of inputs, admitting they could be socially determined.

1.2. Measuring Human Capital

The quantity of individual's human capital is difficult to measure. Researchers in Social Sciences have long studied labour market outcomes as an indirect measure of human capital, in particular, individual's permanent earnings and their educational attainment. Individual's permanent earnings are generally proxied by the average earnings received on a subsequent number of years. Aiming to estimate their production function, Economists have long recognized the importance of cognitive skills in the determination of labour market outcomes, but more recently, they draw attention to the influence of non-cognitive skills, now considered as at least as much important as cognitive skills. According to Linqvist and Vestman (2011) [99], one standard deviation increase in non-cognitive abilities predicts an increase in wages by 6,9%, and they have a higher return than cognitive skills for unskilled workers and managers. Nevertheless, there is still scarce evidence on their determinants.

1.3. Determinants of Human Capital

Social researchers consider a large diversity of determinants of individual's human capital. We retain here three main categories: school, peer effects, and family background. While we would expect a universal school for all children, several studies highlight disparities, coming from differences in teachers' resources (Rockoff 2004 [115], Hanushek and Rivkin 2010 [77], Chetty et al. (2014) [40], Flèche [63]) or financial resources (size class Piketty 2004 [110]). Family background encompasses parents' economic resources, social resources or cultural resources, to follow Bourdieu's classification. Peers effects are also likely to play a large role through the neighbourhood (Goux and Maurin (2007) [73]), and at schools (Hoxby 2000 [82]).

In this Thesis, I focus on family resources. In particular, I investigate the effect of family structure on individuals' human capital regarding parental separation and the number of siblings. Changes in family structure can be seen as a shock on family resources. On one hand, if parents' resources are divided among all the children, an increase in the number of children induces a lower amount of resources for each child, resulting in a lower investment in the child's human capital (See Becker 1994 [14]). On the other hand, parental separation might also be an economic shock for the individuals' parents. By separating, the couple loses all the gains from marriage such as production and consumption complementarity, they have to duplicate all their goods (two houses, two cars, two washing machines). They may have less economic resources to invest in child's human capital. Besides, the custodial parent, to offset the loss of one wage, might increase their working hours and may have less time to look after their child (See Becker et al. 1976 [15], Becker and Tomes 1979 [17], 1994 [14]).

In the last decades, family has known great transformations that have been likely to affect parents' resources: family size has decreased, while parental separation has increased. I present these major transformations in the next section.

2. The new forms of family, and their origins

2.1. Family structure and its transformations over time

The debates and protests around the gay marriage in France in 2013 showed that there is no consensus on the definition of family. For some, family is "natural", constituted by one woman and one man who get married. For others, marriage is not a necessary starting point, and the sex difference is not an element of the family (De Singly 2017 [53]). In laws, the most common definition of family is a group of people who live in the same household, and who are related by their ancestors or a marriage. The structure characterizes the

system of relations between different elements or individuals. Family structure is therefore defined as the number of members and the relations linking them to each other. Family structure has known two main transformations in the last decades.

First, most of OECD countries achieved the Stage 3 of the demographic transition. The number of children per woman has decreased, inducing a decrease in family size. Second, the family considered as “natural” has declined giving way to the emergence of new forms of family¹⁴, such as the mono-parental families and blended. The number of children who were living with only one of their parents has sharply increased, going from 13% in 1968 to 25% in 2017 in the United States¹⁵, and from 8% in 1990 to 21% in 2009 in France¹⁶. The next section explains the origins of these great transformations.

2.2. Origins of the contemporaneous family

In his book *Sociologie de la Famille Contemporaine*¹⁷ (2017), François De Singly [53] analyses the emergence of the new forms of family. According to him, the contemporaneous family is based on the importance of relations, emotions and affection among family members.

First, there is a higher desire of good relations between parents and children. For Philippe Ariès, historian, the decrease in the number of births is due to objective conditions such as the decrease in infant mortality, but also to the new and growing importance given to the child. The decreasing family size reflects both the need for parents to concentrate their investments and their desire of better relations (Ariès 1960 [9]). We also find this idea in Gary Becker’s work emphasizing a quality/quantity trade-off (Becker and Tomes 1976 [15]).

Second, there is also an increasing importance of love in the marriage, which could, paradoxically, be the origin of the increase in separations. In his book *Love in the Western World* (1939) [51], Denis de Rougemont writes:

“Where, then, a couple have married in obedience to a romance, it is natural that the first time a conflict of temperament or of taste becomes manifest the parties should ask themselves: ‘Why did I marry?’ And it is no less natural that, obsessed by the universal propaganda in favour of romance, each should

¹⁴Anthropologists do not agree with this evolution theory of family structures. Lallemand (1993) [92] declares that blended families have always existed in other cultures and societies. In the preface of *Histoire de la famille (Tome I)* (1986) [101], Claude Lévi-Strauss defends the idea that every modality of the family institution has already been seen. (François De Singly 2017 [53])

¹⁵Source: Pew Research Center analysis of Current Population Survey March Supplement

¹⁶Source: Chardon et al., 2008 [39]

¹⁷Sociology of contemporaneous family

seize the first occasion to fall in love with somebody else. And thereupon it is perfectly logical to decide to divorce, so as to obtain from the new love, which demands a fresh marriage, a new promise of happiness – all three words, ‘marriage’, ‘love’, ‘happiness’ being synonyms ” ¹⁸

François de Singly (1992) [52] mocks the “chaos” of contemporaneous families pictured in the media, and defends the idea that it is due to the increasing importance of the feeling of love; reminding that the free choice and the possibility of separation are two necessary conditions to the couple formation.

The transformation of family comes also from the feminist movement and women liberation. The participation of women to the labour force has increased, as they claim the right to define themselves otherwise than as a spouse or a mother. Women become more independent; such as they are now able to separate if they want to. This increase in women independency might also explain the decrease in fertility rate. Women who are more highly educated have a better access to birth control. Moreover, since their place increases in the Labour market, their opportunity cost of having a child increases (Berrington 2004 [20]). Let’s now look more precisely at the facts.

2.3. The great transformations of the family: Stylized facts

The first fact is the decrease in fertility rates in a large number of the OECD countries. Here we mainly focus on the three countries studied in this thesis: France, the United States, the United Kingdom, and as a benchmark for Scandinavian countries we include Sweden. Figure 1 shows the fertility rates for these four countries, from 1970 to nowadays. We observe a sharp decrease until the end of the 1980’s in the four countries of interest. In the United States, the United Kingdom and France, the fertility rate goes down from 2,5 in 1970 to 1,8 in 2017. It increases in the early 1990’s in the United States and in the early 2000’s in France and the United Kingdom without recovering the rate of the beginning of the period. Sweden acts differently, showing some cycles in the fertility.

The second fact is the increase in divorces and separation. Figure 2 shows the crude divorce rate (divorces per 1000 people) in the four countries of interest, from mid 1960’s to today. In the United Kingdom, the share of divorced people was about 0,7‰ in 1965, it is about 1,8‰ in 2016. On the same period in Sweden, it goes from 1,2‰ to 2,4‰ in 2016. We can see a continuous increase until the beginning of the 1980’s, and then it stabilizes. For France and the United States, the data are available only from the

¹⁸Cited by François De Singly, 2017 [53]

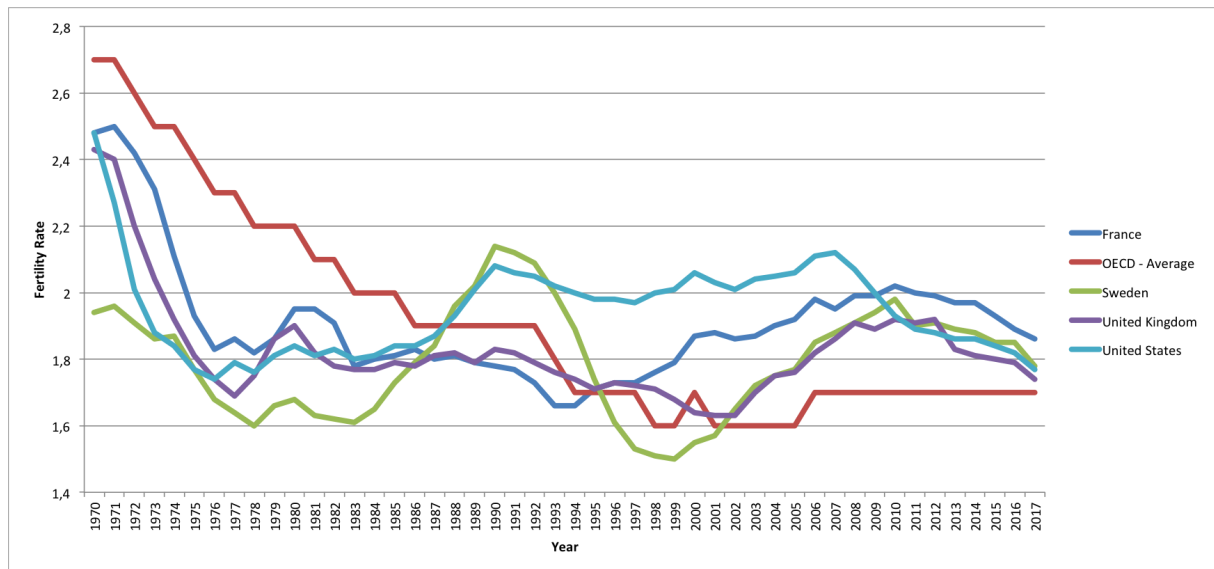


Figure 1 – Fertility rates in France, the United States, the United Kingdom and Sweden

1990's. Of course, this crude rate does not take into account the simultaneous decrease in marriage rates.

More interesting is the increasing share of children who live in a single-parent family. Since the data on OECD or Eurostat are only available from 2004, we focus here on France and compute the share of individuals whose parents are separated for each cohort from retrospective data of the Survey “Formation et Qualification Professionnelle” of INSEE (“Education-Training Employment”), we use the 2003 and 2014 waves. In Figure 3, we can see that among individuals born in 1946, 4% have separated parents at the date of the survey; it reaches the threshold of 10% for individuals born in 1970, due to a large increase for the cohorts born in 1965. This cohort might have parents who were able to benefit from the 1975 law that eased the divorce procedure. 15% of individuals born in 1980 have their parents separated at the date of the survey.

This section has highlighted the major changes in family structure in the last decades. As mentioned before, a change in Family structure (parental separation or a new sibling) is likely to affect parents' resources, and therefore impact child's human capital. Besides, since it is independent from the individual's choice, it should be considered as a circumstance as defined by the Opportunity Equality theory, and therefore it should be compensated. The next section presents the opportunity equality theory with an emphasis on family structure.

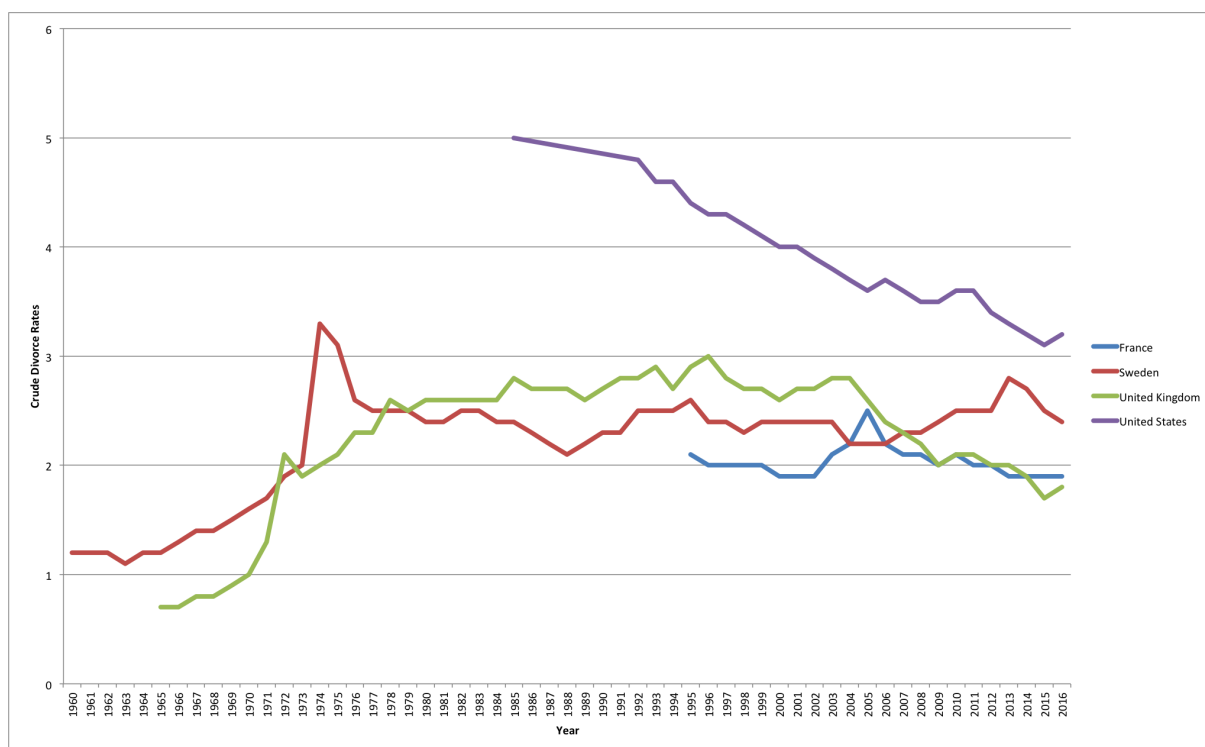


Figure 2 – Crude divorce rates in France, the United States, the United Kingdom and Sweden

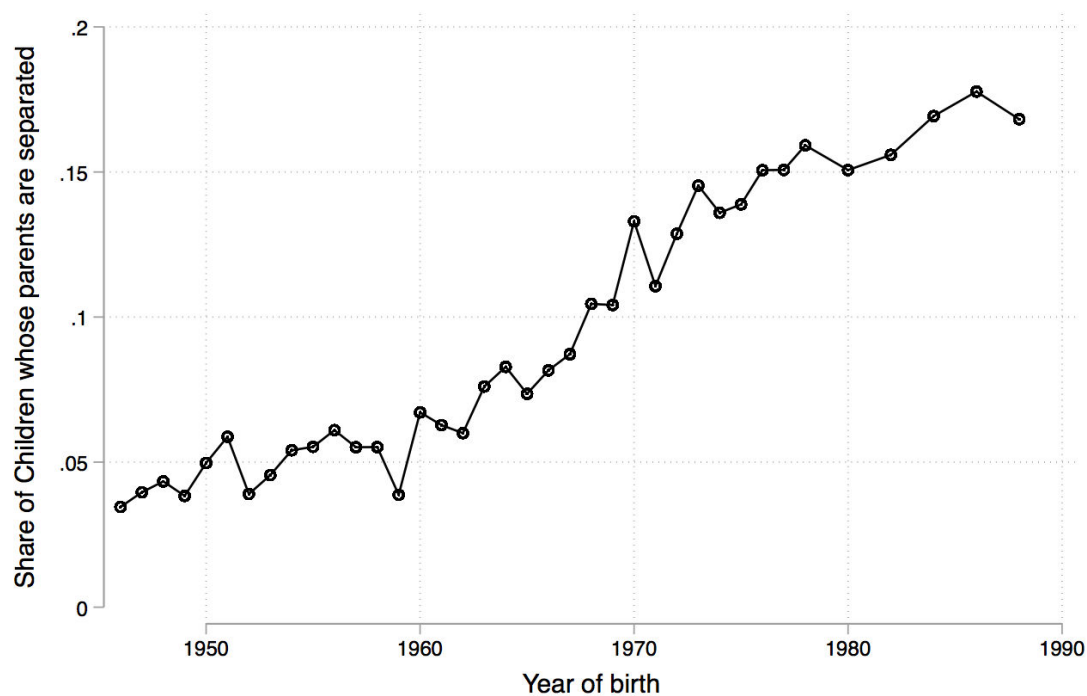


Figure 3 – Share of Children whose parents are separated in France

3. Family Structure from the Perspective of Opportunity Equality Theory

3.1. Opportunity Equality Theory, Responsibility and Family Structure

Rawls is one of the first authors to ask about acceptable and unacceptable inequalities. He declares that the principles of justice should ensure that no one should be “advantaged or disadvantaged [...] by the outcome of natural chance or the contingency of social circumstances” (Rawls 1971 [113]). Dworkin (1981) [57] [58] tackles this view, by underlining that individuals should not receive a compensation for something they are responsible for, such as their preferences. Instead, he argues for the equality of resources, including physical and biological environment. Roemer (1993) [116] defends the principle according to which equality of opportunity holds if individuals who exercise a comparable degree of responsibility have the same outcomes, regardless of their circumstances. Formalizing this idea, he distinguishes between two types of inputs: those for which the individual is hold responsible (effort), and those for which the individual is not (circumstances). The first one should not be compensated following the natural reward principle, while the second should be compensated following the compensation principle¹⁹.

If we apply this theory to family structure, we could first think that individuals are responsible for their separation or their number of children. Nevertheless, this is not consensual since we may ask whether these decisions are partially determined by the social background. There is evidence of an intergenerational transmission of divorce (Traag et al. 2000 [127]); and of fertility decisions (Axinn et al. 1994 [11]). However, children cannot be made responsible for their number of siblings or their parents’ separation. Parental separation and the number of siblings should therefore be considered as circumstances, and thus, following the opportunity equality theory, the possible negative effect of the family structure on child’s outcomes should be compensated. The main difficulty of this compensation is to target children. Trannoy (2016) [128] discusses the possibility of vouchers targeting directly goods that foster child’s human capital, though this policy would be paternalistic.

The question of the child is central in many States. The United Nations Convention on the Rights of the Child (1989), ratified by a large number of Nations, requires the right

¹⁹See Roemer and Trannoy (2016) [117] for a detailed review of the literature of Opportunity Equality Theory

of the child to have a relationship with both parents, even if they are separated. States have a lot of tools available to curb opportunity inequalities. The next section compares the different family policies in four countries: France, United States, United Kingdom that are studied in the Thesis and Sweden for a Scandinavian point of comparison.

3.2. Family Policies in France, United States, United Kingdom and Sweden

Focusing on family policies, benefits and tax breaks for families is about 3,5% of the GDP in 2015 in France, the United Kingdom and Sweden, while this share is only about 1,12% in the United States²⁰. However, a same share might be allocated very differently across countries. Olivier Thévenon (2011) [124] distinguishes family policy patterns in OECD countries using a two principal component analysis. The first component relates to the support provided to working parents with children under the age of three; the second component relates on the length and generosity of the parental leave. Five groups of countries appear. The Scandinavian countries have large and generous parental leaves, with a strong support on early childhood (childcare). Anglo-saxon countries support poor families and single-parent families, but have short leave. Continental European countries (France, Luxembourg, Germany) amounts of spending for families are higher than the OECD average, but less targeted on low-income families. Conservatism is still important: one-earner families have lower taxes than two-household families, discouraging women employment²¹. Eastern Europe family policies are in transition, the cash benefits and childcare are still low but parental leave are long. Finally, Japan, Korea, Southern Europe have limited family policies.

Table 1 summarizes the different policies for the four main countries of interest. We can see that Sweden and France have much longer parental leave than the United Kingdom and the United States. Nevertheless, a missing and relevant piece of information here is the number of weeks actually taken by fathers, which is much smaller in France than in Sweden. Childcare is also more developed in these two countries, with a coverage of 30% of children aged 0-2 years. Preschool (for children aged 3-5 year-olds) is highly developed in France, Sweden and the United Kingdom, nearly 100% of children go to preschool, against 65,6% in the United States. The cost is however much lower in Sweden. In France and in the United Kingdom, single-parent benefit from a lower cost, compared to two-parents families.

²⁰OECD data 2015

²¹See also Stancanelli 2009 [123]

Table 1 – Family policies in France, Sweden, the United States and the United Kingdom.

	Sweden	France	United Kingdom	United States	OCDE
Paid Parental Leave 2016					
Lenght of paid paternity and parental leave in weeks	14	28	2	0	
Lenght of paid maternity and parental leave available to mothers in weeks	56	42	39	0	
Childcare 2016					
Average hours of attendance per week (for children aged 0–2 years)	30,2	33	18,3	29,5	
Childcare services coverage Share of children in childcare or preschool (0-2 year-olds):	46,5	56,7	31,5	28	
Out of pocket childcare for two-earner couple family	3,9	9,8	40,8	22,5	12,9
Out of pocket childcare costs for a single parent family	3,4	3,2	23,3	57,1	15,5
Preschool services coverage (for children aged 3–5 years)	96	100	100	65,6	

Looking at Figure 4, the top graph shows benefits tax breaks and the net income ²² for a couple in which each individual earns 20% of the average wage, and a single-parent earning also 20% of the average wage. The bottom graph shows the same statistics for people who earn the average wage. We can see that all countries have family policies to help poor families. People earning 20% of the average wage are better off in the United Kingdom, where they earn 60% of the average wage after tax and subsidies. France comes just after. Sweden and the United States are close, and two-earner couples are slightly better off than single-parent families. In the four countries, for people who earn 20% of the average wage, single-parent families are equally targeted compared to couple families. The pattern is much different if we look at individuals who earn 100% of the average wage. These people have a higher net income in the United States, due to low tax rates; whereas Swedish couple are the most taxed, their net income is 80% of their initial income. For this population, differences between couple and single-parent families show up. The largest difference is in Sweden and France, single parents are targeted such as their net income is around 88% of their initial income, the difference is smaller in France since two-earner couples are less taxed than in Sweden. In Anglo-saxon countries, single-parents do not benefit from lower tax rates or higher benefits.

²²The income after social assistance, cash housing benefits, family benefits, in work benefits, social contributions, income taxes or benefits

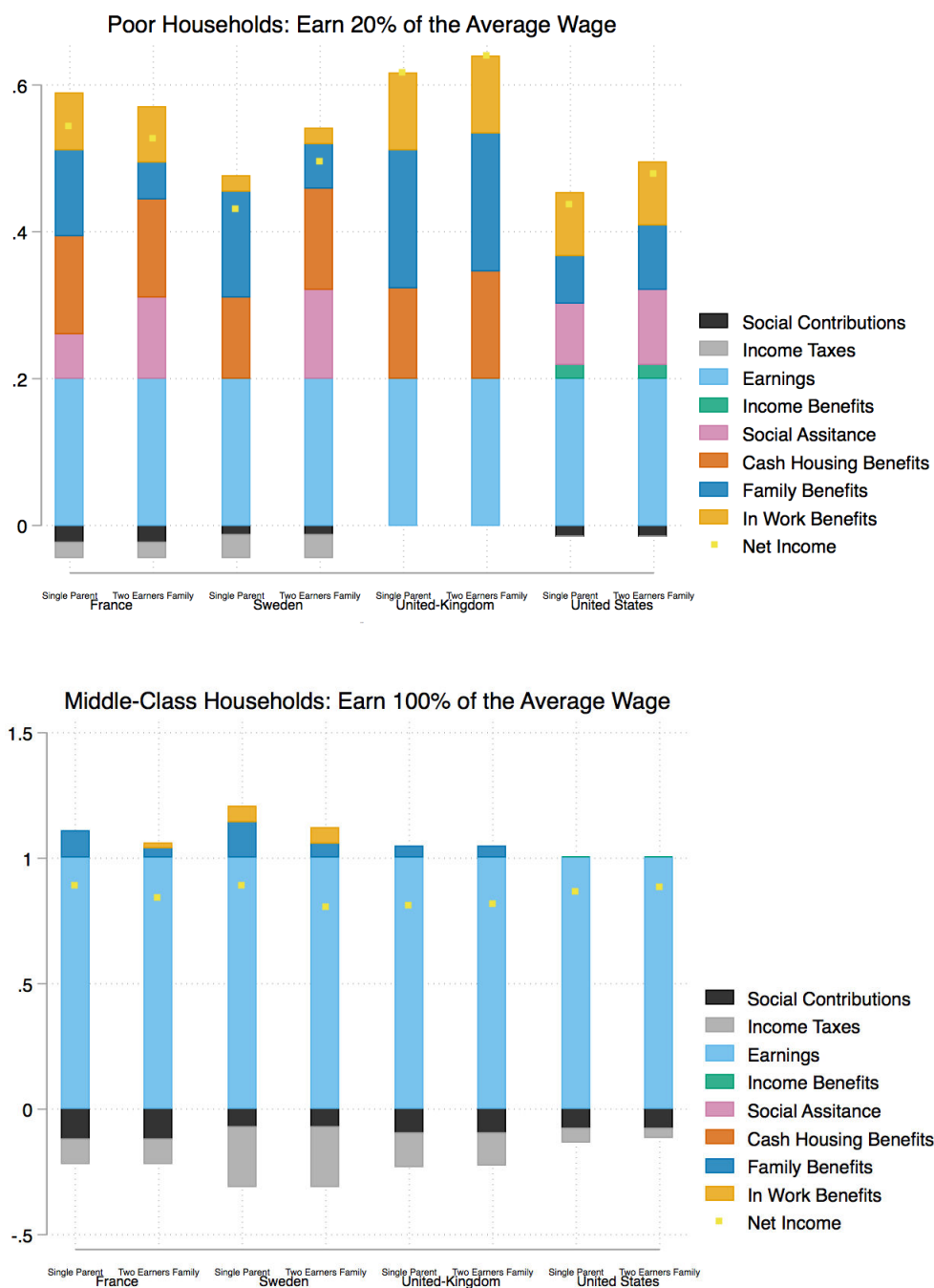


Figure 4 – Family Policies in France, Sweden, the United States and the United Kingdom, regarding the marital status.

To summarize, poor families are equally treated whatever their family status in the four countries, the United-Kingdom is the most generous with poor families. Looking at the population who earns the average wage, Sweden and France are the most generous with single-parent families. Single-parents do not benefit from lower tax rate or higher benefits in Anglo-Saxons countries, but from lower childcare costs in the United Kingdom. Early childhood is more targeted in France and Sweden, with larger subsidies on childcare. In the next section, we look at whether these different family policies result in differences in opportunity equality across countries.

3.3. Opportunity Equality across different countries

We look at three indicators of opportunity equality: siblings correlation, intergenerational correlation and intergenerational elasticity, for education and earnings.²³ We use the available information in the literature. Siblings correlation measures the share of the variation in earnings or education due to variables that are shared by siblings. Looking at education, the United States ranks last in term of opportunity equality, whereas France is the most equal country in terms of education. Looking at earnings, the pattern is different: Sweden is the most equal country, while the United States is still at the bottom, nearly followed by France. If France is an equal society in term of education, it does not result in a higher opportunity equality looking at earnings.

Intergenerational elasticity (IGE) is the degree of inheritance of economic, social or cultural advantages transmitted from the parents to their children. It measures the persistence in education and earnings across generations: between the father and his son, or his daughter, it is the β_1 estimated following this equation:

$$Y_i^C = \beta_0 + \beta_1 Y_i^P + \epsilon_i$$

where Y_i^C is the child's earnings, and Y_i^P is the parent's earnings. Intergenerational correlation (IGC) measures the share of inequalities among individuals that is inherited from their parents. It does not respond to changes in inequalities *within* a generation between two dates. The relation between Intergenerational Correlation (IGC) and Intergenerational Elasticity (IGE) is the following:

$$IGE(= \beta_1) = IGC \frac{\sigma_{Y^C}}{\sigma_{Y^P}}.$$

²³Of course, these indicators might also reflect genetic transmission, but siblings only share 50% of their genes, this is not an issue to compare the countries.

From this equation, we can see that if the level of inequalities within a generation increases (*i.e.* the ratio $\frac{\sigma_{YC}}{\sigma_{YP}}$), the intergenerational elasticity increases, whereas the intergenerational correlation is not affected by this change.

Table 2 – Overview of Opportunity Inequality Indicators

		United States	United Kingdom	France	Sweden
Siblings Correlation	Education	0,60 ^b	?	0,3 ^e	0,46-0,48 ^b
	Earnings	0,45 ^a	?	0,4 ^e	0,22 ^a
Intergenerational	Education	0,46 ^c	0,31 ^c	?	0,40 ^c
Correlation	Earnings Father - Son	0,52 ^d	0,31 ^d	0,55-0,65 ^f	0,26 ^d
	Father - Daughter	0,28 ^d	0,33 ^d	?	0,19 ^d
Intergenerational	Earnings Father - Son	0,36 ^d	0,20 ^d	0,4-0,6 ^f 0,4 ^g	0,14 ^d
Elasticity	Father - Daughter	0,16 ^d	0,14 ^d	0,3 ^g	0,10 ^d

^a : Björklund et al. (2002) [26]

^b : Björklund and Salvanes (2010) [118]

^c : Hertz et al. (2007) [80]

^d : Jäntti et al. (2006) [88]

^e : Lecavelier and Lefranc (2018) [95]

^f : Lefranc (2018) [96]

^g : Lefranc and Trannoy (2005) [97]

Looking at education, the United Kingdom is the most equal society according to the intergenerational elasticity, whereas Sweden is the most equal one according to the intergenerational correlation. This suggests differences in the ratio $\frac{\sigma_{YC}}{\sigma_{YP}}$ across these countries, meaning a different evolution of inequalities within the generations.

Looking at earnings, the persistence between fathers and daughters is lower than between fathers and sons in most countries, which might be due to gender-roles reproduction. Jäntti et al. (2006) [88] find that Sweden is the most mobile country, whatever the indicator, followed by the UK (except for daughters); on the opposite, the United States is the less mobile in terms of earnings. France seems to rank badly, suggesting a larger persistence of earnings across generations. However, datasets observing both parents and offsprings' earnings across periods in the same survey are not available in France. Lefranc (2018) [96] and Lefranc and Trannoy (2005) [97] use a two-sample instrumental variable method, which might not be comparable to Jäntti et al. (2006) [88] estimates based on large panel datasets where fathers' and offspring's earnings are observed several times. Björklund and Jäntti (1997) [23] using the same method as Lefranc and Trannoy (2005) [97], get estimates of intergenerational earnings elasticity around 0,52 for the United States and 0,28 for Sweden. Comparing the estimates of both studies, it suggests that France is more mobile than the United States, and less mobile than Sweden.

From the comparison of family policies and intergenerational indicators, it appears that the country that invests the less in family policies (United States) displays the highest level of opportunity inequality. Family policies are therefore useful to curb opportunity inequalities. Opportunity inequalities are much lower in the United Kingdom and Sweden. If comparing three indicators might not be sufficient to draw any strong conclusion, it suggests however that subsidizing childcare and early childhood with longer parental leave might be the most efficient to tackle the persistence of earnings across generations. Subsidizing poor families such as the United Kingdom is however also relevant to contain the persistence of education across generations. But do family policies manage to curb the effect of family structure on the individual's human capital? This thesis aims at estimate the effect of parental separation and family size on child's human capital.

4. Contribution of the Thesis

The contributions of this Thesis are threefold.

It brings new evidence on the formation of non-cognitive skills. It has long been recognized that cognitive skills play a powerful role in shaping individuals' achievement; but now it is also largely admitted that non-cognitive skills play a role at least as much important as cognitive skills. Yet, little is known about their formation. This thesis brings new evidence on how family environment, and in particular family structure, determines non-cognitive skills.

Second, while theoretical literature has long recognised parental time investments as a determinant of child’s human capital, there are surprisingly few empirical studies that analyse the effect of time allocation and parental time investments on child’s human capital. This thesis sheds light on parental time investments, as an input of child’s development production function. We look at its effect on child’s cognitive and non-cognitive skills. Moreover, we consider time spent with father and both parents together, not much explored until now. To my knowledge, it is the first study that estimates whether mother and father time investments are substitutes rather than complements.

This allows me to break new ground on exploring the potential driving channel for the effect of family structure on child’s development, both regarding the parental separation and the number of children. In the rest of the section, I first present the method and datasets used in this thesis and summarizes each chapter.

In the current section, I start by presenting the datasets and the identification challenges in the thesis. Then, I give an overview of the contributions of each chapter.

4.1. Method and Data

4.1.1 Datasets and measures of human capital

The datasets

This thesis uses datasets across three different countries: France, the United States and the United Kingdom. The datasets are of two kinds: retrospective datasets for France and panel datasets for Anglo-saxon countries. Retrospective datasets allows me to study the effect of family structure on adulthood outcomes, while longitudinal dataset give more detailed information on the effect of family structure in childhood.

The survey *Formation et Qualification Professionnelle* (INSEE) “Education-Training Employment” is used in the first chapter. This is a cross sectional dataset that offers a nationally representative sample of the French population aged between 18 and 65 years old who lives in France at the date of the survey. The two most recent waves, 2003 and 2014, are used. It is used in Chapter 1 for the detailed information provided on one sibling, randomly picked; along with the retrospective information on individuals’ family background, such as if and when parents get separated. Information on siblings is here

crucial for my identification strategy.

In the two other chapters, I use panel datasets with very rich information on children. Chapter 2 is based on the American dataset, Child-Development Supplement of the Panel Study of Income Dynamics (CDS-PSID). 2650 children are first interviewed in 1997 and followed in 2002 and 2007. This dataset offers very detailed information on child's allocation of time and time spent with their parents. The child is asked to fill a time diary on a 24 hours basis for one day in the week and one day in the weekend. They provide the activity, the duration, the location, who was present and who was involved. This enables me to distinguish between Accessible Time (when the parent is present during the activity) and Engaged Time (when the parent is involved in the activity). To my knowledge, there are only two datasets in the world providing such information, the other one is the Longitudinal Survey on Australian Children (LSAC), but this latter does not distinguish between time spent with step-parent and parent, a key information needed to conduct the study of Chapter 2. The dataset also offers rich information on child's cognitive and non-cognitive skills.

The last dataset is the Millennium Cohort Study, a panel dataset that follows around 20 000 British children born in 2000 – 2001. The survey offers very rich information on the family background as well as measures of diverse aspects of children lives, in particular, cognitive and non-cognitive development.

Measuring Human Capital

In Chapter 1, I consider educational attainment and social position as a result of human capital, measured in adulthood. I take two measures of educational attainment: the number of years of schooling, which is the average number of years of school necessary to complete a degree; and the earnings-weighted education which is the average earnings associated to each degree compared to no degree. The latter attempts to take into account the quality of schooling. Indeed, degrees from "*Grandes Ecoles*" are much more valued using this latter measure. Social position is measured as the average earnings for a given degree and a given occupation.

In the two next chapters, I consider human capital formation during childhood, examining non-cognitive skills as a measure of child's human capital, along with cognitive skills in Chapter 2. As mentioned before, it is now largely admitted that non-cognitive skills matter at least as much as cognitive-skills for labour market outcomes. Non-cognitive skills

measures are provided by the Primary Care Giver and might be subject to measurement errors, but the models I use deal well with this issue. In Chapter 2, non-cognitive skills are measured by the Behaviour Problem Index (BPI) that relies on 30 items. In Chapter 3, non-cognitive skills are measured by the Strength and Difficulties Questionnaire (SDQ) that relies on 20 items. Both measures can be decomposed into two subscales: the externalising scale measures behavioural skills and the internalising scale measures emotional skills.

In Chapter 2, I also look at cognitive skills coming from the Woodcock Johnson Revised Tests of Achievements (WJ-R). They go from the easiest question to the most difficult, avoiding the issue of a higher bound to cognitive skills often present with other measures. Reading skills are measured by the Letter-Word Identification test (administered from the age of three) and the Passage Comprehension test (administered from the age of six). Math skills refers to the score on the Applied Problem Test (administered from the age of three). I use the standardized format on the national age group average.

4.1.2 Identification challenges and method employed

One challenge in estimating the effect of family structure on child's development is the endogeneity of family structure, meaning the correlation between family structure and unobserved variables that might also affect individual's human capital, even in the absence of a change in family structure.

First, parental separation might be correlated with unobserved variables. The main example is the parental conflict level that could affect individual's human capital in the absence of parental separation; in this case the effect of parental separation would partly reflect the effect of conflict. Using information on two siblings in Chapter 1, I estimate a family-fixed effect model. It enables to rule out the endogeneity issue due to unobserved variables common to both siblings. In Chapter 2, the repeated observations of the child allow me to use an Individual Fixed Effect model that cancels out all the endogeneity due to omitted variables that are fixed across time.

Second, fertility decisions are likely to be correlated with unobserved parents' characteristics such as parents' mental health, their life satisfaction, or their own non-cognitive skills; variables that are very likely to be correlated with the child's non-cognitive skills. In Chapter 3²⁴, to handle this issue, we instrument fertility decisions by the sex of the two first children. We provide evidence of the internal validity and external validity of our instrument.

A challenge in the estimation of child's cognitive and non-cognitive skills production

²⁴This chapter is based on a work co-authored with Simon Briole and Anthony Lepinteur.

functions is the unobserved child's ability, again, this might be a source of endogeneity. To deal with this issue, I use a Value Added Model and an Individual Fixed-Effect model. But these models rely on the assumptions of a non-age varying production function. I relax this assumption using a Cumulative Value Added Model that takes into account the past inputs. Finally, it is possible that children with higher abilities might also learn faster. In this case, the child's learning speed might be correlated with included inputs (in particular parental inputs). For example, parents may adapt their involvement to a variation of child's development, this would introduce some degree of endogeneity. This is what Del Bono et al. (2016) [55] refer to as feedback effects. This assumption is relaxed using a Generalized Method of Moments model.

A third challenge lies in the measure of non-cognitive skills provided by the primary care giver. These measures might be subject to measurement errors due to the subjectivity of the parent, and therefore might be endogenous. The Individual Fixed Effect and the Value Added model deal with this issue if the measurement error is fixed over time. In Chapter 3 ²⁵, we introduce the skill in the initial period to catch this measurement error.

The rest of the section gives an overview of every chapter.

4.2. Chapter 1 : Age at Parent's Separation and Individual's Achievement

The first chapter investigates the effect of parental separation on individual's achievement. We examine three outcomes: the number of years of schooling, earnings-weighted education and social position. Using a French dataset "Education-Training Employment" (INSEE), the differences in the age of the individuals at parental separation, within a family, are examined in order to control for separated families selection.

Results suggest that individuals whose parents are separated have about one semester less of schooling, have a lower quality of education and social positions associated with earnings 4% to 9% lower than individuals who grew up with their two parents. All these effects remain negative and significant when the family fixed effect is introduced.

The contribution of this chapter is to make a heterogeneity analysis of the effect of parental separation across different groups. Results suggest that parental separation is more harmful for boys' education. When the family fixed-effect is introduced, results suggest that individuals whose mother is less highly educated are more highly affected. These mothers might be more vulnerable, since a lower education level might be associated with a

²⁵This Chapter is based on a work co-authored with Simon Briole et Anthony Lepinteur

lower income. Because of homogamy, the father is likely to be poorer, therefore, it is also possible that these mothers have a lower alimony, or face defaults of payment more often. Individuals with a step-parent are also more affected, nevertheless, it is not possible to control for a family fixed effect. I do not find any evidence of an effect of alternating custody, nevertheless, it was not wide spread for these cohorts. Looking at differential effect across cohorts or divorce rates, I do not find any evidence of a stigmatisation effect. Finding these negative effects in spite of a French family policy targeting poor families and single-parent families, I ask in the second chapter whether this effect might be driven by changes in parental time investments and child's allocation of time.

4.3. Chapter 2 : Time investments as a driving channel for the effect of parental separation on child development

Several studies find a negative effect of parental separation on individual's achievement. Yet, little attention has been paid to the channels of this effect. This chapter focuses on time investments as a potential driving channel for the effect of parental separation on child development.

First, I investigate the effect of parental separation on time spent with parents and the time the child spends in each activity. Due to a lack of data, past studies have only considered time spent with the custodial parent, omitting two key variables: time spent with fathers and with both parents. The dataset allows me to look at time spent with the non-custodial parent. Moreover, using an individual fixed-effect model, I am able to deal with selection due to unobserved variables that do not vary over time. I find that being in a single-parent family decreases by 30% of a standard deviation the time spent with at least one parent present. All activities are concerned, except active leisure. Time spent alone with the non-custodial parent and with both parents together is greatly affected, even if the custodial parent tries to compensate for that. This decrease in time spent with at least one parent *present* does not however reflect in a decrease in time spent with at least one parent *involved* in the activity.

Second, I ask whether this matters for child development. Using a Valued Added model, results suggest that time spent with both parents, or father has slightly different impact than time spent with the mother. Estimating a GMM (Generalized Method of Moments) model, the results suggest the existence of feedback effects, meaning that the parents adapt their investments to their child's development (decreasing their investments if the child goes well). Differences in the effect of the parental time investments are more salient in this model. To my knowledge, this is the first study that shed light on the heterogeneity of the different parental times inputs.

Finally, breaking new ground on exploring the driving channel for the effect of family structure, I estimate how much the effect of a change in family structure is affected when we control for time investments. I find that the effect of family structure on non-cognitive skills decreases by 30% when time spent with at least one parent is accounted for, suggesting it is a channel at stake. The change in the breakdown of parental time investments does not seem to be the driving channel.

Until now, we have considered only one aspect of family structure: the number of parents living with the child. In the next part, we consider the number of siblings.

4.4. Chapter 3: The Effect of Having an Additional Sibling on Child's Non-Cognitive Skills

This Chapter is based on a work co-authored with Simon Briole and Anthony Lepinteur.

In this chapter, we provide new evidence on the effect of family size on child's non-cognitive skills. To account for the endogeneity of fertility decisions, we apply a well-known instrumental approach that exploits parents' preference for children gender diversity. Indeed, parents with two son or two daughter are more likely to have a third child. Using a British dataset, we provide evidence of the validity of our instrument: families with two children of the same sex are not different from families with two children of opposite sex before at the beginning of the survey. Moreover, we do not find any evidence of an own gendered effect: having a sibling of the same sex does not seem to affect child's development by other channel than family size.

We show that having an additional sibling affects negatively the child's non-cognitive skills. Performing a heterogeneity analysis, we find the existence of "sensitive periods": the effect is negative only for children who are under the age of 5 at the moment of the birth. First and second born are equally affected. But an appealing result is that the effect is entirely driven by girls, while boys seem to be unaffected.

We investigate two potential mechanisms to explain this gendered effect. First, we look at whether the parents' time investments responses differ across gender. Indeed, parents seem to increase time spent with boys when there is an additional child, while they do not compensate with girls. Another explanation might rely in the differences in the demand for household chores: having a third sibling increases girls' participation to household chores while boys seem unaffected. An additional child might increase the gender roles between parents, and this would be transmitted at the child level. Though these effects are not statistically significant, they are insights on the potential mechanisms behind this

larger effect for girls. Finally, we investigate the persistence of the effect on average, and do not find any evidence of a recovery.

Part I

PART I: Human Capital Inequalities and Parental Separation

Chapter 1

Age At Parents' Separation And Individual's Achievement: Evidence From France Using A Sibling Approach

Summary of the chapter

This chapter investigates the link between parental separation and individual's achievement in their adulthood. Using a French dataset "Education-Training-Employment", the differences in age of the children at divorce, within a family, are examined in order to control for divorced families selection. The main interest of the chapter lies in three particular outcomes : the number of years of schooling, earnings-weighted education, and social position. The results show that individuals whose parents separated have about one semester of schooling less than the children of non-divorced families, they also have lower quality of education and lower social position associated with wages from 4% to 9% lower than individuals who grew up with their two parents. All these estimated effects remain negative and significant within the family. Parental separation is more harmful for boys, or when the child has a step-parent or when the mother is less highly educated. The study finds no differential effects of alternating custody, or higher divorce rates.

Classification

JEL Classification: I20, J12

Keywords: Education, Divorce, Family Economics, Family Structure, Marital Dissolution, Siblings Estimators

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1. Introduction

The share of children whose parents get separated increased from 3% for the generation born in 1946 to 15% for the generation born in 1988.¹ Despite a growing literature on the effect of parental separation on child's achievement, there is still no consensus on the magnitude of this effect. Several papers highlight that a large part of the effect of parental separation can be attributed to selection on unobserved family characteristics (Ermisch and Francesconi 2001 [59]; Björklund and Sundström 2006 [25]; Björklund et al. 2007 [22]); while the effect remains negative in Eastern Germany and Austria, even after accounting for selection (Francesconi et al. 2010 [66]; Frimmel et al. 2016 [67]). In this study, I provide new evidences about the link between parental separation and individuals' achievement in France, controlling for family fixed effect. I find a negative correlation between parental separation and individual's achievement, even after controlling for family fixed effect. This contrasts with the assumption that the effect of divorce is mainly explained by family selection.

This chapter offers two main contributions. The first is to investigate the heterogeneity of the link between parental separation and individual's achievement according to several variables. Differences in social composition of divorced families across countries could explain differences in magnitude of the correlations between parental separation and individual's achievements. I investigate if differences in the type of custody, the presence of a step-parent, mother's education, and divorce rate could reflect different effects of parental separation. Moreover, this chapter contributes to the burgeoning literature on the impact of parental separation on the existing gender gap (see Brenøe and Lundberg 2016 [35]; Lundberg 2017 [100]).

The second contribution is to shed light on the French case. France is an interesting context in which to investigate this question, since it lies somewhere between the US and Scandinavian countries in terms of welfare expenditures for families with children, and in terms of inequality of opportunity (see Lefranc and Trannoy, 2005 [97]). Therefore, the French case can be helpful in understanding the impact of parental separation on children.

Parental separation may impact individual's achievement through different channels. First, parents resources may be affected by the parental separation. Parents resources could refer to economic resources and to time resources. From a theoretical perspective, it is well established that family background impacts child's achievement (Becker et al. 1976 [15], Becker and Tomes 1979 [17], 1994 [14], Carneiro and Heckman 2003 [36]).

¹Computation from the author on the Formation et Qualification Professionnelle (FQP) surveys, 2003 and 2014 waves.

The wealthier the parents, the more they invest in their children's human capital; and consequently, the wealthier the child will be. A separation is an economic shock for the individuals. By separating, the couple loses all the gains from marriage such as production and consumption complementarity or risk pooling. They may have less economic resources to invest in child's human capital. They could be constrained to move, and the housing quality may be affected. Leturcq and Panico (2018) [98] describe how income poverty and deprivation vary on average around parental separation. Using an event study, they show that leisure deprivation, such as not being able to afford holidays or paying activities such as cinema outings and sports, and material deprivation (housing quality) appear to drive the observed overall deprivation increase. Clark et al. (2015) [41] show that the effect of parental separation on children's outcomes decreases when income is controlled for. Besides, the custodial parent, to offset the loss of one wage, might increase working hours and may have less time to look after their child. A decrease in time spent with parents may be a driving channel as well.

Second, the parental separation may be a psychological shock for the child, especially if the level of conflict was low before the parental separation, which could mean that the separation was not expected (Booth and Amato 2001 [2]).

Nevertheless, parental separation could benefit to the child if it puts an end to a conflictual period (Booth and Amato 2001 [2]). This effect is however not confirmed for education, in Australia (Ribar et al., 2017 [114]) and in the United Kingdom (Clark et al., 2015 [41]).

On the other hand, conflict might be a source of selection, we could wonder about the effect of a "non-divorce", when the child remains in a conflictual family. This correlation between parental separation and conflict (or other latent characteristics) introduces some degree of endogeneity. Divorce would only be an indicator of conflictual families (Amato 2001 [3], Martin (2007) [102]).

A number of methods have been used to deal with the endogeneity issue. Using the variation in the gender ratio in the fathers' firm to instrument divorce, Frimmel et al. (2016) [67] find a negative and persistent impact of divorce in Austria. There is an upward bias. Bedard and Deschênes (2005) [18] use the gender of the first born to instrument separation in the US. A second method is the time differences exploitation (Piketty 2003 [109], Leturcq and Panico (2018) [98]), but this method cannot be used to study the impact of parental separation on children in their adulthood. A strand of the literature (Björklund and Sundström 2006 [25], Bratberg et al. 2014 [34], Ermisch and Francesconi 2001 [59], Francesconi et al. 2010 [66]) uses the variation in the age at divorce across siblings to estimate siblings-difference model. It cancels out the "family fixed effect", that catches all the characteristics that are common to siblings.

I follow this last strand of the literature using the FQP (*Formation et Qualification Professionnelle* - Education, Training and Occupation) surveys conducted by INSEE in 2003 and 2014. This is cross-sectional data. The sample is around 40 000 individuals for the 2003 wave and about 26 000 individuals for the 2014 wave. Information on siblings' outcomes is provided. The total sample includes more than 20 000 families. This guarantees enough significance power in the siblings-difference model. Three outcomes are analysed: the number of years of schooling, the earnings-weighted education, which measures the quality of schooling that may be different from the quantity of schooling in France, and the social position. The earnings-weighted education is the wage value associated with a particular degree as compared to not getting any degree. Social position is measured as the average of the earnings given the individual's characteristics.

I find a negative correlation between parental separation and children's outcomes, poorly explained by divorced family selection in France. These findings contrast with other studies that find a lower effect of parental separation after controlling for family fixed effect, and sometimes no significance at all. It reveals that there is a negative correlation between divorce and children's achievement in France, even after controlling for family fixed effect. There are several possible explanations. First, the larger number of observations - more than 20 000 families - means that not too much significance power is lost in the sibling-difference model. Second, divorce is random across latent characteristics on average. Nevertheless, it is possible that there are several types of divorced families with different latent characteristics, with opposite effects on the children's achievement, but these effects may compensate for each other.

The correlation between parental separation and children outcomes could differ across groups. Parental separation would be more harmful for boys (Frimmel et al. 2016 [67], Bertrand and Pan 2013 [21], Brenøe and Lundberg 2016 [35]), but it would depend on the considered outcomes (Lundberg 2017 [100]), girls suffer more from family background when internalising behaviours such as depression are considered, whereas the impact of family background is greater for boys when we consider externalising behaviour (school attendance...). This disadvantage does not persist into adulthood (Brenøe and Lundberg (2016) [35], Lundberg (2017) [100]). The findings presented in this chapter contrast with theirs, finding that parental separation is more harmful for boys' educational attainment. Blended families are also an interesting part of the question. On the one hand, the step-parent brings new resources, in terms of money and time, but on the other hand this could also be a new source of stress and conflict (Evenhouse and Reilly 2004 [60]). I find that divorce is more harmful having a step-parent. Consequences of divorce are heterogeneous within divorced men and women according to their income, separation exacerbates

existing inequalities (Ananat and Mickaels 2008 [4], Mcmanus et al. (2001) [103]). This chapter investigates this heterogeneity at the child level. Parental separation is more harmful when the mother or the father is highly educated. I do not find differential effects for highly divorce rate or recent cohorts.

The rest of the chapter is organised as follows. In Section 2, a description of the dataset, the main variables, and some descriptive statistics are provided. The identification strategy is explained in Section 3. Section 4 shows the results. In Section 5, the sensitivity of the results is checked. Section 6 concludes.

2. Data & Method

2.1. Data

Data set and main variables Data are taken from the FQP (*Formation et Qualification Professionnelle* - Education, Training and Occupation) surveys conducted by INSEE in 2003 and 2014. The FQP surveys conducted in 2003 and 2014 offer a representative sample of the French population aged 18 to 65 years old, and who live in France at the date of the survey. This is cross-sectional data. The sample is around 40 000 and 26 000 observations for the 2003 wave and for the 2014 wave, respectively. There is detailed information on individual's education, occupation, their earnings, their parents education and professional group. The respondent gives information about one of their siblings: their education level and occupation. The sibling is picked randomly. It is also known if and when the parents were divorced or separated, the type of custody, and if there is a step-parent. This information is reported *a posteriori* by survey respondents and refer to the time when the respondent left the schooling system. Even if the survey team puts a lot of effort to avoid recall errors, errors of measurement due to recall errors are still possible².

Unfortunately, the question about a parental separation is asked at the end of schooling. This could be a source of bias, since the higher my education level, the later I would declare my parent's separation. For example, individuals whose parents separate when they are 23 are supposed to declare it only if they are still at school, and therefore are more likely to do longer schooling. This could artificially lead to higher educated individuals among the separated families. I perform a robustness check to investigate the existence

²The FQP team puts a lot of effort to have good retrospective data. They fill a timetable with the respondent with all the major life events, to make it easier for them to remember the date of each event. They cross check all the events together: what happened at school with what happened in their family. Even if this puts the respondent in a good context to reduce recall errors and insist on the importance of providing the right date, recall errors are still possible.

of this potential question bias, and reject it.

*Measuring individual's achievement*³

Number of years of schooling. We take the highest degree achieved by the individual. To have a continuous variable for educational attainment, I associate with each degree, a number of years of schooling. On the respondents sample, I compute the actual number of years of schooling after the primary class "CP" from the year of the end of schooling and the year of birth (year of the end of schooling - year of birth - 6). Second, the number of years of schooling is regressed on the highest degree, gender, year of birth, its quadratic term, the age and its quadratic term and interaction terms, it is then predicted for individuals and their siblings. To avoid an over-estimation of educational attainment for individuals who repeat many classes or temporarily suspend their education, the median years of schooling is associated with each degree by cohort.

Social Position. Social position is measured as the average annual earnings, given the individual's characteristics such as occupation and highest degree. To measure the social position, the earnings is regressed for each gender, on the respondents sample⁴ on highest degree, year of birth, its quadratic term, the age and its quadratic term along with interaction terms, as previously; dummies for the profession categories (31 categories) and interaction terms are added (see Björklund and Jäntti, 1997 [23] for example). This estimation is carried out for full-time workers, using the Heckman procedure to account for the exclusion of part-time workers and the inactive. The selection equation takes into account the marital status and the number of children.

Earnings-weighted education. The French education system is specific; for the same number of years of schooling, it is possible to obtain degrees of diverse quality. In an attempt to take into account the quality of the degree, the earnings-weighted education is examined for each degree (see Ben-Halima et al. (2014) [19], Björklund and Sundström (2006) [25]). For each gender, the previous earnings equation is used to reveal the contribution of each degree to the wage compared to someone who does not have any degree.⁵ The two measures of education differ in the ranking of the degrees (See Figure A.1) .

For each outcome, we use the predicted outcomes for both siblings, even for the respondent, since we need comparable measures for both of them. Summary of the outcomes is given in Table 1. The first column reports the summary of the outcomes on the whole population of the dataset. The two other columns report it for the sample of interest splitted between the respondents and their sibling. The three subsamples are similar in

³A more detailed description of the predictions and the estimations of the outcomes are available in Appendix A2

⁴Since we don't have information on the siblings's earnings, this model is estimated only on the respondents' sample.

⁵A more detailed description of the predictions and the estimations of the outcomes are available in Appendix A2

terms of outcomes.⁶

Table 1 – Summary statistics for outcomes

	All	Respondents	Siblings
	mean/sd/min/max	mean/sd/min/max	mean/sd/min/max
Schooling	13.36 2.81 8.5 18.3	13.45 2.82 8.5 18.3	13.48 2.77 8.5 18.3
Earnings-weighted Education	0.11 0.12 -0.1 0.5	0.11 0.12 -0.1 0.5	0.12 0.12 -0.1 0.5
Social Position	10.23 0.42 7.4 13.6	10.25 0.42 7.7 13.6	10.22 0.43 7.4 11.7
Observations	81533	28438	28438

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. The first column shows the summary statistics for the whole population of the dataset. The second column shows the summary statistics for our sample considering only the respondents, and the third column shows the summary statistics considering only the respondent's siblings.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

Measuring family structure For a family, divorce is a dummy that equals 1 if the respondent's parents get divorced or separated during the individual's schooling, the individual's age at divorce is also reported and a set of dummies corresponding to each age group at divorce is compiled. Cohabiting parents and married parents are considered equally here, since we do not have information on parent's marriage.

Measuring additional controls Control variables are included: the individual's sex, the region of birth, the year of birth that is centred on the average year of birth (1960), its quadratic term, the age and its quadratic term, and the birth order. Other controls are for family environment: parents' degree and profession, dummies indicating whether the parents are born abroad, the mother's year of birth (then implicitly for the age of the mother at birth), the number of siblings and its quadratic term.

For parent's education, seven categories of certificates and degrees are considered. From the bottom to the top, "No Diploma" means that the individual ends their schooling without any degree or at the end of the primary school. The second category indicates that the parent has a degree from primary or secondary school: the "CEP"⁷ which is a

⁶Please find a more detailed description of the estimation of the outcomes in Appendix A2

⁷Certificat d'Etudes Primaires

former school leaving certificate delivered at the end of primary school or the “*BEPC*”⁸, it is the French equivalent of the Junior High School Certificate, delivered at the age of 15. “*CAP/BEP*”⁹ are vocational training certificates taken at the end of secondary school. The “*Brevet professionnel ou de technicien*” are vocational tracks, the degree is delivered three years after High School. The “*BAC*” (*Baccalauréat général ou technologique*) is the degree taken at the end of High School, generally at the age of 18. It is the French equivalent of A-levels (United Kingdom) or Abitur (Germany). “*BAC + 2*” means that the individual completed two years in higher education (after the *BAC*), this refers to the French vocational training or technical certificates *BTS*¹⁰, *DUT*¹¹. Finally, “*BAC+2 and more*” corresponds to all certificates taken after a 3-year higher education course or more, referring to Bachelor, Master, degrees from engineering or business colleges, and PHD.

For professional occupation, eight categories are considered: Farmers, Artisan (Craftsman), White Collar or Senior Executives, Mid-level Profession (intermediate occupations), Employee, Manual Worker, Retired, Other. Artisan refers to skilled workman, crafts person and storekeeper. Employee refers to administrative, sales or services occupations.

Sample selection criteria The sample is restricted to individuals who (a) are born between 1946 and 1978 for the 2003 wave, and between 1946 and 1989 for the 2014 wave, (b) for whom there is information on one sibling, (c) who experience the parental separation in a different age group and (d) that is not identified as a half sibling (born after a separation)¹². Another more restricted sample requires that (e) the age difference with the referent sibling is lower than 10 years.

Condition (a) was imposed to have individuals old enough to end their schooling (25 years old), and therefore to have a correct information on their highest degree. I also exclude children born during the World War II since they might not be representative of individuals born later. Condition (b) is imposed by the identification strategy that uses differences between siblings.¹³ Although, this leads to exclude only children from the sample, a robustness check confirms that this does not affect the results. Siblings difference model also imposes condition (c), it enables variations in the age group within

⁸Brevet d'Etudes du Premier Cycle

⁹Certificat d'Aptitude Professionnelle/Brevet d'Etudes Professionnelles

¹⁰Brevet de Technicien Supérieur

¹¹Diplômes universitaires de Technologie

¹²The question about the siblings does not distinguish between half-sibling, and natural sibling. Half-siblings are observable if they are born after the respondents' parents' separation. There are 302 siblings born after the respondents' parents' separation. All these siblings are excluded from the main analysis. Half of them have an age difference higher than 10. Therefore, when we focus on the subsample excluding siblings with an age difference higher than 10, we drop more than half of the older half-siblings.

¹³Except only children families, all family sizes are included.

a family in order to be able to estimate the effect of parental separation. Conditions (d) and (e) enable to have the most similar environment across siblings, to be able to assume a family *fixed* effect, that guarantees the assumptions made for the sibling-difference model, and consequently unbiased estimators in the siblings-difference model. Moreover, because it is not possible to identify half-siblings born before a divorce, this restriction could remove 50% of the older half-siblings.¹⁴ Robustness checks are done to see if conditions (b) to (e) could affect the results, they are presented in Section 4..

The sample selection criteria result in a sample of about 56 000 siblings, and more than 50 000 siblings when condition (e) is applied. I perform sensitivity tests to see the effect of these restrictions. The model is also tested excluding respondents who declare a divorce after age 16 because of a potential question bias.

2.2. Descriptive statistics

Comparing summary statistics concerning the non-divorced families and the divorced families of the respondents sample¹⁵ (see Table A.13 in the Appendix, columns 1 and 2), we see that children in divorced families belong to younger cohorts on average. Mothers in divorced families are more educated on average than in the non-divorced families. The share of mothers who have a mid-level profession, who are employees, or manual workers is higher in divorced families, whereas the share of mothers who are farmers or who have an "other" profession (housewives), is higher in the non-divorced families. Divorced family fathers are also more educated, on average. They are more represented in mid-level professions, and employees, and less represented among farmers. Divorced families are more represented in Ile de France.

Comparing the respondents and their siblings in divorced families, the main difference concerns the age at divorce. The average age at divorce is a little higher in the siblings sample, mainly because the 18 and over are over-represented (see Table A.14). Individual responds to the question about a divorce *during schooling*. The respondents who are over age 18 at divorce will not declare a divorce if they have finished their schooling. But respondent's brother or sister can appear as a sibling after age 18, whether or not they were still at school. Table A.15 compares respondents and their siblings who experience a parental separation after the age of 16. Respondents are born latter. Their father is also less likely to be a manual worker. They also have less siblings in average. This information indicates the possible existence of a question bias that will be investigated later.

An increase in separation in all social categories

¹⁴Since we can identify younger half siblings, who are born after divorce, we can observe the distribution of half siblings. Half of them have an age difference higher than 10 years.

¹⁵The sample provided by the French FQP (Formation et Qualification Professionnelle) survey

Divorce has increased, and if it once was characteristic of only certain socio-economic categories, such as the most educated or "White Collar" professions, it is now extended to all social categories. Figure 1 shows that divorce has increased in all (parent's) education categories, especially for less-educated parents. Divorce has also increased in all occupation categories, especially "artisan", "mid-level professions" and employees, and also white collar or senior executives. For the generation born in 1946-1950, the share of children who experience a divorce is much higher when the mother is highly-educated, but this is less true for more recent generations. Looking at the father's profession, the same phenomenon is observed, for the generation born between 1946 and 1950, the share of children who experience a divorce is larger for those who have a father who is a white collar or senior executives, whereas today, divorce is represented in diverse social categories : the artisan (craftsman), white collar or senior executives, mid-level professions, employees and manual workers.

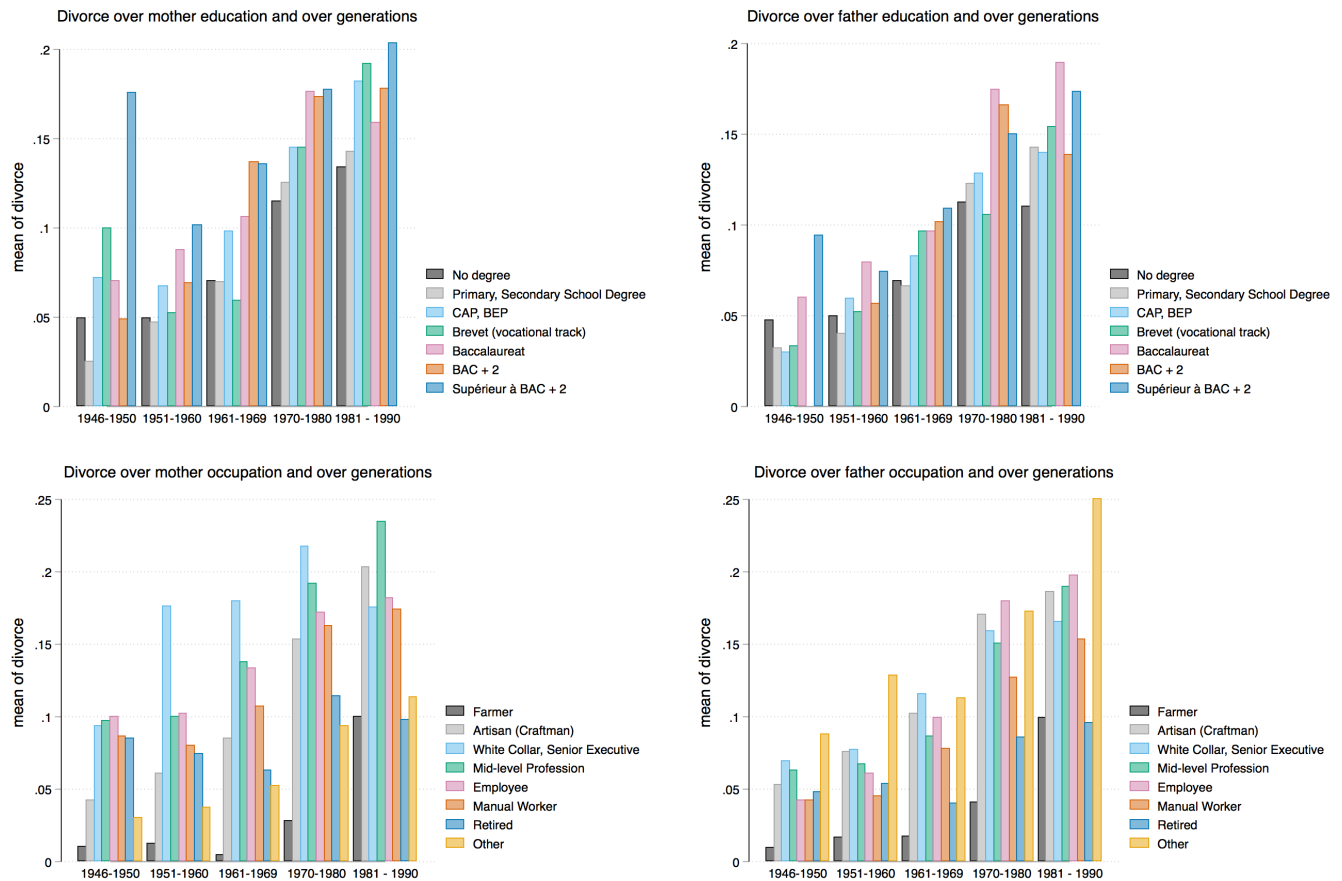


Figure 1 – Share of children whose parents are separated according to parents education and occupation.

Notes: Among children with mother with no degree, 5% experience a divorce for those born between 1946-1950, against nearly 15% for the 1981-1990 generation.

An increase in child's age at the parental separation across generations

Figure 2 shows the distribution of the child's age at divorce over the whole sample, most of whom are around age 10. But around 10% are between 0 and 3 years old when divorce occurs. There is enough information in each age group to provide precise results.

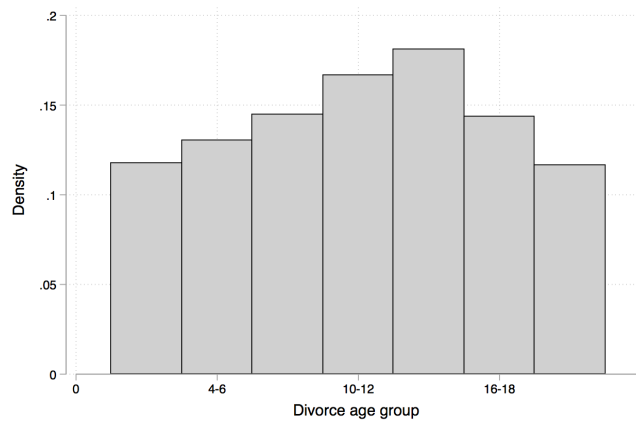


Figure 2 – Distribution of divorced families children by age group

Figure 3 shows the distribution of children according to their age at divorce in each cohort of birth. Across generations, the proportion of children who were very young at divorce (0-3 years old) has decreased, while the proportion of those who experience a divorce after the age of 18 has increased. It seems that, in younger generations, children are older when their parents get divorced. This could come from a change in the parents social composition or a generation effect. Observing the distribution of the child's age at divorce across the mother's degree, there are some differences in the children's age over mother's education. Children who experience a parental separation while they are young are more represented among mothers with no degree. Looking at the average age at divorce over cohorts and over mother's education, having a more highly educated mother seems to be associated with being older at separation, but it is approximately the same across generations (see Figure A.3 in the Appendix). Nevertheless, the differences are much smaller when respondents who declare a parental separation after the age of 15 are excluded.

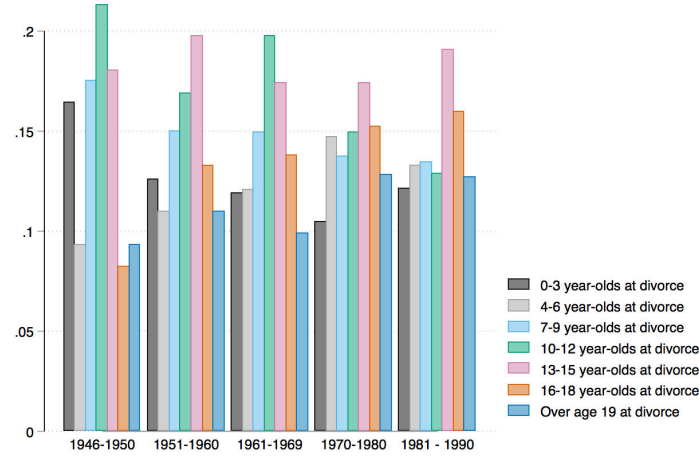


Figure 3 – Distribution of children of divorced families by age group across birth cohorts.

Notes: Among children born between 1946 and 1950, 17% of those who experience a divorce, experience it before 3 yrs old, they are around 12% for the generation born between 1981 and 1990

2.3. Identification strategy

Let us consider a family where individual's achievement is a function of their characteristics, their parents' characteristics, their parents' separation and the age of the individual when this separation occurs. We observe two siblings per family. As benchmark estimates, I first consider a random effects model, assuming exogenous selection.

$$y_{is} = \beta_0 + \beta_1 X_{is} + \beta_2 X_i^P + \gamma_0 D_i + \sum_{g=1}^{G-1} \gamma_1^g DA_{is}^g + \epsilon_{is} \quad (2..1)$$

where family is denoted i , each sibling is denoted s in the family. Outcomes of sibling s in family i is denoted y_{is} . The sibling's characteristics, such as gender, year of birth centred on 1960, and birth order, are denoted X_{is} . Family characteristics, such as family size, parent's occupation, and parent's education are denoted X_i^P , and it is invariant across siblings. D_i is a dummy that equals 1 if the individual experiences a divorce. DA_{is}^g is the age group of the child when the parents are divorced.

γ_0 is the average effect of divorce for the reference age group G (which has been omitted), ceteris paribus. γ_1^g is the average additional effect of experiencing a divorce in this age group compared to the reference age group G , ceteris paribus.

This model requires that ϵ_{is} is not correlated with family structure. ϵ_{is} can be decomposed into two components: $\epsilon_{is} = u_{is} + \alpha_i$, where α_i is the family fixed effect, catching all variables - observed or latent - common among siblings.

In an attempt to relax part of these assumptions, I consider a family fixed-effect model¹⁶. This is equivalent to a siblings-difference model. First differencing Equation (2.1), we have:

$$\Delta y_{is} = \beta_1 \Delta X_{is} + \sum_{g=1}^{G-1} \gamma_1^g \Delta DA_{is}^g + \Delta \epsilon_{is} \quad (2.2)$$

where y_{is} , X_{is} , DA_{is}^g and ϵ_{is} refer to the same variables as before. $\Delta \epsilon_{is} = \Delta u_{is}$. γ_1^g is the effect, within a family, of experiencing a divorce in age group g , compared to experiencing it in the reference group G . For example, γ_1^{0-3} is the effect, within a family, of experiencing a divorce aged between 0 and 3, compared to experiencing it in the reference group G . If group G is not affected at all by divorce $\gamma_1^G = \gamma_0 = 0$, then γ_1^g captures the average total effect of experiencing a divorce between 0 and 3, controlling for divorced families selection. We will see in next section that this assumption is reasonable. Divorce is not variant across siblings (Half-siblings are excluded when possible, because they are not a good counter-factual) but the age at divorce is variant between siblings. Therefore, the focus is on siblings who do not experience parental separation in the same age group g .¹⁷

Standard errors are clustered at the family level, and bootstrapped using 500 replications in both models.

The siblings-difference method rules out the endogeneity issue due to a family effect common to both siblings. Formally, it will handle with selection due to unobserved characteristics common among siblings (α_i). Therefore, the family environment is assumed to be similar between siblings, and this assumption is crucial, the more similar the familial environment is among siblings, the larger part of the selection the family fixed effect catches. To be sure that the family environment is similar between siblings, I test the model excluding siblings with an age difference greater than 10 years.

Nevertheless, this method is subject to limitations as well. First, it does not take into account that siblings may react differently to any change in the parents situation or behaviour at specific ages. Such examples of a change in the family environment are multiple: the development of an alcohol addiction, a job loss, or conflict. Focusing on conflict, siblings will be confronted to different levels of conflict at specific age. If conflict

¹⁶See also Ermisch and Francesconi (2001) [59], Björklund and Sundström (2007) [22], Francesconi et al (2010) [66] or Bratberg et al (2014) [34]

¹⁷In the Appendix, results concerning an alternative model are reported. $divage_{is}$ is the child's age when the parents get divorced.

$$\Delta y_{is} = \beta_1 \Delta X_{is} + \gamma_1 \Delta f(divage_{is}) + \Delta \epsilon_{is} \quad (2.3)$$

γ_1 is the average effect of being one year older at the moment of divorce, within a family.

has a different effect on the child depending on age, it will not be cancelled out by the family-fixed effect model. If there is no clear evidence in the psychological literature that parental conflict impacts more children at a specific age, it is clear that they respond differently. According to Jenkins and Buccioni (2000) [85], younger children are more vulnerable than older children because they are more likely to blame themselves for their parents' conflict, but less vulnerable on other dimensions, since they perceive the conflict as over if angry affect and shouting stops. Children of 9 years of age have been found to be more sensitive to whether conflict has been resolved than 5-year-olds children, and report more distress than 5-year-olds to unresolved conflict ¹⁸. The effect of conflict on educational attainment and labor market outcomes is still unclear, nevertheless, assuming that the two siblings outcomes react equally to a conflict that occurs at different ages is hard to accept. Moreover, siblings can react differently to family environment just because they are different, but this is less a concern, since there are many observations, it can be assumed there is a convergence, and birth order is already controlled for. Second, this model assumes that idiosyncratic endowment u_{is} is not correlated with divorce. This assumes that inherent differences between siblings, such as a very different behaviour or a disability, are not correlated with divorce. For further discussion, see Ermisch and Francesconi (2001) [59]. Even if the assumptions of this model are much weaker than the random effects model ones, it must be stressed that any resulting effect has to be interpreted with care, indicating correlation rather than causal relation.

On the other hand, siblings-difference model requires variations in the variable of interest among the siblings. It cannot be used if this variable does not vary, and still, we must have enough observations in each age group. Siblings-difference model cannot be used to study the heterogeneity of the effect of divorce according to gender; it would require to exclude same gender siblings, and to assume that the sex composition of siblings does not impact individual's achievement, and this may not be reasonable. To look at the heterogeneity of the effect of parental separation according to some variables, we also must have enough observations by age group after splitting the sample according to the variable of interest. We use the random effects model to investigate heterogeneity of parental separation in presence of a step-parent, and we complete the analysis with a fixed effect model to study the heterogeneity of the effect according to mother's degree, or to divorce rate in the region of birth.

¹⁸Younger children are less able to distinguish between parent and spousal roles, and conceptualized the social roles of mothers and fathers as parental more than spousal. This may account for the greater likelihood that young children blame themselves for conflict. This has generally been attributed to egocentricity in the younger child

3. Results

It must be stressed that the causal interpretation of the following results relies on strong assumptions (see previous Section). Any resulting effect has to be interpreted with care, indicating correlations rather than causal relation.

3.1. Main results

Table 2 shows the estimated effects of divorce on three outcomes : schooling which is a proxy for the number of years of schooling, earnings-weighted education, and the individual's social position.¹⁹

Controls for individual characteristics, such as gender, year of birth and its quadratic term, age and its quadratic term and birth order are included, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, number of siblings, and region of birth are included. Siblings who experience the separation in the same age group are excluded, to avoid identification issues.

For schooling, in the random effects model, without considering age heterogeneity, the estimated effect of divorce is about 0.38 year of schooling less for children who experience a divorce (not reported here). First column of Table 2 shows the results for the random effects model for schooling outcome. Children who experience a parental separation after the age of 18 fare the same as children who grew up with both parents (they are the reference group). This enables us to catch the total effect in siblings-difference model and not just a relative effect to this reference age group.

When divorce occurs before the age of 18, children have about one semester less of schooling than those who experience it after the age of 18. The 16-18 year-olds, and the 7-9 year-olds are less affected among those who experience the separation before the age of 18. The youngest are the most affected, they do nearly one year less of schooling than the reference age group. In column 2 of Table 2, we account for selection of divorced families - all latent characteristics common between siblings -, the estimated effect of parental separation is smaller (in absolute values), but the differences are small, especially for adolescents. It is not significant any more for the 7-9 year-olds.

In France, for two individuals of the same age who end their schooling between the age of 16 and 22, one year of schooling more leads to a wage 7% to 9% higher. The first years after compulsory school seem to be the most determining for future earnings (see Goux and Maurin (1994) [72]). Looking at the effect on social position in columns 5 and 6 of Table 2, we should recover that one semester less of schooling leads to earn around 3-4%

¹⁹Estimations of the outcomes are described earlier, in the data section, a more detailed description is given in Appendix A2.

less. However, the estimates are much larger (in absolute values): individuals whose parents separate when they were 4-6 year-olds have a social position associated with wages 9% lower than someone who experiences the parental separation after the age of 18. Column 6 of Table 2 shows the estimated effect of parental separation on social position, after controlling for divorced family selection. The results are similar. The greatest impact is on the 4-6 year-olds, which is the age of *CP*, the class when children learn to read and begin their basic education. The 10-12 year-olds are also more affected. This larger estimated effect on social position indicates that other variables than education are at stake. Social position catches the effect on the individual's occupation. We can think to a lower access to father's social network or to effects on non-cognitive skills such as self-confidence or emotional skills that reflects in a lower social position through the choice of occupation or the wage bargaining. Also, individuals could choose degrees associated to lower earnings, therefore earnings-weighted education is considered.

Earnings-weighted education accounts for the quality of schooling, which may differ from the quantity of schooling in the French education system. Each degree is associated with average earnings, earnings-weighted education is the wage value associated with this degree compared to having no degree. It measures the quality of the degree. Here, there is a different consideration of studying in a *Grande Ecole* compared to a Master's Degree at University²⁰. Nevertheless, the results are similar to those for schooling. Columns 3 and 4 of Table 2 show the results for this outcome. Those who experience a divorce before the age of 15 have a lower earnings-weighted education: they have degrees associated with a wage 2-3% lower, corresponding to the national average wage loss due to one semester less. We recover the effect of parental separation on the number of years of schooling.

We are aware that the analysis of these two latter outcomes relies on the assumption that we do not lose too much information with the use of estimated earnings.

It could be argued that this estimation does not account for all divorced family selection, because the family environment has changed between the two siblings, and thus the latent characteristics, such as conflict, are not invariant across siblings, and are not cancelled. For robustness, the model is tested excluding siblings with a large age difference. Results are in Table 3. For all three outcomes, results are slightly larger (in absolute values) for this sample in the random effects model, but looking at the sibling-difference model, results are very similar to the previous one.

²⁰See Figure A.1 in Appendix A2 to see the differences with the education measured as the number of years of schooling

A Durbin-Wu-Hausman test shows that we should use the Fixed effect model; but looking more precisely the results, it is not because of the endogeneity of divorce variables. Differences between the two models are small considering these variables, except for the social position when siblings with age difference higher than 10 are excluded.

Parental separation could have a different effect according to some variables. To estimate the heterogeneity of effect of parental separation, we need to have enough observations in each age group. This is not the case for step parent and alternating custody. Besides, if we use the siblings difference model to analyse the differential effect of parental separation according to gender, this would suppose to restrict the sample to siblings with one man and one woman; and this sample may be not representative. Therefore, we estimate the heterogeneity of the effect of parental separation across gender, or the presence of a step parent or alternating custody only with a random effects model. For the other variables of interest, we provide the siblings-difference model results as well.

Table 2 – Effect of a parental separation

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.91*** (0.14)	-0.45+ (0.26)	-0.03*** (0.01)	-0.02+ (0.01)	-0.08*** (0.02)	-0.05 (0.04)
4-6 at divorce	-0.88*** (0.12)	-0.54* (0.24)	-0.03*** (0.00)	-0.02+ (0.01)	-0.09*** (0.01)	-0.09* (0.03)
7-9 at divorce	-0.60*** (0.11)	-0.32 (0.21)	-0.03*** (0.00)	-0.02+ (0.01)	-0.05*** (0.01)	-0.04 (0.03)
10-12 at divorce	-0.70*** (0.10)	-0.55** (0.19)	-0.02*** (0.00)	-0.01+ (0.01)	-0.06*** (0.01)	-0.08** (0.03)
13-15 at divorce	-0.68*** (0.10)	-0.55*** (0.16)	-0.02*** (0.00)	-0.02* (0.01)	-0.05*** (0.01)	-0.05* (0.02)
16-18 at divorce	-0.34*** (0.10)	-0.32* (0.15)	-0.01* (0.00)	-0.01 (0.01)	-0.04** (0.01)	-0.04 (0.02)
Ref. Group : 19+ at divorce	0.10 (0.08)		0.00 (0.00)		0.01 (0.01)	
Man	-0.23*** (0.01)	-0.22*** (0.02)	0.03*** (0.00)	0.03*** (0.00)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.14*** (0.00)	0.07** (0.02)	0.00*** (0.00)	-0.00 (0.00)	0.02*** (0.00)	-0.10*** (0.00)
Year of birth squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.53*** (0.02)		0.02*** (0.00)		0.05*** (0.00)	
Father: CAP, BEP	0.57*** (0.02)		0.02*** (0.00)		0.06*** (0.00)	
Father: Brevet (vocational track)	1.21***		0.05***		0.13***	

Continued on next page

Table 2 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.06)		(0.00)		(0.01)	
Father: Baccalaureat	1.38***		0.05***		0.14***	
	(0.03)		(0.00)		(0.00)	
Father: BAC + 2	1.45***		0.06***		0.15***	
	(0.04)		(0.00)		(0.01)	
Father: Supérieur à BAC + 2	1.86***		0.09***		0.21***	
	(0.03)		(0.00)		(0.00)	
Father: Artisan (Craftman)	0.19***		0.01***		0.18***	
	(0.03)		(0.00)		(0.01)	
Father: White Collar, Senior Executive	0.72***		0.03***		0.24***	
	(0.04)		(0.00)		(0.01)	
Father: Intermediate profession	0.25***		0.01***		0.17***	
	(0.03)		(0.00)		(0.01)	
Father: Employee	-0.08*		-0.00		0.13***	
	(0.03)		(0.00)		(0.01)	
Father: Manual Worker	-0.48***		-0.02***		0.07***	
	(0.03)		(0.00)		(0.01)	
Father: Retired	0.82***		0.03***		0.21***	
	(0.04)		(0.00)		(0.01)	
Father: Other	-0.21***		-0.00		0.10***	
	(0.05)		(0.00)		(0.01)	
Mother: Primary, Secondary School Degreee	0.71***		0.02***		0.07***	
	(0.01)		(0.00)		(0.00)	
Mother: CAP, BEP	0.88***		0.03***		0.10***	
	(0.02)		(0.00)		(0.00)	
Mother: Brevet (vocational track)	1.31***		0.05***		0.16***	

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Table 2 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.06)		(0.00)		(0.01)	
Mother: Baccaalaureat	1.53***		0.06***		0.17***	
	(0.03)		(0.00)		(0.00)	
Mother: BAC + 2	1.57***		0.07***		0.18***	
	(0.04)		(0.00)		(0.01)	
Mother: Supérieur à BAC + 2	1.70***		0.08***		0.18***	
	(0.04)		(0.00)		(0.01)	
Mother: Artisan (Craftman)	0.01		0.00		0.05***	
	(0.04)		(0.00)		(0.01)	
Mother: White Collar, Senior Executive	0.24***		0.02***		0.08***	
	(0.05)		(0.00)		(0.01)	
Mother: Intermediate profession	0.31***		0.01***		0.08***	
	(0.04)		(0.00)		(0.01)	
Mother: Employee	0.16***		0.01***		0.07***	
	(0.03)		(0.00)		(0.01)	
Mother: Manual Worker	-0.14***		-0.01***		0.03***	
	(0.03)		(0.00)		(0.01)	
Mother: Retired	-0.02		-0.00		0.01	
	(0.05)		(0.00)		(0.01)	
Mother: Other	0.08**		0.00**		0.06***	
	(0.03)		(0.00)		(0.01)	
Sibling Size	-0.19***		-0.01***		-0.02***	
	(0.01)		(0.00)		(0.00)	
Sibling Size squared	0.01***		0.00***		0.00***	
	(0.00)		(0.00)		(0.00)	
Region of birth:North West	-0.06**		-0.00***		-0.05***	

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Table 2 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.02)		(0.00)		(0.00)	
Region of birth:North	0.04		0.00		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth:East	0.01		-0.00+		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth:West	0.08***		-0.00		-0.05***	
	(0.02)		(0.00)		(0.00)	
Region of birth:South West	0.07**		-0.00		-0.06***	
	(0.02)		(0.00)		(0.00)	
Region of birth:South East	0.08***		0.00		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth:Corse	-0.27*		-0.01+		-0.07***	
	(0.13)		(0.01)		(0.02)	
Region of birth:Oversea	0.07		0.00		-0.01+	
	(0.06)		(0.00)		(0.01)	
Mother Nationality: European	0.32***		0.01***		0.03***	
	(0.03)		(0.00)		(0.01)	
Mother Nationality: Other	0.90***		0.03***		0.08***	
	(0.08)		(0.00)		(0.01)	
Father Nationality: European	0.20***		0.01***		0.03***	
	(0.03)		(0.00)		(0.00)	
Father Nationality: Other	0.05		0.00		0.03**	
	(0.07)		(0.00)		(0.01)	
Mother Year of Birth	-0.01***		-0.00***		-0.00***	
	(0.00)		(0.00)		(0.00)	
Last Born	0.05***	0.05*	0.00***	0.00*	-0.00	-0.00

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Table 2 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Age	-0.00		0.00		0.11***	
	(0.01)		(0.00)		(0.00)	
Age squared	0.00***	-0.00	0.00*	-0.00*	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.05**	-0.04+	-0.00***	-0.00**	0.01***	0.01***
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.16***	-0.13***	-0.01***	-0.01***	0.01*	0.02**
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=4	-0.23***	-0.22***	-0.01***	-0.01***	-0.01+	0.00
	(0.03)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=5	-0.31***	-0.26***	-0.01***	-0.01***	0.01	0.03*
	(0.03)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=6	-0.34***	-0.28***	-0.02***	-0.01***	0.01	0.04**
	(0.05)	(0.08)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=7	-0.40***	-0.36***	-0.02***	-0.01***	-0.00	0.03
	(0.05)	(0.09)	(0.00)	(0.00)	(0.01)	(0.02)
Birth Order=8	-0.33***	-0.36**	-0.02***	-0.02***	0.01	0.04*
	(0.07)	(0.13)	(0.00)	(0.00)	(0.01)	(0.02)
Birth Order=9	-0.34***	-0.41*	-0.02***	-0.02**	0.02	0.05
	(0.09)	(0.19)	(0.00)	(0.01)	(0.02)	(0.03)
Birth Order=10	-0.33**	-0.30	-0.02***	-0.01	0.02	0.07
	(0.12)	(0.20)	(0.00)	(0.01)	(0.02)	(0.04)
Birth Order=11	-0.23	-0.39	-0.03***	-0.03+	0.05+	0.06
	(0.17)	(0.32)	(0.01)	(0.01)	(0.03)	(0.06)
Birth Order=12	-0.66**	-0.53	-0.03***	-0.02+	-0.04	0.03

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Table 2 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.23)	(0.39)	(0.01)	(0.01)	(0.03)	(0.08)
Birth Order=13	-0.15	-0.02	-0.02**	-0.02	0.02	0.00
	(0.25)	(0.42)	(0.01)	(0.01)	(0.06)	(0.14)
Birth Order=14	-0.90**	0.14	-0.02*	0.02	0.36+	0.65+
	(0.31)	(0.39)	(0.01)	(0.02)	(0.19)	(0.37)
Birth Order=15	-1.63**	-1.81	-0.05***	-0.05*	0.04	-0.08
	(0.63)	(1.27)	(0.01)	(0.02)	(0.09)	(0.24)
Birth Order=16	-0.06	0.58	-0.02	0.03	-0.14	-0.17
	(0.65)	(0.80)	(0.03)	(0.03)	(0.16)	(0.13)
Birth Order=18	-1.27+	0.08	-0.05**	-0.01***	0.03	
	(0.66)	(0.08)	(0.02)	(0.00)	(0.02)	
Constant	39.75***	13.76***	1.55***	0.16***	11.12***	12.64***
	(2.35)	(0.56)	(0.10)	(0.03)	(0.36)	(0.12)
Observations	56876	56876	56876	56876	54570	54570

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group are excluded, to avoid identification issues.

Table 3 – Effect of a parental separation excluding siblings with a high age difference

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-1.15*** (0.14)	-0.57+ (0.29)	-0.04*** (0.01)	-0.02 (0.01)	-0.08*** (0.02)	-0.03 (0.05)
4-6 at divorce	-0.97*** (0.12)	-0.56* (0.26)	-0.04*** (0.00)	-0.02* (0.01)	-0.09*** (0.02)	-0.07+ (0.04)
7-9 at divorce	-0.71*** (0.11)	-0.36 (0.23)	-0.03*** (0.00)	-0.02+ (0.01)	-0.05** (0.02)	-0.02 (0.04)
10-12 at divorce	-0.79*** (0.11)	-0.58** (0.18)	-0.02*** (0.00)	-0.02+ (0.01)	-0.06*** (0.02)	-0.07* (0.03)
13-15 at divorce	-0.74*** (0.10)	-0.56*** (0.16)	-0.02*** (0.00)	-0.02* (0.01)	-0.05*** (0.01)	-0.04 (0.03)
16-18 at divorce	-0.43*** (0.11)	-0.35* (0.15)	-0.01* (0.00)	-0.01 (0.01)	-0.04** (0.01)	-0.03 (0.02)
Ref. Group : 19+ at divorce	0.18* (0.08)		0.00 (0.00)		0.01 (0.01)	
Man	-0.24*** (0.01)	-0.23*** (0.02)	0.03*** (0.00)	0.04*** (0.00)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.13*** (0.00)	0.05 (0.03)	0.00*** (0.00)	-0.00* (0.00)	0.01*** (0.00)	-0.10*** (0.01)
Year of birth squared	-0.00*** (0.00)	-0.00** (0.00)	-0.00*** (0.00)	0.00** (0.00)	0.00 (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.53*** (0.02)		0.02*** (0.00)		0.05*** (0.00)	
Father: CAP, BEP	0.57*** (0.02)		0.02*** (0.00)		0.06*** (0.00)	
Father: Brevet (vocational track)	1.21***		0.05***		0.13***	

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Table 3 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.05)		(0.00)		(0.01)	
Father: Baccalaureat	1.36***		0.05***		0.14***	
	(0.03)		(0.00)		(0.00)	
Father: BAC + 2	1.49***		0.06***		0.15***	
	(0.04)		(0.00)		(0.01)	
Father: Supérieur à BAC + 2	1.86***		0.09***		0.21***	
	(0.03)		(0.00)		(0.00)	
Father: Artisan (Craftman)	0.21***		0.01***		0.18***	
	(0.04)		(0.00)		(0.01)	
Father: White Collar, Senior Executive	0.73***		0.03***		0.25***	
	(0.04)		(0.00)		(0.01)	
Father: Intermediate profession	0.27***		0.01***		0.17***	
	(0.03)		(0.00)		(0.01)	
Father: Employee	-0.08*		-0.00		0.13***	
	(0.03)		(0.00)		(0.01)	
Father: Manual Worker	-0.47***		-0.02***		0.08***	
	(0.03)		(0.00)		(0.01)	
Father: Retired	0.87***		0.04***		0.21***	
	(0.04)		(0.00)		(0.01)	
Father: Other	-0.22***		-0.00		0.11***	
	(0.05)		(0.00)		(0.01)	
Mother: Primary, Secondary School Degreee	0.70***		0.02***		0.07***	
	(0.01)		(0.00)		(0.00)	
Mother: CAP, BEP	0.89***		0.03***		0.10***	
	(0.02)		(0.00)		(0.00)	
Mother: Brevet (vocational track)	1.30***		0.05***		0.15***	

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Table 3 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.06)		(0.00)		(0.01)	
Mother: Baccaalaureat	1.55***		0.06***		0.17***	
	(0.03)		(0.00)		(0.00)	
Mother: BAC + 2	1.60***		0.07***		0.18***	
	(0.04)		(0.00)		(0.01)	
Mother: Supérieur à BAC + 2	1.69***		0.08***		0.18***	
	(0.04)		(0.00)		(0.01)	
Mother: Artisan (Craftman)	-0.04		-0.00		0.04***	
	(0.04)		(0.00)		(0.01)	
Mother: White Collar, Senior Executive	0.21***		0.02***		0.07***	
	(0.05)		(0.00)		(0.01)	
Mother: Intermediate profession	0.27***		0.01***		0.07***	
	(0.04)		(0.00)		(0.01)	
Mother: Employee	0.13***		0.00***		0.06***	
	(0.03)		(0.00)		(0.01)	
Mother: Manual Worker	-0.16***		-0.01***		0.03***	
	(0.04)		(0.00)		(0.01)	
Mother: Retired	-0.07		-0.00		0.00	
	(0.05)		(0.00)		(0.01)	
Mother: Other	0.06+		0.00*		0.05***	
	(0.03)		(0.00)		(0.01)	
Sibling Size	-0.19***		-0.01***		-0.03***	
	(0.01)		(0.00)		(0.00)	
Sibling Size squared	0.01***		0.00***		0.00***	
	(0.00)		(0.00)		(0.00)	
Region of birth:North West	-0.07***		-0.00***		-0.05***	

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Table 3 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.02)		(0.00)		(0.00)	
Region of birth:North	0.03		0.00		-0.04***	
	(0.03)		(0.00)		(0.00)	
Region of birth:East	0.01		-0.00*		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth:West	0.06**		-0.00		-0.05***	
	(0.02)		(0.00)		(0.00)	
Region of birth:South West	0.05*		-0.00		-0.06***	
	(0.02)		(0.00)		(0.00)	
Region of birth:South East	0.07**		0.00		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth:Corse	-0.23+		-0.01		-0.06**	
	(0.13)		(0.01)		(0.02)	
Region of birth:Oversea	0.04		0.00		-0.02*	
	(0.06)		(0.00)		(0.01)	
Mother Nationality: European	0.32***		0.01***		0.03***	
	(0.03)		(0.00)		(0.01)	
Mother Nationality: Other	0.80***		0.02***		0.07***	
	(0.07)		(0.00)		(0.01)	
Father Nationality: European	0.22***		0.01***		0.03***	
	(0.03)		(0.00)		(0.01)	
Father Nationality: Other	0.16**		0.01+		0.03***	
	(0.06)		(0.00)		(0.01)	
Mother Year of Birth	-0.01***		-0.00***		-0.00***	
	(0.00)		(0.00)		(0.00)	
Last Born	0.04**	0.03	0.00**	0.00*	-0.00	-0.01

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Table 3 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Age	-0.00		0.00		0.11***	
	(0.01)		(0.00)		(0.00)	
Age squared	0.00***	-0.00	0.00*	-0.00**	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.05***	-0.04+	-0.00***	-0.00**	0.01***	0.02***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.18***	-0.15***	-0.01***	-0.01***	0.01**	0.02***
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=4	-0.24***	-0.22***	-0.01***	-0.01***	-0.01	0.00
	(0.03)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=5	-0.37***	-0.32***	-0.02***	-0.01***	0.01	0.03*
	(0.04)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=6	-0.43***	-0.37***	-0.02***	-0.02***	0.01	0.05**
	(0.05)	(0.08)	(0.00)	(0.00)	(0.01)	(0.02)
Birth Order=7	-0.52***	-0.51***	-0.02***	-0.02***	-0.00	0.04+
	(0.06)	(0.12)	(0.00)	(0.00)	(0.01)	(0.02)
Birth Order=8	-0.42***	-0.49**	-0.02***	-0.02***	0.02	0.06*
	(0.08)	(0.15)	(0.00)	(0.01)	(0.01)	(0.03)
Birth Order=9	-0.49***	-0.64***	-0.02***	-0.02***	-0.01	0.03
	(0.11)	(0.19)	(0.00)	(0.01)	(0.02)	(0.03)
Birth Order=10	-0.50***	-0.47+	-0.02***	-0.01+	-0.02	0.06
	(0.14)	(0.25)	(0.00)	(0.01)	(0.02)	(0.06)
Birth Order=11	-0.23	-0.32	-0.03**	-0.03+	0.04	0.06
	(0.18)	(0.37)	(0.01)	(0.02)	(0.03)	(0.08)
Birth Order=12	-0.64**	-0.42	-0.04***	-0.02	-0.03	0.10

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Table 3 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.21)	(0.34)	(0.01)	(0.01)	(0.03)	(0.07)
Birth Order=13	-0.06	0.05	-0.02*	-0.01	-0.00	-0.03
	(0.32)	(0.55)	(0.01)	(0.02)	(0.06)	(0.15)
Birth Order=14	-0.75*	0.13	-0.01	0.01	0.57+	0.75
	(0.31)	(0.54)	(0.01)	(0.02)	(0.33)	(0.56)
Birth Order=15	-1.69*	-1.82	-0.05***	-0.05*	0.02	-0.08
	(0.66)	(1.21)	(0.01)	(0.02)	(0.08)	(0.23)
Birth Order=16	-0.11	0.57	-0.03	0.03	-0.16	-0.14
	(0.69)	(0.86)	(0.03)	(0.03)	(0.16)	(0.12)
Birth Order=18	-1.37*	-0.08	-0.05**	-0.01***	-0.00	
	(0.68)	(0.08)	(0.02)	(0.00)	(0.03)	
Constant	36.76***	14.09***	1.52***	0.19***	10.31***	12.76***
	(2.60)	(0.78)	(0.12)	(0.03)	(0.40)	(0.14)
Observations	52602	52602	52602	52602	50516	50516

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

3.2. Heterogeneity of the effect of divorce

In this section, I mainly use the Random Effect Model. Since many of these characteristics are chosen by the family and might be endogeneous, the following estimated effects have to be interpreted with care, indicating correlations rather than causal relation.

Gender heterogeneity. Table 4 shows the effect of parental separation on labour market outcome according to gender. The results suggest that boys' education suffer more from a parental separation than do girls. This is the case until the age of 12, but only significant for 7-12 years-old (see Table A.17²¹ in the Appendix). Girls' social position is more affected by parental separation than boys' one, but the difference is not statistically significant. These findings contrast with Brenøe and Lundberg (2016) [35] and Lundberg (2017) [100] who find no gender difference in the effect of family structure on adult outcomes.

Table 4 – Heterogeneous divorce effect according to gender

	Schooling	Earnings-weighted Education	Social Position
Divorced	-0.38*** (0.04)	-0.02*** (0.00)	-0.04*** (0.01)
Male=1	-0.23*** (0.01)	0.04*** (0.00)	-0.20*** (0.00)
DivorcedXMale=1	-0.18** (0.06)	-0.01** (0.00)	0.01 (0.01)
Year of birth	0.13*** (0.00)	0.00*** (0.00)	0.01*** (0.00)
Year of birth squared	-0.00*** (0.00)	-0.00*** (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.53*** (0.02)	0.02*** (0.00)	0.05*** (0.00)
Father: CAP, BEP	0.57*** (0.02)	0.02*** (0.00)	0.06*** (0.00)
Father: Brevet (vocational track)	1.21*** (0.06)	0.05*** (0.00)	0.13*** (0.01)
Father: Baccalaureat	1.36*** (0.03)	0.05*** (0.00)	0.14*** (0.00)
Father: BAC + 2	1.49*** (0.04)	0.06*** (0.00)	0.15*** (0.01)
Father: Supérieur à BAC + 2	1.86*** (0.04)	0.09*** (0.00)	0.21*** (0.01)
Father: Artisan (Craftman)	0.21***	0.01***	0.18***

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²¹We must note that the third column is not exactly the difference between the 2 first columns, in the 2 first columns, the models are estimated for girls and boys separately, thus coefficients of the control variables are also allowed to vary across gender, but results are consistent.

Table 4 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
	(0.03)	(0.00)	(0.01)
Father: White Collar, Senior Executive	0.73***	0.03***	0.25***
	(0.04)	(0.00)	(0.01)
Father: Intermediate profession	0.27***	0.01***	0.17***
	(0.03)	(0.00)	(0.01)
Father: Employee	-0.07*	-0.00	0.13***
	(0.03)	(0.00)	(0.01)
Father: Manual Worker	-0.46***	-0.02***	0.08***
	(0.03)	(0.00)	(0.01)
Father: Retired	0.87***	0.04***	0.21***
	(0.04)	(0.00)	(0.01)
Father: Other	-0.20***	-0.00	0.11***
	(0.05)	(0.00)	(0.01)
Mother: Primary, Secondary School Degreee	0.70***	0.02***	0.08***
	(0.01)	(0.00)	(0.00)
Mother: CAP, BEP	0.89***	0.03***	0.10***
	(0.02)	(0.00)	(0.00)
Mother: Brevet (vocational track)	1.31***	0.05***	0.16***
	(0.06)	(0.00)	(0.01)
Mother: Baccalaureat	1.55***	0.06***	0.17***
	(0.03)	(0.00)	(0.00)
Mother: BAC + 2	1.60***	0.07***	0.18***
	(0.04)	(0.00)	(0.01)
Mother: Supérieur à BAC + 2	1.70***	0.08***	0.18***
	(0.05)	(0.00)	(0.01)
Mother: Artisan (Craftman)	-0.04	-0.00	0.04***
	(0.04)	(0.00)	(0.01)
Mother: White Collar, Senior Executive	0.21***	0.02***	0.07***
	(0.05)	(0.00)	(0.01)
Mother: Intermediate profession	0.27***	0.01***	0.07***
	(0.04)	(0.00)	(0.01)
Mother: Employee	0.13***	0.00**	0.06***
	(0.03)	(0.00)	(0.01)
Mother: Manual Worker	-0.17***	-0.01***	0.03***
	(0.03)	(0.00)	(0.01)
Mother: Retired	-0.07	-0.00	0.00
	(0.05)	(0.00)	(0.01)
Mother: Other	0.06+	0.00*	0.05***
	(0.03)	(0.00)	(0.01)
Sibling Size	-0.19***	-0.01***	-0.03***
	(0.01)	(0.00)	(0.00)
Sibling Size squared	0.01***	0.00***	0.00***

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table 4 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
	(0.00)	(0.00)	(0.00)
Region of birth:North West	-0.07***	-0.00***	-0.05***
	(0.02)	(0.00)	(0.00)
Region of birth:North	0.03	0.00	-0.04***
	(0.02)	(0.00)	(0.00)
Region of birth:East	0.00	-0.00*	-0.04***
	(0.02)	(0.00)	(0.00)
Region of birth:West	0.06**	-0.00	-0.05***
	(0.02)	(0.00)	(0.00)
Region of birth:South West	0.05*	-0.00	-0.06***
	(0.02)	(0.00)	(0.00)
Region of birth:South East	0.07**	0.00	-0.04***
	(0.02)	(0.00)	(0.00)
Region of birth:Corse	-0.23+	-0.01	-0.06**
	(0.13)	(0.01)	(0.02)
Region of birth:Oversea	0.03	0.00	-0.02*
	(0.06)	(0.00)	(0.01)
Mother Nationality: European	0.32***	0.01***	0.03***
	(0.03)	(0.00)	(0.01)
Mother Nationality: Other	0.80***	0.02***	0.07***
	(0.08)	(0.00)	(0.01)
Father Nationality: European	0.22***	0.01***	0.03***
	(0.04)	(0.00)	(0.01)
Father Nationality: Other	0.16*	0.01+	0.03**
	(0.07)	(0.00)	(0.01)
Mother Year of Birth	-0.01***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)
Last Born	0.04**	0.00**	-0.00
	(0.01)	(0.00)	(0.00)
Age	-0.00	0.00	0.11***
	(0.01)	(0.00)	(0.00)
Age squared	0.00***	0.00*	-0.00***
	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.06***	-0.00***	0.01***
	(0.02)	(0.00)	(0.00)
Birth Order=3	-0.19***	-0.01***	0.01**
	(0.02)	(0.00)	(0.00)
Birth Order=4	-0.25***	-0.01***	-0.01
	(0.03)	(0.00)	(0.00)
Birth Order=5	-0.37***	-0.02***	0.01
	(0.04)	(0.00)	(0.01)
Birth Order=6	-0.43***	-0.02***	0.01

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Table 4 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
	(0.05)	(0.00)	(0.01)
Birth Order=7	-0.53***	-0.02***	-0.00
	(0.06)	(0.00)	(0.01)
Birth Order=8	-0.42***	-0.02***	0.02
	(0.09)	(0.00)	(0.01)
Birth Order=9	-0.48***	-0.02***	-0.01
	(0.10)	(0.00)	(0.02)
Birth Order=10	-0.51***	-0.02***	-0.02
	(0.14)	(0.00)	(0.02)
Birth Order=11	-0.23	-0.03***	0.04
	(0.19)	(0.01)	(0.03)
Birth Order=12	-0.64**	-0.04***	-0.03
	(0.23)	(0.01)	(0.03)
Birth Order=13	-0.05	-0.02*	-0.00
	(0.32)	(0.01)	(0.07)
Birth Order=14	-0.74*	-0.01	0.57+
	(0.31)	(0.01)	(0.33)
Birth Order=15	-1.68*	-0.05***	0.02
	(0.69)	(0.01)	(0.08)
Birth Order=16	-0.10	-0.03	-0.16
	(0.66)	(0.03)	(0.16)
Birth Order=18	-1.37*	-0.05**	-0.00
	(0.66)	(0.02)	(0.03)
Constant	34.62***	1.45***	10.18***
	(2.50)	(0.12)	(0.41)
Observations	52602	52602	50516

Notes: Random effects results. See notes to previous Tables for a description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Heterogeneity according to family background: Table 5 shows the heterogeneity of the estimated effect of a parental separation according to mother's education. Looking at random effects results, a divorce is more harmful if the mother is more highly educated, this is the case for the three outcomes. We consider more educated mothers as mothers who have a degree (vs those who do not have any degree). This effect is true for all ages at separation in the random effects model (see Table A.18 in the Appendix).

When the family fixed effect is controlled for, results are different. Individuals whose mother is less highly educated are more affected by their parents' separation (see Table A.19 in the Appendix). These mothers might be more vulnerable, since a lower education level might be associated with a lower income. Because of homogamy, the father is likely to be poorer, therefore, it is also possible that these mothers have a lower alimony, or face more often defaults of payment²².

However, among individuals whose mothers are less highly educated, those who experience a parental separation are positively selected. If they experience it after the age of 18, and are therefore not very affected by the parental separation per se, they do on average one semester more of schooling and have a social position associated on average with a wage 8% larger (see Table A.18). This explains why the effect of parental separation is lower for this subsample in the random effects model.

Moreover, having a mother with no degree could mean a lower potential loss from a separation; the children of non-divorced families where the mother has a lower level of education experience shorter schooling, lower social position, and so divorce has a lower impact because their level of schooling/earnings is already low ; whereas where the mother is more highly educated, there is place for more inequalities. This might also explain why in the random effects model, the effect of parental separation seems larger in this group.

Table 5 – Heterogeneous divorce effect according to mother's degree

	Schooling	Earnings-weighted Education	Social Position
Divorced	-0.58*** (0.03)	-0.02*** (0.00)	-0.06*** (0.00)
Less=1	-0.83*** (0.01)	-0.03*** (0.00)	-0.09*** (0.00)
DivorcedXLess=1	0.40*** (0.05)	0.02*** (0.00)	0.06*** (0.01)
Male	-0.24*** (0.01)	0.03*** (0.00)	-0.20*** (0.00)

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²²In France, alimony is not systematic and depends on father's income. If the father is considered too poor, he does not have to give alimony for his child, but the State gives 100 euros a month for a child. In other cases, the alimony is in average 140 euros a month for a child. The Yellow Jacket movement has highlighted the economic difficulties of single mothers in France, facing their ex-husband's default of payment.

Table 5 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Year of birth	0.13*** (0.00)	0.00*** (0.00)	0.01*** (0.00)
Year of birth squared	-0.00*** (0.00)	-0.00+ (0.00)	0.00** (0.00)
Father: Primary, Secondary School Degreee	0.50*** (0.02)	0.01*** (0.00)	0.05*** (0.00)
Father: CAP, BEP	0.57*** (0.02)	0.02*** (0.00)	0.06*** (0.00)
Father: Brevet (vocational track)	1.31*** (0.05)	0.05*** (0.00)	0.15*** (0.01)
Father: Baccalaureat	1.52*** (0.03)	0.06*** (0.00)	0.16*** (0.00)
Father: BAC + 2	1.71*** (0.04)	0.07*** (0.00)	0.18*** (0.01)
Father: Supérieur à BAC + 2	2.24*** (0.03)	0.11*** (0.00)	0.25*** (0.00)
Father: Artisan (Craftman)	0.23*** (0.03)	0.01*** (0.00)	0.18*** (0.01)
Father: White Collar, Senior Executive	0.77*** (0.04)	0.04*** (0.00)	0.25*** (0.01)
Father: Intermediate profession	0.27*** (0.03)	0.01*** (0.00)	0.18*** (0.01)
Father: Employee	-0.09* (0.03)	-0.00+ (0.00)	0.13*** (0.01)
Father: Manual Worker	-0.48*** (0.03)	-0.02*** (0.00)	0.07*** (0.01)
Father: Retired	0.86*** (0.04)	0.04*** (0.00)	0.21*** (0.01)
Father: Other	-0.22*** (0.05)	-0.00 (0.00)	0.11*** (0.01)
Mother: Artisan (Craftman)	-0.01 (0.04)	0.00 (0.00)	0.04*** (0.01)
Mother: White Collar, Senior Executive	0.63*** (0.05)	0.04*** (0.00)	0.12*** (0.01)
Mother: Intermediate profession	0.66*** (0.04)	0.03*** (0.00)	0.12*** (0.01)
Mother: Employee	0.17*** (0.04)	0.01*** (0.00)	0.07*** (0.01)
Mother: Manual Worker	-0.17*** (0.04)	-0.01*** (0.00)	0.03*** (0.01)
Mother: Retired	0.08 (0.05)	0.01* (0.00)	0.02+ (0.01)

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table 5 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Mother: Other	0.09** (0.03)	0.00** (0.00)	0.06*** (0.01)
Sibling Size	-0.19*** (0.01)	-0.01*** (0.00)	-0.03*** (0.00)
Sibling Size squared	0.01*** (0.00)	0.00*** (0.00)	0.00*** (0.00)
Region of birth:North West	-0.09*** (0.02)	-0.01*** (0.00)	-0.05*** (0.00)
Region of birth:North	0.01 (0.02)	-0.00 (0.00)	-0.04*** (0.00)
Region of birth:East	-0.01 (0.02)	-0.00** (0.00)	-0.04*** (0.00)
Region of birth:West	0.04* (0.02)	-0.00 (0.00)	-0.05*** (0.00)
Region of birth:South West	0.05+ (0.02)	-0.00+ (0.00)	-0.06*** (0.00)
Region of birth:South East	0.08*** (0.02)	0.00 (0.00)	-0.04*** (0.00)
Region of birth:Corse	-0.25+ (0.14)	-0.01 (0.01)	-0.06** (0.02)
Region of birth:Oversea	0.03 (0.06)	0.00 (0.00)	-0.02** (0.01)
Mother Nationality: European	0.35*** (0.03)	0.01*** (0.00)	0.04*** (0.01)
Mother Nationality: Other	0.80*** (0.08)	0.02*** (0.00)	0.07*** (0.01)
Father Nationality: European	0.19*** (0.03)	0.01** (0.00)	0.03*** (0.01)
Father Nationality: Other	0.14* (0.07)	0.01 (0.00)	0.03** (0.01)
Mother Year of Birth	-0.01*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Last Born	0.04** (0.01)	0.00** (0.00)	-0.00 (0.00)
Age	0.00 (0.01)	0.00 (0.00)	0.12*** (0.00)
Age squared	0.00*** (0.00)	0.00 (0.00)	-0.00*** (0.00)
Birth Order=2	-0.06*** (0.02)	-0.00*** (0.00)	0.01*** (0.00)
Birth Order=3	-0.20*** (0.02)	-0.01*** (0.00)	0.01* (0.00)

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Table 5 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Birth Order=4	-0.25*** (0.03)	-0.01*** (0.00)	-0.01+ (0.00)
Birth Order=5	-0.38*** (0.04)	-0.02*** (0.00)	0.01 (0.01)
Birth Order=6	-0.45*** (0.05)	-0.02*** (0.00)	0.01 (0.01)
Birth Order=7	-0.54*** (0.07)	-0.02*** (0.00)	-0.00 (0.01)
Birth Order=8	-0.43*** (0.08)	-0.02*** (0.00)	0.02 (0.01)
Birth Order=9	-0.49*** (0.11)	-0.02*** (0.00)	-0.01 (0.02)
Birth Order=10	-0.51*** (0.14)	-0.02*** (0.00)	-0.02 (0.02)
Birth Order=11	-0.21 (0.19)	-0.03** (0.01)	0.05 (0.03)
Birth Order=12	-0.63** (0.21)	-0.04*** (0.01)	-0.03 (0.03)
Birth Order=13	-0.04 (0.33)	-0.02* (0.01)	-0.00 (0.06)
Birth Order=14	-0.71* (0.30)	-0.01 (0.01)	0.57+ (0.31)
Birth Order=15	-1.67* (0.67)	-0.05*** (0.01)	0.02 (0.08)
Birth Order=16	-0.12 (0.73)	-0.03 (0.03)	-0.16 (0.16)
Birth Order=18	-1.40* (0.70)	-0.05** (0.02)	-0.01 (0.03)
Constant	35.35*** (2.35)	1.50*** (0.11)	10.34*** (0.42)
Observations	52602	52602	50516

Notes: Random effects results. See notes to previous Tables for a description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Step-parent and type of custody. There are only 262 siblings (131 families) who have a step-parent, because this variable is not available in the 2014 wave and because half-siblings are excluded from the sample. There are too few observations to have relevant results by age group, so endogeneity cannot be controlled for - even though there are reasons to consider a selection of parents who remarry. Table 6 shows the results of the random effects model for the three outcomes. We can see that parents' separation is more harmful when there is a step-parent. Estimations show a negative effect of having a step parent on education. It is interesting that the presence of a step-parent accounts for half of the effect of parental separation on labour outcomes, and even for two thirds for the effect on the number of years of schooling.

Only 176 individuals (88 families) in the sample exhibit alternating custody, indeed, alternating custody begins to increase for couples who separate in 2003. The estimated effect is positive but statistically significant only for social position, mainly because of a lack of observations.

The (no) role of stigmatisation

High/Low divorce rate. Table 7 shows the effect of parental separation in regions with low divorce rate and in regions with high divorce rate. The divorce rate, computed from the data, is the share of individuals whose parents get separated for their cohort in their region. The divorce rate is considered high when it is over 10%. The results are not clear-cut, the estimated effect of parental separation is not different according to the share of parental separations. Unless, looking at education, we note that it is more harmful for 10-15 year-olds if the share of children whose parents are separated is low, this could reflect a stigmatisation effect, but it is less harmful for other age groups. The results are quite similar estimating a fixed-effects model (see Table A.20).

Cohorts In 1975, no fault divorce law is adopted in France, which could reflect a change in the public perception of divorce. Here, being born in 1970 is taken as the threshold, rather than the date of separation, even if those born between 1970 and 1975 experience a divorce before or after the change in the law. The reform is considered more as a variable that reflects the social perception of divorce and the increasing demand for divorce, which, clearly, had changed before 1975. Even more, it allows for the same number of observations of children who experience a separation in both sub-samples, and it makes it easier to have a comparison group in the non-divorced families (in which there is no date of separation).

Table 8 shows the estimated effect of parental separation on labour market outcomes for generations born before and after 1970. The results are not clear-cut, but they are consistent with the results by divorce rate.

The results are not clear-cut either estimating a fixed-effects model (see Table [A.21](#)).

Gender sibling heterogeneity (results not reported): The estimated effect of divorce according to the gender composition of the siblings sister/sister, brother/brother, sister/brother is not significant, although there is no information on the sex of other siblings.

Age difference (results not reported): In random effects models, there is no significant effect of the age difference between siblings on the effect of divorce, although there is no information on the year of birth of other siblings.

Table 6 – Heterogeneous divorce effect according to type of custody or presence of a step-parent

	Step parent			Alternating custody		
	Schooling	Earnings-weighted Education	Social Position	Schooling	Earnings-weighted Education	Social Position
Divorce	-0.41*** (0.04)	-0.02*** (0.00)	-0.04*** (0.01)	-0.47*** (0.03)	-0.02*** (0.00)	-0.04*** (0.00)
Having a Step-Parent	-0.81*** (0.10)	-0.03*** (0.00)	-0.06*** (0.01)			
Alternating Custody				0.04 (0.13)	0.00 (0.01)	0.05* (0.02)
Male	-0.17*** (0.02)	0.03*** (0.00)	-0.18*** (0.00)	-0.24*** (0.01)	0.03*** (0.00)	-0.20*** (0.00)
Year of birth	0.10*** (0.00)	0.00*** (0.00)	-0.01*** (0.00)	0.13*** (0.00)	0.00*** (0.00)	0.01*** (0.00)
Year of birth squared	0.00 (0.00)	0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.51*** (0.02)	0.02*** (0.00)	0.05*** (0.00)	0.53*** (0.02)	0.02*** (0.00)	0.05*** (0.00)
Father: CAP, BEP	0.59*** (0.02)	0.02*** (0.00)	0.06*** (0.00)	0.57*** (0.02)	0.02*** (0.00)	0.06*** (0.00)
Father: Brevet (vocational track)	0.66*** (0.16)	0.02** (0.01)	0.07** (0.02)	1.21*** (0.05)	0.05*** (0.00)	0.13*** (0.01)
Father: Baccalaureat	1.41*** (0.05)	0.05*** (0.00)	0.14*** (0.01)	1.36*** (0.03)	0.05*** (0.00)	0.14*** (0.00)
Father: BAC + 2	1.50*** (0.06)	0.06*** (0.00)	0.15*** (0.01)	1.49*** (0.04)	0.06*** (0.00)	0.15*** (0.01)
Father: Supérieur à BAC + 2	1.97*** (0.05)	0.09*** (0.00)	0.23*** (0.01)	1.86*** (0.03)	0.09*** (0.00)	0.21*** (0.01)
Father: Artisan (Craftman)	0.13** (0.04)	0.01*** (0.00)	0.16*** (0.01)	0.21*** (0.03)	0.01*** (0.00)	0.18*** (0.01)
Father: White Collar, Senior Executive	0.79*** (0.05)	0.04*** (0.00)	0.22*** (0.01)	0.73*** (0.04)	0.03*** (0.00)	0.25*** (0.01)
Father: Intermediate profession	0.25*** (0.04)	0.01*** (0.00)	0.16*** (0.01)	0.27*** (0.03)	0.01*** (0.00)	0.17*** (0.01)
Father: Employee	-0.14*** (0.04)	-0.01*** (0.00)	0.11*** (0.01)	-0.07* (0.03)	-0.00 (0.00)	0.13*** (0.01)
Father: Manual Worker	-0.52***	-0.02***	0.06***	-0.47***	-0.02***	0.08***

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Table 6 – *Continued from previous page*

	Step parent			Alternating custody		
	Schooling	Earnings-weighted Education	Social Position	Schooling	Earnings-weighted Education	Social Position
Father: Retired	(0.04) 0.82***	(0.00) 0.03***	(0.01) 0.18***	(0.03) 0.87***	(0.00) 0.04***	(0.01) 0.21***
Father: Other	(0.05) -0.19***	(0.00) -0.00	(0.01) 0.09***	(0.04) -0.20***	(0.00) -0.00	(0.01) 0.11***
Mother: Primary, Secondary School Degreee	(0.05) 0.69***	(0.00) 0.02***	(0.01) 0.07***	(0.05) 0.70***	(0.00) 0.02***	(0.01) 0.08***
Mother: CAP, BEP	(0.02) 0.88***	(0.00) 0.03***	(0.00) 0.09***	(0.02) 0.89***	(0.00) 0.03***	(0.00) 0.10***
Mother: Brevet (vocational track)	(0.03) 1.88***	(0.00) 0.07***	(0.00) 0.23***	(0.02) 1.31***	(0.00) 0.05***	(0.00) 0.16***
Mother: Baccalaureat	(0.22) 1.58***	(0.01) 0.06***	(0.03) 0.17***	(0.06) 1.55***	(0.00) 0.06***	(0.01) 0.17***
Mother: BAC + 2	(0.04) 1.75***	(0.00) 0.07***	(0.01) 0.20***	(0.03) 1.60***	(0.00) 0.07***	(0.01) 0.18***
Mother: Supérieur à BAC + 2	(0.05) 1.92***	(0.00) 0.08***	(0.01) 0.20***	(0.03) 1.70***	(0.00) 0.08***	(0.01) 0.18***
Mother: Artisan (Craftman)	(0.07) 0.06	(0.00) 0.00	(0.01) 0.04***	(0.04) -0.04	(0.00) -0.00	(0.01) 0.04***
Mother: White Collar, Senior Executive	(0.05) 0.21*	(0.00) 0.02***	(0.01) 0.05***	(0.04) 0.21***	(0.00) 0.02***	(0.01) 0.07***
Mother: Intermediate profession	(0.09) 0.22***	(0.00) 0.01***	(0.01) 0.06***	(0.05) 0.27***	(0.00) 0.01***	(0.01) 0.07***
Mother: Employee	(0.05) 0.14***	(0.00) 0.01***	(0.01) 0.06***	(0.04) 0.13***	(0.00) 0.00**	(0.01) 0.06***
Mother: Manual Worker	(0.04) -0.18***	(0.00) -0.01***	(0.01) 0.02*	(0.03) -0.17***	(0.00) -0.01***	(0.01) 0.03***
Mother: Retired	(0.04) -0.38***	(0.00) -0.02***	(0.01) -0.04***	(0.04) -0.07	(0.00) -0.00	(0.01) 0.00
Mother: Other	(0.06) 0.08*	(0.00) 0.00**	(0.01) 0.05***	(0.05) 0.06+	(0.00) 0.00*	(0.01) 0.05***
Sibling Size	(0.04) -0.15***	(0.00) -0.01***	(0.01) -0.03***	(0.03) -0.19***	(0.00) -0.01***	(0.01) -0.03***
Sibling Size squarred	(0.01) 0.00***	(0.00) 0.00***	(0.00) 0.00***	(0.01) 0.01***	(0.00) 0.00***	(0.00) 0.00***

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Table 6 – *Continued from previous page*

	Step parent			Alternating custody		
	Schooling	Earnings-weighted Education	Social Position	Schooling	Earnings-weighted Education	Social Position
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:North West	-0.09***	-0.01***	-0.05***	-0.07***	-0.00***	-0.05***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Region of birth:North	0.03	0.00	-0.04***	0.03	0.00	-0.04***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Region of birth:East	-0.00	-0.00	-0.04***	0.00	-0.00*	-0.04***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Region of birth:West	0.05	-0.00	-0.04***	0.06**	-0.00	-0.05***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Region of birth:South West	0.06+	-0.00*	-0.06***	0.05*	-0.00	-0.06***
	(0.03)	(0.00)	(0.01)	(0.02)	(0.00)	(0.00)
Region of birth:South East	0.08**	0.00	-0.03***	0.07***	0.00	-0.04***
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Region of birth:Corse	-0.32*	-0.00	-0.06*	-0.23	-0.01	-0.06**
	(0.14)	(0.01)	(0.03)	(0.14)	(0.01)	(0.02)
Region of birth:Oversea	-0.05	-0.00	-0.02*	0.03	0.00	-0.02*
	(0.08)	(0.00)	(0.01)	(0.06)	(0.00)	(0.01)
Mother Nationality: European	0.31***	0.01***	0.03***	0.32***	0.01***	0.03***
	(0.04)	(0.00)	(0.01)	(0.03)	(0.00)	(0.01)
Mother Nationality: Other	0.59***	0.01*	0.04**	0.80***	0.02***	0.07***
	(0.10)	(0.00)	(0.01)	(0.07)	(0.00)	(0.01)
Father Nationality: European	0.19***	0.01***	0.03***	0.22***	0.01***	0.03***
	(0.04)	(0.00)	(0.01)	(0.04)	(0.00)	(0.01)
Father Nationality: Other	0.11	0.01*	0.03*	0.16*	0.01+	0.03***
	(0.09)	(0.00)	(0.01)	(0.07)	(0.00)	(0.01)
Mother Year of Birth	-0.01***	-0.00***	-0.00***	-0.01***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.04*	0.00*	-0.00+	0.04**	0.00**	-0.00
	(0.02)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Birth Order=2	-0.12***	-0.01***	0.01***	-0.06***	-0.00***	0.01***
	(0.02)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Birth Order=3	-0.33***	-0.01***	0.01*	-0.19***	-0.01***	0.01**
	(0.03)	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
Birth Order=4	-0.44***	-0.02***	-0.01*	-0.25***	-0.01***	-0.01

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Table 6 – *Continued from previous page*

	Step parent			Alternating custody		
	Schooling	Earnings-weighted Education	Social Position	Schooling	Earnings-weighted Education	Social Position
Birth Order=5	(0.03) -0.55***	(0.00) -0.02***	(0.01) 0.01	(0.03) -0.37***	(0.00) -0.02***	(0.00) 0.01
Birth Order=6	(0.05) -0.61***	(0.00) -0.02***	(0.01) 0.01	(0.04) -0.43***	(0.00) -0.02***	(0.01) 0.01
Birth Order=7	(0.06) -0.76***	(0.00) -0.03***	(0.01) -0.00	(0.05) -0.52***	(0.00) -0.02***	(0.01) -0.00
Birth Order=8	(0.07) -0.60***	(0.00) -0.02***	(0.01) 0.04*	(0.06) -0.42***	(0.00) -0.02***	(0.01) 0.02
Birth Order=9	(0.09) -0.85***	(0.00) -0.03***	(0.02) -0.03+	(0.09) -0.49***	(0.00) -0.02***	(0.01) -0.01
Birth Order=10	(0.12) -0.94***	(0.00) -0.03***	(0.02) -0.06*	(0.12) -0.51***	(0.00) -0.02***	(0.02) -0.02
Birth Order=11	(0.15) -0.32	(0.01) -0.02*	(0.02) 0.06	(0.14) -0.22	(0.01) -0.03***	(0.02) 0.04
Birth Order=12	(0.22) -0.81**	(0.01) -0.03***	(0.04) -0.02	(0.19) -0.64**	(0.01) -0.04***	(0.03) -0.03
Birth Order=13	(0.26) -0.20	(0.01) -0.02*	(0.04) -0.01	(0.22) -0.06	(0.01) -0.02+	(0.04) -0.00
Birth Order=14	(0.39) -1.07***	(0.01) -0.02*	(0.07) 0.90	(0.34) -0.75*	(0.01) -0.01	(0.06) 0.57
Birth Order=15	(0.31) -1.19+	(0.01) -0.05***	(0.59) 0.07	(0.29) -1.68**	(0.01) -0.05***	(0.35) 0.02
Birth Order=16	(0.70) -0.79	(0.01) -0.05	(0.06) -0.44***	(0.63) -0.10	(0.01) -0.03	(0.08) -0.16
Birth Order=18	(0.98) -1.52*	(0.05) -0.05**	(0.05) -0.03	(0.65) -1.38*	(0.03) -0.05**	(0.16) -0.00
Age	(0.64)	(0.02)	(0.03)	(0.66) -0.00	(0.02) 0.00	(0.03) 0.11***
Age squared				(0.01) 0.00***	(0.00) 0.00*	(0.00) -0.00***
Constant	36.05*** (3.52)	1.25*** (0.14)	12.86*** (0.47)	34.59*** (2.52)	1.44*** (0.12)	10.18*** (0.41)
Observations	31898	31898	30624	52602	52602	50516

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Table 6 – Continued from previous page

	Step parent			Alternating custody		
	Schooling	Earnings-weighted Education	Social Position	Schooling	Earnings-weighted Education	Social Position

Notes: Random effects results. See notes to previous Tables for a description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded. To analyse the effect of a step parent, only the 2003 wave has been used (information on step-parent is not provided in the 2014 wave).

Table 7 – Heterogeneous divorce effect according to divorce rate (by region and cohort)

	Schooling		Earnings-weighted Education		Social Position	
	Low Rate	High Rate	Low Rate	High Rate	Low Rate	High Rate
0-3 at divorce	-1.01*** (0.17)	-0.96*** (0.13)	-0.04*** (0.01)	-0.04*** (0.01)	-0.06*** (0.02)	-0.06*** (0.02)
0-3 at divorce=1			-1.03*** (0.17)		-0.04*** (0.01)	-0.06** (0.02)
0-3 at divorce=1X High Divorce Rate			0.09 (0.22)		-0.00 (0.01)	-0.01 (0.03)
4-6 at divorce	-0.74*** (0.12)	-0.78*** (0.10)	-0.03*** (0.00)	-0.03*** (0.00)	-0.08*** (0.02)	-0.07*** (0.01)
4-6 at divorce=1			-0.72*** (0.13)		-0.03*** (0.00)	-0.07*** (0.02)
4-6 at divorce=1X High Divorce Rate			-0.13 (0.16)		-0.01 (0.01)	-0.01 (0.02)
7-9 at divorce	-0.46*** (0.10)	-0.56*** (0.07)	-0.02*** (0.00)	-0.03*** (0.00)	-0.05*** (0.01)	-0.03** (0.01)
7-9 at divorce=1			-0.46*** (0.11)		-0.02*** (0.00)	-0.04** (0.01)
7-9 at divorce=1X High Divorce Rate			-0.14		-0.02**	0.00

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Table 7 – *Continued from previous page*

	Schooling		Earnings-weighted Education			Social Position			
	Low rate	High rate	Low rate	High rate		Low rate	High rate		
			(0.14)		(0.01)			(0.02)	
10-12 at divorce	-0.77*** (0.08)	-0.47*** (0.08)		-0.03*** (0.00)	-0.02*** (0.00)	-0.05*** (0.01)	-0.05*** (0.01)		
10-12 at divorce=1			-0.74*** (0.10)		-0.02*** (0.00)			-0.05*** (0.01)	
10-12 at divorce=1X High Divorce Rate			0.24+ (0.13)		0.00 (0.01)			-0.01 (0.02)	
13-15 at divorce	-0.73*** (0.08)	-0.45*** (0.08)		-0.02*** (0.00)	-0.02*** (0.00)	-0.03* (0.01)	-0.05*** (0.01)		
13-15 at divorce=1			-0.69*** (0.09)		-0.02*** (0.00)			-0.02 (0.01)	
13-15 at divorce=1X High Divorce Rate			0.22+ (0.12)		0.00 (0.01)			-0.04* (0.02)	
16-18 at divorce	-0.19* (0.09)	-0.35*** (0.08)		-0.00 (0.00)	-0.02*** (0.00)	-0.03** (0.01)	-0.03** (0.01)		
16-18 at divorce=1			-0.14 (0.10)		-0.00 (0.00)			-0.02 (0.01)	
16-18 at divorce=1X High Divorce Rate			-0.21 (0.14)		-0.01* (0.01)			-0.02 (0.02)	
19 and more at divorce	0.25* (0.10)	0.04 (0.11)		0.01 (0.01)	-0.00 (0.01)	0.03+ (0.02)	-0.01 (0.01)		
19 and more at divorce=1			0.31* (0.13)		0.01 (0.01)			0.04+ (0.02)	
19 and more at divorce=1X High Divorce Rate			-0.31+ (0.16)		-0.01 (0.01)			-0.05* (0.02)	
Man	-0.12***	-0.49***	-0.24***	0.03***	0.04***	0.03***	-0.20***	-0.19***	-0.20***

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Table 7 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Low rate	High rate		Low rate	High rate		Low rate	High rate	
Year of Birth	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.13***	0.21***	0.13***	0.00***	0.01***	0.00***	0.01***	0.02***	0.01***
Year of birth squared	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.00	-0.00***	-0.00***	0.00***	-0.00***	-0.00***	0.00***	-0.00***	0.00
Father: Primary, Secondary School Degreee	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.54***	0.44***	0.53***	0.02***	0.02***	0.02***	0.05***	0.04***	0.05***
Father: CAP, BEP	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.61***	0.38***	0.57***	0.02***	0.01***	0.02***	0.07***	0.04***	0.06***
Father: Brevet (vocational track)	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1.28***	0.89***	1.20***	0.05***	0.04***	0.05***	0.15***	0.08***	0.13***
Father: Baccalaureat	(0.07)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	1.60***	0.88***	1.36***	0.06***	0.04***	0.05***	0.17***	0.09***	0.14***
Father: BAC + 2	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	1.62***	1.22***	1.48***	0.06***	0.06***	0.06***	0.17***	0.12***	0.15***
Father: Supérieur à BAC + 2	(0.06)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	2.04***	1.49***	1.85***	0.09***	0.08***	0.09***	0.23***	0.17***	0.21***
Father: Artisan (Craftman)	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.23***	0.07	0.22***	0.01***	0.01***	0.01***	0.21***	0.10***	0.18***
Father: White Collar, Senior Executive	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.82***	0.51***	0.73***	0.03***	0.03***	0.03***	0.28***	0.16***	0.25***
Father: Intermediate profession	(0.04)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.23***	0.19***	0.27***	0.01***	0.01***	0.01***	0.19***	0.10***	0.17***
Father: Employee	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.05	-0.24***	-0.07*	-0.00	-0.01**	-0.00	0.15***	0.06***	0.13***
Father: Manual Worker	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.49***	-0.50***	-0.46***	-0.02***	-0.02***	-0.02***	0.08***	0.02**	0.08***

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Table 7 – *Continued from previous page*

	Schooling		Earnings-weighted Education			Social Position			
	Low rate	High rate		Low rate	High rate		Low rate	High rate	
	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Retired	0.91***	0.68***	0.87***	0.04***	0.03***	0.04***	0.23***	0.14***	0.21***
	(0.04)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Other	-0.18***	-0.34***	-0.22***	-0.00	-0.00	-0.00	0.12***	0.03**	0.11***
	(0.05)	(0.07)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Primary, Secondary School Degreee	0.72***	0.52***	0.70***	0.02***	0.02***	0.02***	0.08***	0.05***	0.07***
	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: CAP, BEP	0.91***	0.70***	0.89***	0.03***	0.03***	0.03***	0.11***	0.08***	0.10***
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: Brevet (vocational track)	1.44***	0.97***	1.29***	0.05***	0.04***	0.05***	0.18***	0.11***	0.15***
	(0.09)	(0.06)	(0.07)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Baccalaureat	1.80***	1.13***	1.55***	0.07***	0.05***	0.06***	0.21***	0.11***	0.17***
	(0.04)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Mother: BAC + 2	1.90***	1.22***	1.60***	0.08***	0.06***	0.07***	0.22***	0.14***	0.18***
	(0.05)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Supérieur à BAC + 2	1.96***	1.45***	1.69***	0.08***	0.08***	0.08***	0.23***	0.15***	0.18***
	(0.06)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Artisan (Craftman)	0.02	-0.39***	-0.04	0.00	-0.02***	-0.00	0.04***	0.02	0.04***
	(0.05)	(0.06)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: White Collar, Senior Executive	0.34***	-0.05	0.20***	0.02***	0.00	0.02***	0.07***	0.06***	0.07***
	(0.07)	(0.06)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Intermediate profession	0.28***	-0.02	0.26***	0.01***	-0.00	0.01***	0.07***	0.04***	0.07***
	(0.05)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Employee	0.13***	-0.17***	0.13***	0.01***	-0.01**	0.00**	0.06***	0.03***	0.06***
	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Manual Worker	-0.15***	-0.49***	-0.16***	-0.00**	-0.02***	-0.01***	0.02*	0.00	0.03***

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Table 7 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Low rate	High rate		Low rate	High rate		Low rate	High rate	
Mother: Retired	(0.04)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.36***	0.20**	-0.07	-0.01***	0.00	-0.00	-0.04**	0.05***	0.00
Mother: Other	(0.05)	(0.06)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.10**	-0.32***	0.06+	0.00***	-0.01***	0.00*	0.05***	0.02*	0.05***
Family Size	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.15***	-0.26***	-0.19***	-0.01***	-0.01***	-0.01***	-0.02***	-0.03***	-0.03***
Family Size squared	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.00***	0.01***	0.01***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
Region of birth:North West	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.19***	0.11***	0.02	-0.01***	0.00	-0.00*	-0.08***	-0.03***	-0.05***
Region of birth:North	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.03	0.10*	0.19***	-0.00	0.00	0.00**	-0.06***	-0.07***	-0.03***
Region of birth:East	(0.03)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	-0.07*	0.08**	0.10***	-0.00*	-0.00	-0.00	-0.06***	-0.04***	-0.04***
Region of birth:West	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.06*	0.22***	0.14***	-0.00*	0.00	0.00	-0.07***	-0.03***	-0.04***
Region of birth:South West	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.04	0.20***	0.14***	-0.00**	0.00	0.00	-0.09***	-0.04***	-0.06***
Region of birth:South East	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	-0.01	0.15***	0.16***	-0.00	-0.00	0.00*	-0.06***	-0.04***	-0.04***
Region of birth:Corse	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.35**	1.19	-0.06	-0.01+	0.01	-0.01	-0.08***	-0.26***	-0.05*
Region of birth:Oversea	(0.13)	(1.02)	(0.15)	(0.01)	(0.09)	(0.01)	(0.02)	(0.03)	(0.02)
	-0.24**	0.08	-0.05	0.01	0.01*	-0.00	-0.04***	-0.03**	-0.02**
Mother Nationality: European	(0.09)	(0.07)	(0.06)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.28***	0.28***	0.31***	0.01***	0.01***	0.01***	0.04***	0.01+	0.03***

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Table 7 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Low rate	High rate		Low rate	High rate		Low rate	High rate	
	(0.04)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother Nationality: Other	0.82***	0.77***	0.80***	0.02***	0.02***	0.02***	0.06***	0.07***	0.07***
	(0.09)	(0.08)	(0.07)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father Nationality: European	0.25***	0.10*	0.21***	0.01***	0.00	0.01***	0.03***	0.03***	0.03***
	(0.04)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father Nationality: Other	0.10	0.05	0.16*	0.01+	0.01	0.01*	0.03*	0.02*	0.03***
	(0.08)	(0.07)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother Year of Birth	-0.01***	-0.02***	-0.01***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.06***	0.01	0.04**	0.00*	0.00+	0.00**	-0.01*	-0.00	-0.00
	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.05***	-0.01	0.01	0.00**	-0.00	0.00	0.12***	0.11***	0.11***
	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	-0.00	0.00**	0.00***	-0.00	0.00+	0.00+	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.12***	0.06*	-0.05***	-0.01***	0.00	-0.00***	0.02***	0.00	0.01***
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.22***	-0.14***	-0.18***	-0.01***	-0.01***	-0.01***	0.02***	-0.02***	0.01**
	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=4	-0.29***	-0.17***	-0.24***	-0.01***	-0.01***	-0.01***	0.00	-0.03***	-0.01
	(0.03)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Birth Order=5	-0.41***	-0.40***	-0.37***	-0.02***	-0.02***	-0.02***	0.01*	-0.02*	0.01
	(0.04)	(0.07)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Birth Order=6	-0.48***	-0.53***	-0.43***	-0.02***	-0.02***	-0.02***	0.01	-0.04**	0.01
	(0.06)	(0.11)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Birth Order=7	-0.58***	-0.58***	-0.52***	-0.02***	-0.02***	-0.02***	-0.01	-0.01	-0.00

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Table 7 – *Continued from previous page*

	Schooling		Earnings-weighted Education			Social Position			
	Low rate	High rate		Low rate	High rate		Low rate	High rate	
	(0.07)	(0.13)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)	(0.01)
Birth Order=8	-0.53***	-0.27	-0.41***	-0.02***	-0.01	-0.02***	0.02	-0.03	0.02
	(0.09)	(0.20)	(0.09)	(0.00)	(0.01)	(0.00)	(0.01)	(0.03)	(0.01)
Birth Order=9	-0.42***	-0.81***	-0.48***	-0.02***	-0.04***	-0.02***	-0.00	-0.07+	-0.01
	(0.11)	(0.23)	(0.10)	(0.00)	(0.01)	(0.00)	(0.02)	(0.04)	(0.02)
Birth Order=10	-0.69***	-0.13	-0.51***	-0.03***	0.00	-0.02***	-0.04+	0.03	-0.02
	(0.13)	(0.31)	(0.14)	(0.00)	(0.01)	(0.01)	(0.02)	(0.04)	(0.02)
Birth Order=11	-0.55**	0.17	-0.24	-0.04***	-0.01	-0.03***	0.06	-0.04	0.04
	(0.20)	(0.29)	(0.19)	(0.01)	(0.01)	(0.01)	(0.04)	(0.04)	(0.03)
Birth Order=12	-0.72**	-1.32*	-0.62**	-0.04***	-0.07**	-0.04***	-0.06*	0.10	-0.03
	(0.23)	(0.57)	(0.22)	(0.01)	(0.02)	(0.01)	(0.03)	(0.18)	(0.03)
Birth Order=13	-0.56*	0.74***	-0.06	-0.03***	0.01	-0.02*	-0.05	0.04	-0.00
	(0.24)	(0.16)	(0.29)	(0.01)	(0.01)	(0.01)	(0.08)	(0.03)	(0.07)
Birth Order=14	-0.81*	-1.77***	-0.78**	-0.01	-0.05***	-0.01	0.56+		0.57+
	(0.35)	(0.18)	(0.29)	(0.01)	(0.01)	(0.01)	(0.33)		(0.34)
Birth Order=15	-2.22***	-2.23***	-1.71**	-0.06***	-0.06***	-0.05***	0.06	-0.17***	0.02
	(0.54)	(0.30)	(0.63)	(0.01)	(0.01)	(0.01)	(0.14)	(0.05)	(0.08)
Birth Order=16	0.18		0.03	-0.02		-0.02	-0.13		-0.15
	(0.63)		(0.63)	(0.03)		(0.03)	(0.16)		(0.16)
Birth Order=18	-1.31*		-1.40*	-0.04**		-0.05**	0.00		-0.00
	(0.58)		(0.68)	(0.01)		(0.02)	(0.03)		(0.03)
1.divorce_rate			0.29***			0.01***			0.01***
			(0.02)			(0.00)			(0.00)
Constant	38.08***	52.19***	37.39***	1.25***	2.66***	1.54***	10.55***	11.93***	10.34***
	(2.94)	(3.45)	(2.59)	(0.12)	(0.16)	(0.12)	(0.48)	(0.52)	(0.43)
Observations	35020	17582	52602	35020	17582	52602	33700	16816	50516

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Table 7 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Low rate	High rate	Low rate	High rate	Low rate	High rate

Notes: Random effects results. See notes to previous Tables for a description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table 8 – Heterogeneous divorce effect according to year of birth : born before or after 1970.

	Schooling		Earnings-weighted Education		Social Position	
	Before 1970	After 1970	Before 1970	After 1970	Before 1970	After 1970
0-3 at divorce	-0.90*** (0.17)	-1.04*** (0.11)	-0.04*** (0.01)	-0.04*** (0.00)	-0.04* (0.02)	-0.09*** (0.02)
0-3 at divorce=1						
0-3 at divorce=1X1.Born After 1970						
4-6 at divorce	-0.84*** (0.11)	-0.71*** (0.09)	-0.03*** (0.00)	-0.03*** (0.00)	-0.08*** (0.02)	-0.07*** (0.01)
4-6 at divorce=1						
4-6 at divorce=1X1.Born After 1970						
7-9 at divorce	-0.41*** (0.10)	-0.60*** (0.08)	-0.02*** (0.00)	-0.03*** (0.00)	-0.04** (0.01)	-0.03** (0.01)
7-9 at divorce=1						

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Table 8 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Before 1970	After 1970	Before 1970	After 1970	Before 1970	After 1970
7-9 at divorce=1X1.Born After 1970						
10-12 at divorce	-0.69***	-0.52***	-0.02***	-0.02***	-0.05***	-0.05***
	(0.08)	(0.07)	(0.00)	(0.00)	(0.01)	(0.01)
10-12 at divorce=1						
10-12 at divorce=1X1.Born After 1970						
13-15 at divorce	-0.71***	-0.46***	-0.02***	-0.02***	-0.02*	-0.06***
	(0.07)	(0.08)	(0.00)	(0.00)	(0.01)	(0.01)
13-15 at divorce=1						
13-15 at divorce=1X1.Born After 1970						
16-18 at divorce	-0.21*	-0.35***	-0.00	-0.02***	-0.02*	-0.04***
	(0.09)	(0.08)	(0.00)	(0.00)	(0.01)	(0.01)
16-18 at divorce=1						
16-18 at divorce=1X1.Born After 1970						
19 and more at divorce	0.24**	0.07	0.01	0.00	0.03+	-0.02
	(0.09)	(0.11)	(0.00)	(0.01)	(0.02)	(0.01)
19 and more at divorce=1						
19 and more at divorce=1X1.Born After 1970						

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Table 8 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Before 1970	After 1970		Before 1970	After 1970		Before 1970	After 1970	
			(0.17)			(0.01)			(0.02)
Man	-0.11*** (0.01)	-0.53*** (0.02)	-0.24*** (0.01)	0.03*** (0.00)	0.04*** (0.00)	0.03*** (0.00)	-0.20*** (0.00)	-0.19*** (0.00)	-0.20*** (0.00)
Year of Birth	0.12*** (0.00)	0.21*** (0.01)	0.12*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.03*** (0.00)	0.01*** (0.00)
Year of birth squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	0.00 (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	0.00 (0.00)	-0.00*** (0.00)	-0.00 (0.00)
Father: Primary, Secondary School Degreee	0.53*** (0.02)	0.46*** (0.02)	0.53*** (0.01)	0.02*** (0.00)	0.02*** (0.00)	0.02*** (0.00)	0.05*** (0.00)	0.05*** (0.00)	0.05*** (0.00)
Father: CAP, BEP	0.60*** (0.02)	0.39*** (0.02)	0.57*** (0.02)	0.02*** (0.00)	0.01*** (0.00)	0.02*** (0.00)	0.07*** (0.00)	0.03*** (0.00)	0.06*** (0.00)
Father: Brevet (vocational track)	1.31*** (0.06)	0.84*** (0.05)	1.20*** (0.06)	0.04*** (0.00)	0.04*** (0.00)	0.05*** (0.00)	0.15*** (0.01)	0.08*** (0.01)	0.13*** (0.01)
Father: Baccalaureat	1.60*** (0.04)	0.84*** (0.04)	1.36*** (0.03)	0.06*** (0.00)	0.04*** (0.00)	0.05*** (0.00)	0.17*** (0.01)	0.09*** (0.01)	0.14*** (0.00)
Father: BAC + 2	1.63*** (0.06)	1.19*** (0.04)	1.48*** (0.04)	0.06*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	0.17*** (0.01)	0.12*** (0.01)	0.15*** (0.01)
Father: Supérieur à BAC + 2	2.02*** (0.04)	1.45*** (0.04)	1.85*** (0.03)	0.09*** (0.00)	0.08*** (0.00)	0.09*** (0.00)	0.23*** (0.01)	0.16*** (0.01)	0.21*** (0.01)
Father: Artisan (Craftman)	0.25*** (0.04)	0.09+ (0.05)	0.22*** (0.04)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.21*** (0.01)	0.10*** (0.01)	0.18*** (0.01)
Father: White Collar, Senior Executive	0.83*** (0.04)	0.45*** (0.05)	0.73*** (0.04)	0.04*** (0.00)	0.03*** (0.00)	0.03*** (0.00)	0.28*** (0.01)	0.15*** (0.01)	0.25*** (0.01)
Father: Intermediate profession	0.24*** (0.03)	0.21*** (0.04)	0.27*** (0.03)	0.01*** (0.00)	0.01*** (0.00)	0.01*** (0.00)	0.19*** (0.01)	0.10*** (0.01)	0.18*** (0.01)
Father: Employee	-0.04 (0.03)	-0.26*** (0.04)	-0.07* (0.03)	-0.00 (0.00)	-0.01** (0.00)	-0.00 (0.00)	0.15*** (0.01)	0.06*** (0.01)	0.13*** (0.01)

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Table 8 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Before 1970	After 1970		Before 1970	After 1970		Before 1970	After 1970	
Father: Manual Worker	(0.04)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.49***	-0.52***	-0.46***	-0.02***	-0.02***	-0.02***	0.08***	0.02*	0.08***
Father: Retired	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.91***	0.66***	0.87***	0.04***	0.03***	0.04***	0.23***	0.14***	0.21***
Father: Other	(0.04)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.18***	-0.46***	-0.22***	-0.00	-0.01**	-0.00	0.12***	0.03*	0.11***
Mother: Primary, Secondary School Degreee	(0.05)	(0.07)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.70***	0.56***	0.69***	0.02***	0.02***	0.02***	0.08***	0.06***	0.07***
Mother: CAP, BEP	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.88***	0.75***	0.89***	0.03***	0.03***	0.03***	0.10***	0.08***	0.10***
Mother: Brevet (vocational track)	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1.38***	1.04***	1.30***	0.05***	0.05***	0.05***	0.19***	0.10***	0.15***
Mother: Bacculaureat	(0.09)	(0.06)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	1.77***	1.13***	1.54***	0.07***	0.05***	0.06***	0.20***	0.11***	0.17***
Mother: BAC + 2	(0.04)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	1.87***	1.22***	1.61***	0.08***	0.06***	0.07***	0.21***	0.14***	0.18***
Mother: Supérieur à BAC + 2	(0.05)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	1.98***	1.44***	1.69***	0.08***	0.08***	0.08***	0.23***	0.15***	0.18***
Mother: Artisan (Craftman)	(0.06)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.01	-0.35***	-0.04	0.00	-0.02***	-0.00	0.04***	0.02	0.04***
Mother: White Collar, Senior Executive	(0.04)	(0.06)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.28***	0.02	0.20***	0.01***	0.01	0.02***	0.05***	0.08***	0.07***
Mother: Intermediate profession	(0.07)	(0.06)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.33***	-0.04	0.26***	0.02***	-0.01+	0.01***	0.08***	0.05***	0.07***
Mother: Employee	(0.05)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.14***	-0.16***	0.13***	0.01***	-0.01**	0.00**	0.06***	0.04***	0.06***

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Table 8 – *Continued from previous page*

	Schooling		Earnings-weighted Education			Social Position		
	Before 1970	After 1970	Before 1970	After 1970		Before 1970	After 1970	
	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Manual Worker	-0.15***	-0.48***	-0.17***	-0.00**	-0.02***	-0.01***	0.02+	0.01
	(0.04)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Retired	-0.32***	0.27***	-0.07	-0.01***	0.01**	-0.00	-0.03**	0.06***
	(0.06)	(0.06)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Other	0.10**	-0.33***	0.06+	0.00***	-0.01***	0.00+	0.05***	0.02*
	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Family Size	-0.15***	-0.27***	-0.18***	-0.01***	-0.01***	-0.01***	-0.02***	-0.03***
	(0.01)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Family Size squared	0.00***	0.01***	0.01***	0.00***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:North West	-0.10***	-0.01	-0.08***	-0.01***	-0.00+	-0.00***	-0.06***	-0.03***
	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:North	-0.04+	0.21***	0.02	-0.00	0.01***	0.00	-0.05***	-0.02***
	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:East	0.02	-0.03	0.00	-0.00	-0.01**	-0.00*	-0.04***	-0.04***
	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:West	0.04	0.09***	0.05*	-0.00	-0.00	-0.00	-0.05***	-0.03***
	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:South West	0.05+	0.09**	0.05+	-0.00	-0.00	-0.00+	-0.07***	-0.04***
	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Region of birth:South East	0.08***	0.04	0.07***	0.00+	-0.00*	0.00	-0.04***	-0.04***
	(0.02)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:Corse	-0.29*	-0.14	-0.25+	-0.01	-0.01	-0.01	-0.04+	-0.09**
	(0.14)	(0.20)	(0.13)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)
Region of birth:Oversea	-0.01	0.12	0.03	0.00	0.00	0.00	-0.02*	-0.02*

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Table 8 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Before 1970	After 1970		Before 1970	After 1970		Before 1970	After 1970	
Mother Nationality: European	(0.07) 0.32***	(0.08) 0.23***	(0.06) 0.31***	(0.00) 0.01***	(0.00) 0.01**	(0.00) 0.01***	(0.01) 0.05***	(0.01) 0.00	(0.01) 0.03***
Mother Nationality: Other	(0.04) 0.86***	(0.04) 0.73***	(0.03) 0.80***	(0.00) 0.03***	(0.00) 0.02***	(0.00) 0.02***	(0.01) 0.07***	(0.01) 0.05***	(0.01) 0.07***
Father Nationality: European	(0.08) 0.27***	(0.08) 0.07	(0.07) 0.21***	(0.00) 0.01***	(0.00) 0.00	(0.00) 0.01***	(0.01) 0.03***	(0.01) 0.03***	(0.01) 0.03***
Father Nationality: Other	(0.04) 0.10	(0.05) 0.07	(0.04) 0.15*	(0.00) 0.00	(0.00) 0.01*	(0.00) 0.01+	(0.01) 0.02+	(0.01) 0.04**	(0.01) 0.03***
Mother Year of Birth	(0.08) -0.01***	(0.07) -0.02***	(0.07) -0.01***	(0.00) -0.00***	(0.00) -0.00***	(0.00) -0.00***	(0.01) -0.00***	(0.01) -0.00***	(0.01) -0.00***
Last Born	(0.00) 0.06***	(0.00) 0.01	(0.00) 0.04**	(0.00) 0.00**	(0.00) 0.00	(0.00) 0.00**	(0.00) -0.00+	(0.00) -0.00	(0.00) -0.00
Age	(0.02) 0.06***	(0.02) 0.02	(0.01) 0.03***	(0.00) 0.00**	(0.00) -0.00	(0.00) 0.00*	(0.00) 0.12***	(0.00) 0.12***	(0.00) 0.12***
Age squared	(0.01) -0.00*	(0.03) 0.00	(0.01) 0.00	(0.00) -0.00	(0.00) 0.00	(0.00) 0.00	(0.00) -0.00***	(0.00) -0.00***	(0.00) -0.00***
Birth Order=2	(0.00) -0.12***	(0.00) 0.05*	(0.00) -0.05**	(0.00) -0.01***	(0.00) 0.00	(0.00) -0.00***	(0.00) 0.02***	(0.00) -0.00	(0.00) 0.01***
Birth Order=3	(0.02) -0.22***	(0.02) -0.16***	(0.02) -0.18***	(0.00) -0.01***	(0.00) -0.01***	(0.00) -0.01***	(0.00) 0.02***	(0.00) -0.03***	(0.00) 0.01**
Birth Order=4	(0.02) -0.28***	(0.03) -0.19***	(0.02) -0.24***	(0.00) -0.01***	(0.00) -0.01***	(0.00) -0.01***	(0.00) 0.00	(0.01) -0.04***	(0.00) -0.01
Birth Order=5	(0.03) -0.43***	(0.05) -0.35***	(0.03) -0.37***	(0.00) -0.02***	(0.00) -0.02***	(0.00) -0.02***	(0.01) 0.01*	(0.01) -0.02*	(0.00) 0.01
Birth Order=6	(0.04) -0.48***	(0.07) -0.52***	(0.04) -0.43***	(0.00) -0.02***	(0.00) -0.03***	(0.00) -0.02***	(0.01) 0.01+	(0.01) -0.04**	(0.01) 0.01

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table 8 – *Continued from previous page*

	Schooling		Earnings-weighted Education				Social Position		
	Before 1970	After 1970	Before 1970	After 1970	Before 1970	After 1970	Before 1970	After 1970	
Birth Order=7	(0.05) -0.60***	(0.11) -0.41**	(0.05) -0.51***	(0.00) -0.02***	(0.01) -0.02***	(0.00) -0.02***	(0.01) -0.00	(0.01) -0.03	(0.01) -0.00
Birth Order=8	(0.07) -0.46***	(0.14) -0.46*	(0.06) -0.42***	(0.00) -0.02***	(0.01) -0.02**	(0.00) -0.02***	(0.01) 0.03*	(0.02) -0.06*	(0.01) 0.02
Birth Order=9	(0.08) -0.46***	(0.20) -0.63**	(0.09) -0.48***	(0.00) -0.02***	(0.01) -0.04***	(0.00) -0.02***	(0.01) -0.00	(0.03) -0.05	(0.01) -0.01
Birth Order=10	(0.12) -0.66***	(0.24) -0.01	(0.10) -0.51***	(0.00) -0.03***	(0.01) 0.00	(0.00) -0.02***	(0.01) -0.03	(0.04) -0.00	(0.02) -0.02
Birth Order=11	(0.13) -0.30	(0.29) -0.60	(0.13) -0.23	(0.00) -0.03**	(0.01) -0.04***	(0.00) -0.03***	(0.03) 0.07+	(0.04) -0.12+	(0.02) 0.04
Birth Order=12	(0.21) -0.68**	(0.39) -1.53**	(0.19) -0.63**	(0.01) -0.03***	(0.01) -0.09**	(0.01) -0.04***	(0.04) -0.03	(0.07) -0.19***	(0.04) -0.03
Birth Order=13	(0.24) -0.38	(0.59) 0.74***	(0.22) -0.08	(0.01) -0.03**	(0.03) 0.01+	(0.01) -0.02*	(0.04) -0.01	(0.04) -0.06*	(0.03) -0.01
Birth Order=14	(0.27) -0.74*	(0.19) -1.80***	(0.31) -0.79**	(0.01) -0.00	(0.01) -0.05***	(0.01) -0.01	(0.07) 0.57+	(0.03) 0.57+	(0.06) 0.57+
Birth Order=15	(0.34) -2.16***	(0.20) -2.30***	(0.27) -1.74**	(0.01) -0.06***	(0.01) -0.07***	(0.01) -0.05***	(0.31) 0.06	(0.03) -0.25***	(0.34) 0.02
Birth Order=16	(0.64) 0.24	(0.34) 0.12	(0.61) 0.12	(0.01) -0.01	(0.01) -0.02	(0.01) -0.02	(0.13) -0.12	(0.05) -0.12	(0.09) -0.14
Birth Order=18	(0.58) -1.25*	(0.63) -1.37*	(0.03) -0.04**	(0.03) -0.04**	(0.03) -0.05**	(0.03) 0.01	(0.16) 0.01	(0.17) -0.00	(0.02) -0.00
1.Born After 1970	(0.54) 0.57***	(0.64) 0.57***	(0.01) 0.57***	(0.01) 0.57***	(0.02) 0.01***	(0.02) 0.01***	(0.03) 0.01***	(0.03) 0.01***	(0.02) 0.03***
Constant	37.74***	55.66***	38.79***	1.19***	2.99***	1.58***	10.48***	12.17***	10.42***

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Table 8 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
			(2.55)			(0.12)			(0.41)
	Before 1970	After 1970		Before 1970	After 1970		Before 1970	After 1970	
	(3.01)	(3.46)		(0.12)	(0.17)		(0.46)	(0.49)	
Observations	36150	16452	52602	36150	16452	52602	34813	15703	50516

Notes: Random effects results. See notes to previous Tables for a description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

4. Sensitivity checks

4.1. Sample selection

Some sample restriction is needed when using the sibling-difference model. In this section, the possible effect of these restrictions on the results are investigated.

Excluding only children. The siblings-difference method necessarily excludes only-children from the analysis. This might be a concern, according to Caya and Liem (1998) [38], individuals from high-conflict homes with high sibling support report more positive adjustment than do only-children and individuals with low sibling support. Sibling support has also a buffering effect. To test if the exclusion of only children might affect the results, the initial sample from the survey Formation et Qualification Professionnelle (INSEE, 2003 and 2014 waves), of individuals born between 1946 and 1989 is used, their siblings are excluded here.

Table 9 shows the effect of parental separation on labour market outcomes for only children compared to children with siblings. Children with no sibling do shorter schooling and have lower social position, but the estimated effect of divorce is not significantly different for only children than for children with siblings. Thus excluding only children does not seem to affect the results on the estimation of divorce effect.

Table 9 – Sensitivity to the sample restriction: Exclusion of only children

	Schooling	Earnings-weighted Education	Social Position
Divorce	-0.39 (0.00)	-0.02 (0.00)	-0.04 (0.00)
Only child X divorce	0.18 (0.00)	0.01 (0.00)	0.01 (0.00)
Only child	-0.29 (0.00)	-0.01 (0.00)	-0.03 (0.00)
Man	-0.29 (0.00)	0.03 (0.00)	-0.18 (0.00)
Year of Birth	0.18 (0.00)	0.00 (0.00)	0.02 (0.00)
Year of birth squared	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Father: Primary, Secondary School Degreee	0.54 (0.00)	0.02 (0.00)	0.06 (0.00)
Father: CAP, BEP	0.60 (0.00)	0.02 (0.00)	0.06 (0.00)

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table 9 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Father: Brevet (vocational track)	1.14 (0.00)	0.05 (0.00)	0.12 (0.00)
Father: Baccalaureat	1.26 (0.00)	0.05 (0.00)	0.14 (0.00)
Father: BAC + 2	1.43 (0.00)	0.06 (0.00)	0.14 (0.00)
Father: Supérieur à BAC + 2	1.78 (0.00)	0.08 (0.00)	0.20 (0.00)
Father: Artisan (Craftman)	0.19 (0.00)	0.01 (0.00)	0.17 (0.00)
Father: White Collar, Senior Executive	0.77 (0.00)	0.03 (0.00)	0.24 (0.00)
Father: Intermediate profession	0.33 (0.00)	0.01 (0.00)	0.17 (0.00)
Father: Employee	-0.06 (0.00)	-0.00 (0.00)	0.12 (0.00)
Father: Manual Worker	-0.48 (0.00)	-0.02 (0.00)	0.06 (0.00)
Father: Retired	1.12 (0.00)	0.05 (0.00)	0.23 (0.00)
Father: Other	-0.01 (0.00)	0.00 (0.00)	0.12 (0.00)
Mother: Primary, Secondary School Degreee	0.69 (0.00)	0.02 (0.00)	0.07 (0.00)
Mother: CAP, BEP	0.86 (0.00)	0.03 (0.00)	0.10 (0.00)
Mother: Brevet (vocational track)	1.26 (0.00)	0.05 (0.00)	0.17 (0.00)
Mother: Baccalaureat	1.50 (0.00)	0.06 (0.00)	0.16 (0.00)
Mother: BAC + 2	1.49 (0.00)	0.07 (0.00)	0.18 (0.00)
Mother: Supérieur à BAC + 2	1.63 (0.00)	0.08 (0.00)	0.19 (0.00)
Mother: Artisan (Craftman)	0.02 (0.00)	0.00 (0.00)	0.04 (0.00)
Mother: White Collar, Senior Executive	0.29 (0.00)	0.02 (0.00)	0.06 (0.00)
Mother: Intermediate profession	0.31 (0.00)	0.01 (0.00)	0.07 (0.00)
Mother: Employee	0.13 (0.00)	0.01 (0.00)	0.06 (0.00)

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Table 9 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Mother: Manual Worker	-0.18 (0.00)	-0.01 (0.00)	0.02 (0.00)
Mother: Retired	-0.04 (0.00)	-0.00 (0.00)	-0.02 (0.00)
Mother: Other	0.08 (0.00)	0.00 (0.00)	0.05 (0.00)
Family Size	-0.17 (0.00)	-0.01 (0.00)	-0.02 (0.00)
Family Size squared	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Region of birth:North West	-0.08 (0.00)	-0.00 (0.00)	-0.06 (0.00)
Region of birth:North	-0.06 (0.00)	-0.00 (0.00)	-0.06 (0.00)
Region of birth:East	-0.07 (0.00)	-0.00 (0.00)	-0.07 (0.00)
Region of birth:West	0.02 (0.00)	-0.00 (0.00)	-0.05 (0.00)
Region of birth:South West	-0.01 (0.00)	-0.00 (0.00)	-0.07 (0.00)
Region of birth:South East	0.05 (0.00)	0.00 (0.00)	-0.05 (0.00)
Region of birth:Corse	-0.41 (0.00)	-0.02 (0.00)	-0.07 (0.00)
Region of birth:Oversea	-0.09 (0.00)	-0.00 (0.00)	-0.04 (0.00)
Birth Order=2	-0.26 (0.00)	-0.01 (0.00)	-0.02 (0.00)
Birth Order=3	-0.45 (0.00)	-0.02 (0.00)	-0.04 (0.00)
Birth Order=4	-0.52 (0.00)	-0.02 (0.00)	-0.05 (0.00)
Birth Order=5	-0.63 (0.00)	-0.03 (0.00)	-0.04 (0.00)
Birth Order=6	-0.72 (0.00)	-0.03 (0.00)	-0.05 (0.00)
Birth Order=7	-0.68 (0.00)	-0.03 (0.00)	-0.06 (0.00)
Birth Order=8	-0.56 (0.00)	-0.03 (0.00)	-0.04 (0.00)
Birth Order=9	-0.26 (0.00)	-0.02 (0.00)	-0.03 (0.00)

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Table 9 – *Continued from previous page*

	Schooling	Earnings-weighted Education	Social Position
Birth Order=10	-0.64 (0.00)	-0.04 (0.00)	-0.04 (0.00)
Birth Order=11	-0.23 (0.00)	-0.04 (0.00)	0.01 (0.00)
Birth Order=12	-0.89 (0.00)	-0.05 (0.00)	-0.07 (0.00)
Birth Order=13	-0.60 (0.00)	-0.04 (0.00)	0.04 (0.00)
Birth Order=14	-2.06 (0.00)	-0.07 (0.00)	-0.01 (0.00)
Birth Order=15	-2.18 (0.00)	-0.08 (0.00)	-0.13 (0.00)
Birth Order=16	-3.52 (0.00)	-0.18 (0.00)	-0.22 (0.00)
Mother Nationality: European	0.39 (0.00)	0.01 (0.00)	0.04 (0.00)
Mother Nationality: Other	0.95 (0.00)	0.03 (0.00)	0.08 (0.00)
Father Nationality: European	0.18 (0.00)	0.01 (0.00)	0.03 (0.00)
Father Nationality: Other	-0.08 (0.00)	-0.00 (0.00)	0.01 (0.00)
Mother Year of Birth	-0.03 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Age	-0.00 (0.00)	0.00 (0.00)	0.11 (0.00)
Age squared	0.00 (0.00)	0.00 (0.00)	-0.00 (0.00)
Constant	61.24 (0.00)	2.14 (0.00)	13.25 (0.00)
Observations	34421	34421	33906

Notes: Random effects results. Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: All respondents from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014, born between 1946 and 1988.

Excluding siblings who experience a divorce in the same age group. To be able to estimate the siblings-difference model, siblings in the same age group must be excluded. The random effects excluding, or not, siblings who are in the same age group are shown in Table 10. Columns 1, 3 and 5 show the results for the whole sample, and columns 2, 4 and 6 show the results excluding siblings who experience a divorce in the same age group. Results are similar except for schooling for those who are older than 19 at the moment of the separation, which is the reference group. It is possible that the effect of divorce is somewhat under-estimated for the sample excluding siblings who experience the separation is the same age group, but this is very small.

Table 10 – Sensitivity to the sample restriction: Exclusion of the siblings of the same age group

	Schooling		Earnings-weighted Education		Social Position	
0-3 at divorce	-0.73*** (0.08)	-0.81*** (0.10)	-0.03*** (0.00)	-0.03*** (0.00)	-0.06*** (0.01)	-0.07*** (0.01)
4-6 at divorce	-0.78*** (0.07)	-0.78*** (0.08)	-0.03*** (0.00)	-0.03*** (0.00)	-0.07*** (0.01)	-0.07*** (0.01)
7-9 at divorce	-0.48*** (0.06)	-0.50*** (0.06)	-0.02*** (0.00)	-0.03*** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)
10-12 at divorce	-0.59*** (0.05)	-0.60*** (0.06)	-0.02*** (0.00)	-0.02*** (0.00)	-0.06*** (0.01)	-0.05*** (0.01)
13-15 at divorce	-0.54*** (0.05)	-0.59*** (0.05)	-0.02*** (0.00)	-0.02*** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)
16-18 at divorce	-0.23*** (0.06)	-0.25*** (0.07)	-0.01** (0.00)	-0.01** (0.00)	-0.02** (0.01)	-0.03*** (0.01)
19 and more at divorce	0.23*** (0.05)	0.10 (0.07)	0.01*** (0.00)	0.00 (0.00)	0.03*** (0.01)	0.01 (0.01)
Man	-0.24*** (0.01)	-0.23*** (0.01)	0.03*** (0.00)	0.03*** (0.00)	-0.19*** (0.00)	-0.20*** (0.00)
Year of birth	0.14*** (0.00)	0.14*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.02*** (0.00)	0.02*** (0.00)
Year of birth squared	-0.00***	-0.00***	-0.00***	-0.00***	0.00	0.00
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Primary, Secondary School Degreee	0.52***	0.53***	0.02***	0.02***	0.05***	0.05***
	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Father: CAP, BEP	0.56***	0.57***	0.02***	0.02***	0.06***	0.06***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Brevet (vocational track)	1.22***	1.21***	0.05***	0.05***	0.13***	0.13***
	(0.05)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Baccalaureat	1.36***	1.38***	0.05***	0.05***	0.14***	0.14***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Father: BAC + 2	1.44***	1.45***	0.06***	0.06***	0.14***	0.15***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Supérieur à BAC + 2	1.85***	1.86***	0.09***	0.09***	0.21***	0.21***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
Father: Artisan (Craftman)	0.19***	0.19***	0.01***	0.01***	0.18***	0.18***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: White Collar, Senior Executive	0.72***	0.72***	0.03***	0.03***	0.25***	0.24***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Intermediate profession	0.25***	0.25***	0.01***	0.01***	0.17***	0.17***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Father: Employee	-0.08*	-0.08*	-0.00	-0.00	0.13***	0.13***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Manual Worker	-0.48***	-0.48***	-0.02***	-0.02***	0.07***	0.07***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Retired	0.82***	0.82***	0.03***	0.03***	0.21***	0.21***
	(0.04)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Other	-0.20***	-0.21***	-0.00	-0.00	0.10***	0.10***
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Primary, Secondary School Degreee	0.70***	0.71***	0.02***	0.02***	0.08***	0.07***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: CAP, BEP	0.89***	0.88***	0.03***	0.03***	0.10***	0.10***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: Brevet (vocational track)	1.30***	1.31***	0.05***	0.05***	0.16***	0.16***
	(0.07)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Baccalaureat	1.53***	1.53***	0.06***	0.06***	0.17***	0.17***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: BAC + 2	1.58***	1.57***	0.07***	0.07***	0.18***	0.18***
	(0.03)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Supérieur à BAC + 2	1.68***	1.70***	0.08***	0.08***	0.18***	0.18***
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Artisan (Craftman)	0.02	0.01	0.00	0.00	0.05***	0.05***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: White Collar, Senior Executive	0.25***	0.24***	0.02***	0.02***	0.08***	0.08***
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Intermediate profession	0.31***	0.31***	0.01***	0.01***	0.08***	0.08***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Employee	0.17***	0.16***	0.01***	0.01***	0.07***	0.07***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Manual Worker	-0.15***	-0.14***	-0.01***	-0.01***	0.03***	0.03***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Retired	-0.02	-0.02	-0.00	-0.00	0.01	0.01
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Other	0.08**	0.08**	0.00**	0.00**	0.06***	0.06***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Sibling Size	-0.19***	-0.19***	-0.01***	-0.01***	-0.02***	-0.02***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Sibling Size squared	0.01***	0.01***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Region of birth:North West	-0.05** (0.02)	-0.06** (0.02)	-0.00*** (0.00)	-0.00*** (0.00)	-0.05*** (0.00)	-0.05*** (0.00)
Region of birth:North	0.04+ (0.02)	0.04+ (0.02)	0.00 (0.00)	0.00 (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:East	0.01 (0.02)	0.01 (0.02)	-0.00* (0.00)	-0.00+ (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:West	0.07*** (0.02)	0.08*** (0.02)	-0.00 (0.00)	-0.00 (0.00)	-0.05*** (0.00)	-0.05*** (0.00)
Region of birth:South West	0.07** (0.02)	0.07** (0.02)	-0.00 (0.00)	-0.00 (0.00)	-0.06*** (0.00)	-0.06*** (0.00)
Region of birth:South East	0.08*** (0.02)	0.08*** (0.02)	0.00 (0.00)	0.00 (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:Corse	-0.27* (0.14)	-0.27* (0.13)	-0.01 (0.01)	-0.01 (0.01)	-0.07*** (0.02)	-0.07*** (0.02)
Region of birth:Oversea	0.05 (0.06)	0.07 (0.06)	0.00 (0.00)	0.00 (0.00)	-0.01 (0.01)	-0.01+ (0.01)
Mother Nationality: European	0.32*** (0.03)	0.32*** (0.03)	0.01*** (0.00)	0.01*** (0.00)	0.03*** (0.01)	0.03*** (0.01)
Mother Nationality: Other	0.88***	0.90***	0.03***	0.03***	0.08***	0.08***
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.07)	(0.08)	(0.00)	(0.00)	(0.01)	(0.01)
Father Nationality: European	0.21***	0.20***	0.01***	0.01***	0.03***	0.03***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
Father Nationality: Other	0.06	0.05	0.00	0.00	0.02*	0.03*
	(0.06)	(0.07)	(0.00)	(0.00)	(0.01)	(0.01)
Mother Year of Birth	-0.01***	-0.01***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.05***	0.05***	0.00***	0.00***	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Age	-0.00	-0.00	0.00	0.00	0.11***	0.11***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	0.00***	0.00***	0.00*	0.00*	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.05***	-0.05**	-0.00***	-0.00***	0.01***	0.01***
	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.16***	-0.16***	-0.01***	-0.01***	0.01**	0.01**
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=4	-0.24***	-0.23***	-0.01***	-0.01***	-0.01*	-0.01+
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Birth Order=5	-0.32*** (0.03)	-0.31*** (0.04)	-0.01*** (0.00)	-0.01*** (0.00)	0.01 (0.01)	0.01 (0.01)
Birth Order=6	-0.34*** (0.04)	-0.34*** (0.05)	-0.02*** (0.00)	-0.02*** (0.00)	0.01 (0.01)	0.01 (0.01)
Birth Order=7	-0.41*** (0.06)	-0.40*** (0.06)	-0.02*** (0.00)	-0.02*** (0.00)	-0.00 (0.01)	-0.00 (0.01)
Birth Order=8	-0.34*** (0.07)	-0.33*** (0.08)	-0.02*** (0.00)	-0.02*** (0.00)	0.01 (0.01)	0.01 (0.01)
Birth Order=9	-0.36*** (0.10)	-0.34*** (0.10)	-0.02*** (0.00)	-0.02*** (0.00)	0.02 (0.02)	0.02 (0.02)
Birth Order=10	-0.34** (0.12)	-0.33* (0.13)	-0.02*** (0.00)	-0.02*** (0.00)	0.02 (0.02)	0.02 (0.02)
Birth Order=11	-0.25 (0.17)	-0.23 (0.18)	-0.03*** (0.01)	-0.03*** (0.01)	0.05+ (0.03)	0.05+ (0.03)
Birth Order=12	-0.66** (0.21)	-0.66** (0.22)	-0.03*** (0.01)	-0.03*** (0.01)	-0.03 (0.03)	-0.04 (0.03)
Birth Order=13	-0.15 (0.26)	-0.15 (0.24)	-0.02* (0.01)	-0.02* (0.01)	0.02 (0.06)	0.02 (0.06)
Birth Order=14	-0.91**	-0.90**	-0.02+	-0.02+	0.37+	0.36+
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.29)	(0.30)	(0.01)	(0.01)	(0.20)	(0.19)
Birth Order=15	-1.64*	-1.63*	-0.05***	-0.05***	0.04	0.04
	(0.67)	(0.70)	(0.01)	(0.01)	(0.09)	(0.09)
Birth Order=16	-0.06	-0.06	-0.02	-0.02	-0.13	-0.14
	(0.64)	(0.64)	(0.03)	(0.03)	(0.17)	(0.16)
Birth Order=18	-1.28+	-1.27*	-0.05**	-0.05**	0.04	0.03
	(0.66)	(0.64)	(0.01)	(0.02)	(0.02)	(0.03)
Constant	39.93***	39.75***	1.56***	1.55***	11.10***	11.12***
	(2.33)	(2.28)	(0.10)	(0.09)	(0.34)	(0.34)
Observations	57932	56876	57932	56876	55572	54570
Siblings experiencing a separation in the same age group	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 10 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Included	Excluded	Included	Excluded	Included	Excluded
Siblings experiencing a separation in the same age group						

Notes: Random effects results. Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Formation et Qualification Professionnelle (INSEE), 2003 and 2014 waves, using individuals who report information on a sibling, and born between 1946 and 1988 in columns 1, 3 and 5; and excluding siblings who experience a divorce in the same age group in columns 2, 4 and 6.

4.2. Controlling for question bias

The question asks about a parental separation *during schooling*, which means that after age 16 (the age of compulsory school in France), those who declare a parental separation are still at school. This could bias the divorced families sample where more educated individuals are concerned. For example, if the individual is 25 years old when the parents are separated, it is declared only if the subject is still at school, then the longer is the schooling, the greater is the probability that the separation is declared. To investigate this potential bias, the results are compared in two different sub-samples, one including families where the respondents declare a divorce after 16 years old, and the other excluding them. All the respondents' siblings who experience a parental separation after age 16 remain in the sample.

In both Tables 11 and 12, columns 1, 3 and 5 show the results when siblings with an age difference higher than 10 years are excluded from the sample, and columns 2, 4 and 6 show the results when all the respondents and their siblings who declare a divorce after 16 years old are also excluded from the sample.

Random effects results (Table 11)

Considering differences between the two sub-samples for those who experience a parental separation after the age of 19 and the 16-18 year-olds, the estimated effect of parental separation is more negative (0.2 year of schooling) for those who experience a parental separation after the age of 19 in the second sub-sample, suggesting a small question bias for the number of years of schooling. The differences are negligible, and it does not impact the other age groups. Moreover the effect of experiencing a parental separation after the age of 19 is non statistically insignificant for all outcomes. The only thing that may change is the benchmark from the one the effect of divorce is estimated, but this change is very tiny.

Siblings-difference results (Table 12)

The siblings-difference model cannot consider all the age groups because the reference age group of 18 and over is too small, which introduces some collinearity between the age groups. Then, only five age groups are considered and the reference age group is those who experience a parental separation after the age of 16. Since this reference group is more affected by parental separation than those over the age of 18, differences compared to this reference group are smaller. Some significance is lost because a loss of observations decreases the statistical power of the estimation.

Comparing the two sub-samples, results are similar regarding the three outcomes. Therefore, question bias could be rejected.

Table 11 – Question bias. Random effects results.

	Schooling		Earnings-weighted Education		Social Position	
0-3 at divorce	-0.97*** (0.11)	-0.97*** (0.10)	-0.04*** (0.00)	-0.04*** (0.00)	-0.06*** (0.01)	-0.06*** (0.01)
4-6 at divorce	-0.79*** (0.07)	-0.79*** (0.08)	-0.03*** (0.00)	-0.03*** (0.00)	-0.08*** (0.01)	-0.08*** (0.01)
7-9 at divorce	-0.53*** (0.07)	-0.56*** (0.06)	-0.03*** (0.00)	-0.03*** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)
10-12 at divorce	-0.61*** (0.06)	-0.59*** (0.06)	-0.02*** (0.00)	-0.02*** (0.00)	-0.05*** (0.01)	-0.05*** (0.01)
13-15 at divorce	-0.56*** (0.06)	-0.56*** (0.06)	-0.02*** (0.00)	-0.02*** (0.00)	-0.04*** (0.01)	-0.04*** (0.01)
16-18 at divorce	-0.25*** (0.07)	-0.24* (0.10)	-0.01** (0.00)	-0.01 (0.00)	-0.03*** (0.01)	-0.03* (0.01)
19 and more at divorce	0.18* (0.09)	-0.04 (0.14)	0.00 (0.00)	-0.00 (0.01)	0.01 (0.01)	-0.02 (0.02)
Man	-0.24*** (0.01)	-0.24*** (0.01)	0.03*** (0.00)	0.03*** (0.00)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.13*** (0.00)	0.13*** (0.00)	0.00*** (0.00)	0.00*** (0.00)	0.01*** (0.00)	0.01*** (0.00)
Year of birth squared	-0.00***	-0.00***	-0.00***	-0.00***	0.00	0.00
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Primary, Secondary School Degreee	0.53***	0.53***	0.02***	0.02***	0.05***	0.05***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Father: CAP, BEP	0.57***	0.57***	0.02***	0.02***	0.06***	0.06***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Brevet (vocational track)	1.21***	1.21***	0.05***	0.05***	0.13***	0.13***
	(0.06)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Baccalaureat	1.36***	1.36***	0.05***	0.05***	0.14***	0.14***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Father: BAC + 2	1.49***	1.50***	0.06***	0.06***	0.15***	0.15***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Supérieur à BAC + 2	1.86***	1.87***	0.09***	0.09***	0.21***	0.21***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Artisan (Craftman)	0.21***	0.21***	0.01***	0.01***	0.18***	0.18***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: White Collar, Senior Executive	0.73***	0.74***	0.03***	0.03***	0.25***	0.25***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Intermediate profession	0.27***	0.27***	0.01***	0.01***	0.17***	0.17***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Father: Employee	-0.08*	-0.08*	-0.00	-0.00	0.13***	0.13***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Manual Worker	-0.47***	-0.46***	-0.02***	-0.02***	0.08***	0.08***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Retired	0.87***	0.87***	0.04***	0.04***	0.21***	0.21***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Father: Other	-0.22***	-0.22***	-0.00	-0.00	0.11***	0.11***
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Primary, Secondary School Degreee	0.70***	0.70***	0.02***	0.02***	0.07***	0.08***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: CAP, BEP	0.89***	0.90***	0.03***	0.03***	0.10***	0.10***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: Brevet (vocational track)	1.30***	1.30***	0.05***	0.05***	0.15***	0.16***
	(0.06)	(0.07)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Baccalaureat	1.55***	1.56***	0.06***	0.06***	0.17***	0.17***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: BAC + 2	1.60***	1.60***	0.07***	0.07***	0.18***	0.18***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Supérieur à BAC + 2	1.69***	1.70***	0.08***	0.08***	0.18***	0.19***
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Artisan (Craftman)	-0.04	-0.04	-0.00	-0.00	0.04***	0.04***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: White Collar, Senior Executive	0.21***	0.19***	0.02***	0.02***	0.07***	0.07***
	(0.05)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Intermediate profession	0.27***	0.27***	0.01***	0.01***	0.07***	0.07***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Employee	0.13***	0.13***	0.00**	0.00**	0.06***	0.06***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Manual Worker	-0.16***	-0.17***	-0.01***	-0.01***	0.03***	0.03**
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Retired	-0.07	-0.07	-0.00	-0.00	0.00	0.00
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Mother: Other	0.06*	0.06*	0.00*	0.00*	0.05***	0.05***
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Sibling Size	-0.19***	-0.19***	-0.01***	-0.01***	-0.03***	-0.03***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Sibling Size squared	0.01***	0.01***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Region of birth:North West	-0.07*** (0.02)	-0.07*** (0.02)	-0.00*** (0.00)	-0.00*** (0.00)	-0.05*** (0.00)	-0.05*** (0.00)
Region of birth:North	0.03 (0.02)	0.04 (0.02)	0.00 (0.00)	0.00 (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:East	0.01 (0.02)	0.01 (0.02)	-0.00* (0.00)	-0.00+ (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:West	0.06* (0.02)	0.06** (0.02)	-0.00 (0.00)	-0.00 (0.00)	-0.05*** (0.00)	-0.05*** (0.00)
Region of birth:South West	0.05* (0.02)	0.05* (0.02)	-0.00 (0.00)	-0.00 (0.00)	-0.06*** (0.00)	-0.06*** (0.00)
Region of birth:South East	0.07** (0.02)	0.07*** (0.02)	0.00 (0.00)	0.00 (0.00)	-0.04*** (0.00)	-0.04*** (0.00)
Region of birth:Corse	-0.23+ (0.12)	-0.20 (0.14)	-0.01 (0.01)	-0.01 (0.01)	-0.06** (0.02)	-0.06** (0.02)
Region of birth:Oversea	0.04 (0.06)	0.03 (0.06)	0.00 (0.00)	0.00 (0.00)	-0.02* (0.01)	-0.02* (0.01)
Mother Nationality: European	0.32*** (0.03)	0.32*** (0.03)	0.01*** (0.00)	0.01*** (0.00)	0.03*** (0.01)	0.03*** (0.01)
Mother Nationality: Other	0.80***	0.83***	0.02***	0.02***	0.07***	0.07***
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.07)	(0.07)	(0.00)	(0.00)	(0.01)	(0.01)
Father Nationality: European	0.22***	0.21***	0.01***	0.01***	0.03***	0.03***
	(0.04)	(0.04)	(0.00)	(0.00)	(0.01)	(0.01)
Father Nationality: Other	0.16*	0.14*	0.01+	0.01+	0.03***	0.04***
	(0.06)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Mother Year of Birth	-0.01***	-0.01***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.04**	0.04**	0.00**	0.00**	-0.00	-0.00
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Age	-0.00	-0.00	0.00	0.00	0.11***	0.11***
	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Age squared	0.00***	0.00***	0.00*	0.00**	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.05**	-0.05**	-0.00***	-0.00***	0.01***	0.01***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.18***	-0.19***	-0.01***	-0.01***	0.01**	0.01*
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=4	-0.24***	-0.25***	-0.01***	-0.01***	-0.01	-0.01
	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Birth Order=5	-0.37*** (0.04)	-0.38*** (0.04)	-0.02*** (0.00)	-0.02*** (0.00)	0.01 (0.01)	0.01 (0.01)
Birth Order=6	-0.43*** (0.05)	-0.44*** (0.05)	-0.02*** (0.00)	-0.02*** (0.00)	0.01 (0.01)	0.01 (0.01)
Birth Order=7	-0.52*** (0.06)	-0.53*** (0.06)	-0.02*** (0.00)	-0.02*** (0.00)	-0.00 (0.01)	-0.00 (0.01)
Birth Order=8	-0.42*** (0.09)	-0.42*** (0.09)	-0.02*** (0.00)	-0.02*** (0.00)	0.02 (0.01)	0.02 (0.01)
Birth Order=9	-0.49*** (0.11)	-0.47*** (0.11)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01 (0.02)	-0.01 (0.02)
Birth Order=10	-0.50*** (0.13)	-0.51*** (0.15)	-0.02*** (0.00)	-0.02*** (0.00)	-0.02 (0.02)	-0.02 (0.02)
Birth Order=11	-0.23 (0.19)	-0.23 (0.20)	-0.03*** (0.01)	-0.03*** (0.01)	0.04 (0.03)	0.04 (0.03)
Birth Order=12	-0.64** (0.23)	-0.64** (0.21)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03 (0.03)	-0.03 (0.03)
Birth Order=13	-0.06 (0.32)	-0.06 (0.34)	-0.02* (0.01)	-0.02* (0.01)	-0.00 (0.07)	-0.00 (0.07)
Birth Order=14	-0.75* (0.32)	-0.75* (0.34)	-0.01 (0.01)	-0.01 (0.01)	0.57 (0.07)	0.57+ (0.07)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 11 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.29)	(0.33)	(0.01)	(0.01)	(0.37)	(0.33)
Birth Order=15	-1.69*	-1.69*	-0.05***	-0.05***	0.02	0.02
	(0.67)	(0.67)	(0.01)	(0.01)	(0.08)	(0.08)
Birth Order=16	-0.11	-0.10	-0.03	-0.03	-0.16	-0.16
	(0.69)	(0.64)	(0.03)	(0.03)	(0.16)	(0.16)
Birth Order=18	-1.37*	-1.37*	-0.05**	-0.05**	-0.00	-0.00
	(0.67)	(0.65)	(0.02)	(0.02)	(0.03)	(0.03)
Constant	36.76***	36.55***	1.52***	1.51***	10.31***	10.35***
	(2.61)	(2.54)	(0.11)	(0.11)	(0.38)	(0.40)
Observations	52602	51946	52602	51946	50516	49889

Notes: Random effects results. Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation samples drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Columns 1, 3 and 5 show the results when siblings with an age difference larger than 10 years are excluded from the sample, and columns 2, 4 and 6 show the results when all the families of respondents who declare a divorce after age 16 are also excluded from the sample.

Table 12 – Question bias. Fixed effects results.

	Schooling		Earnings-weighted Education		Social Position	
0-3 at divorce	-0.30 (0.26)	-0.29 (0.30)	-0.01 (0.01)	-0.02 (0.01)	-0.01 (0.04)	-0.01 (0.04)
4-6 at divorce	-0.29 (0.23)	-0.27 (0.25)	-0.01 (0.01)	-0.02+ (0.01)	-0.05 (0.03)	-0.05 (0.04)
7-9 at divorce	-0.09 (0.18)	-0.10 (0.22)	-0.01 (0.01)	-0.02 (0.01)	0.00 (0.03)	-0.00 (0.03)
10-12 at divorce	-0.32* (0.16)	-0.26 (0.20)	-0.01 (0.01)	-0.01 (0.01)	-0.04+ (0.02)	-0.04 (0.03)
13-15 at divorce	-0.31* (0.13)	-0.24 (0.17)	-0.01+ (0.01)	-0.01 (0.01)	-0.02 (0.02)	-0.02 (0.03)
Man	-0.23*** (0.02)	-0.22*** (0.02)	0.04*** (0.00)	0.04*** (0.00)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.05 (0.03)	0.05 (0.03)	-0.00* (0.00)	-0.00+ (0.00)	-0.10*** (0.01)	-0.10*** (0.01)
Year of birth squared	-0.00** (0.00)	-0.00*** (0.00)	0.00* (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
Last Born	0.03 (0.02)	0.03 (0.02)	0.00+ (0.00)	0.00* (0.00)	-0.01 (0.00)	-0.01 (0.00)
Age squared	-0.00 (0.00)	-0.00 (0.00)	-0.00* (0.00)	-0.00* (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 12 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.04+	-0.05+	-0.00**	-0.00**	0.02***	0.02***
	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.16***	-0.16***	-0.01***	-0.01***	0.02**	0.02**
	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=4	-0.22***	-0.23***	-0.01***	-0.01***	0.00	0.00
	(0.05)	(0.05)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=5	-0.33***	-0.34***	-0.01***	-0.02***	0.03**	0.03*
	(0.06)	(0.07)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=6	-0.38***	-0.39***	-0.02***	-0.02***	0.05**	0.05**
	(0.09)	(0.08)	(0.00)	(0.00)	(0.02)	(0.02)
Birth Order=7	-0.52***	-0.54***	-0.02***	-0.02***	0.04+	0.04+
	(0.10)	(0.11)	(0.00)	(0.00)	(0.02)	(0.02)
Birth Order=8	-0.49**	-0.50**	-0.02***	-0.02***	0.06*	0.06*
	(0.17)	(0.16)	(0.01)	(0.01)	(0.03)	(0.03)
Birth Order=9	-0.65***	-0.63**	-0.02***	-0.02***	0.03	0.03
	(0.19)	(0.20)	(0.01)	(0.01)	(0.04)	(0.04)
Birth Order=10	-0.48+	-0.49+	-0.02	-0.02+	0.06	0.06
	(0.26)	(0.25)	(0.01)	(0.01)	(0.06)	(0.06)
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 12 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
Birth Order=11	-0.32 (0.38)	-0.32 (0.37)	-0.03 (0.02)	-0.03+ (0.02)	0.06 (0.08)	0.06 (0.07)
Birth Order=12	-0.43 (0.35)	-0.42 (0.35)	-0.02 (0.01)	-0.02 (0.01)	0.09 (0.07)	0.09 (0.07)
Birth Order=13	0.04 (0.58)	0.04 (0.65)	-0.01 (0.02)	-0.01 (0.02)	-0.03 (0.16)	-0.03 (0.15)
Birth Order=14	0.13 (0.55)	0.13 (0.56)	0.01 (0.03)	0.01 (0.03)	0.75 (0.69)	0.75 (0.61)
Birth Order=15	-1.82 (1.39)	-1.83 (1.31)	-0.05+ (0.03)	-0.05* (0.02)	-0.08 (0.23)	-0.08 (0.23)
Birth Order=16	0.56 (0.83)	0.55 (0.85)	0.03 (0.03)	0.03 (0.04)	-0.14 (0.13)	-0.14 (0.13)
Birth Order=18	-0.09 (0.09)	-0.10 (0.09)	-0.01*** (0.00)	-0.01*** (0.00)		
Constant	14.08*** (0.80)	13.96*** (0.79)	0.19*** (0.04)	0.18*** (0.03)	12.76*** (0.14)	12.74*** (0.14)
Observations	52602	51946	52602	51946	50516	49889
Families of respondents who declare a divorce after age 16	Included	Excluded	Included	Excluded	Included	Excluded

Continued on next page

Table 12 – *Continued from previous page*

Schooling	Earnings-weighted Education	Social Position

Notes: Fixed effects results. Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual’s highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation samples drawn from the Dataset “Formation et Qualification Professionnelle” (INSEE), waves 2003 and 2014. Columns 1, 3 and 5 show the results when siblings with an age difference larger than 10 years are excluded from the sample, and columns 2, 4 and 6 show the results when all the families of respondents who declare a divorce after age 16 are also excluded from the sample.

5. Concluding discussion

This chapter examines the extent of the effect of parental separation on three specific outcomes: number of years of schooling, earnings-weighted education, which accounts for the quality of the studies, and the social position. The aim is to take into account divorced family selection, using a sibling approach. The negative effect of parental separation depends on the age of the individual. Until the age of 16, those who experience a parental separation have one semester less of schooling than those who do not, and the analysis of earnings-weighted education reveals that they also experience a lower quality education. This second effect is significant but not as high. Where social position is concerned, these individuals have a social position associated with a wage 4% lower than those who do not experience a parental separation, and this effect rises to 9% for the 4-6 year-olds. Taking into account the divorced family selection, results do not change significantly.

These findings are difficult to compare to the other studies, since the outcomes vary. Björklund and Sundström (2006) [25] find no significant effect of parental separation on "earnings-weighted education" when divorced family selection is taken into account. It is not so surprising that the parental separation impact is greater in France than in Sweden, since inequality of opportunity is lower in the latter country. Francesconi et al. (2010) [66], in Germany, Ermisch and Francesconi (2001) [59], in Great Britain also find negative effects of parental separation on the probability of achieving a minimum degree (A-level or equivalent), and these authors find smaller effects but still statistically significant when selection is accounted for. Surprisingly, in France, the estimated effect of parental separation is the same when selection is taken into account, which may be due to the larger sample used for this study, that enables the retention of statistical power in the sibling-difference model. This could also signify that divorce is more wide-spread, in all social categories, in France, which makes any latent characteristics appear to be random. Therefore, there is poor evidence of a selection of divorced family in France.

If this negative correlation results from a causal relation, several mechanisms could be at stake.

On the first hand, the parental separation may impact the available parents resources. First, economic resources might decrease after the parental separation. This channel is relevant whatever the child's age at the moment of the parental separation. In France, fiscal policies already aim to help separated single parent families ²³, but it seems to be insufficient. Alimony is not systematic and covers only partially children's needs, since it depends on father's income. If the father is considered too poor, he does not have to give alimony for his child, but the State gives 100 euros a month for a child. In other cases,

²³There is a higher fiscal advantage to be widowed than separated

the alimony is in average 140 euros a month for a child. The Yellow jacket movement has highlighted the economic difficulties of single mothers in France, facing their ex-husband's default of payment. This might be at stake especially for mothers who are less highly educated. Indeed, individuals' achievement is lower than their older sibling, especially for individuals whose mother is less highly educated.

The second parental resource at stake is time, and this channel may not be independent from the first one. To compensate the decrease in income, the custodial parent might increase their working hours. Consequently, time spent with at least one parent might decrease. Several studies (Del Bono (2016) [55], Del Boca (2017) [54]) highlight the importance of time spent with the mother in early childhood. Therefore, this channel might be particularly at stake for young children. In this case, labour market policies going in the sense of a decrease in working hours or more flexible schedule might participate to decrease the causal effect of parental separation²⁴. Moreover, breakdown of parental time is likely to be affected, children would spend less time with their two parents and with the non custodial parent, this may also affect the child's development (see Chapter 2).

A third parental resource at stake is the non-custodial parent's social network. Indeed, I find that individuals whose parents are separated do less education or earn less than those whose parents are still together, especially if the mother or the father is more highly educated. This could reflect a greater loss of social network for individuals whose parents are more highly educated. Moreover, this channel may explain the large impact of parental separation on social position, given the low impact on education. Promoting alternating custody might be a solution for this channel. Even if this paper does not find any effect of alternating custody, there are too few observations in this dataset to draw any strong conclusion.

On the second hand, the parental separation may impact individual's achievement through psychological channel. First, if parental separation was not expected, children would blame themselves for their parental separation (see Booth and Amato (2001) [2]), this would be particularly at stake for younger children (see Jenkins and Boccioni (2000) [85]). Second, children might be stigmatized by their parents' separation; but this does not seem to be the case since I do not find any differential effect, neither according to the share of children whose parents are separated in their region of birth and cohort; neither according to their cohorts.

Finally, the large impact on social position, given the low impact on education, there must be other determinants of social position at play here, we could think about the occupation, largely determined by the individual's non-cognitive skills such as self-confidence,

²⁴Those policies might have adverse effects, since it may negatively impact the mother's future labour market outcomes and exacerbate gender discriminations on the labour market.

behavioural skills or social skills. This channel might differ across genders. Policy implications for the psychological channel are limited.

Future research should be devoted to investigate the different channels at stake.

6. Appendix

A1 Number of observations

Table A.1 – Number of observations depending on the sample

	(1)	(2)	(3)	(4)	(5)
Not divorced	54498	53608	53608	49534	49534
Divorced	4405	4324	3268	3068	2412
Total	58903	57932	56876	52602	51946
Only_Child	Included	Excluded	Excluded	Excluded	Excluded
Same_age_group	Included	Included	Excluded	Excluded	Excluded
High_age_difference	Included	Included	Included	Excluded	Excluded
Question_bias					Treated

Table A.2 – Number of observations by age group at divorce depending on the sample

	(1)	(2)	(3)	(4)	(5)
0-3	351	343	197	169	169
4-6	430	420	346	327	327
7-9	594	578	476	456	445
10-12	697	686	592	572	524
13-15	825	813	663	636	548
16-18	686	673	569	543	258
18 et plus	822	811	425	365	141
Total	4405	4324	3268	3068	2412
Only_Child	Included	Excluded	Excluded	Excluded	Excluded
Same_age_group	Included	Included	Excluded	Excluded	Excluded
High_age_difference	Included	Included	Included	Excluded	Excluded
Question_bias					Treated

A2 Estimation of the Outcomes

A2.1 Number of years of schooling

- i) Compute the number of years of schooling on the respondents sample after the primary school "CP"

$$Y_1 = \text{year of end of schooling} - \text{year of birth} - 6$$

- ii) Regress Y_1 on the highest degree, gender, year of birth, its quadratic term, age and its quadratic term and interaction terms. It is then predicted for individuals and their siblings. Results of this regression are presented in Table A.3.

$$Y_1 = X\beta + \epsilon \quad (\text{A.1})$$

$$\Rightarrow \hat{Y}_1 = X\hat{\beta}$$

- iii) To avoid an over-estimation of educational attainment for individuals who repeat many classes or temporarily suspend their education, the median years of schooling is associated with each degree by cohort. Table A.4 reports the values of the number of years of schooling for each cohort and each degree in the fifth first columns.

$$Y_2^{\text{degree} \times \text{cohort}} = \text{median}(Y_1^{\text{degree} \times \text{cohort}})$$

Table A.3 – Estimations of the Number of Years of Schooling

	Number of years of Schooling
Year of birth squared	-0.002*** (0.000)
Grande Ecole	-0.090 (0.103)
1st cycle at University	-1.994*** (0.105)
BTS, DUT	-2.490*** (0.066)
Paramedical or Social degree	-1.543*** (0.077)
Baccalaureat (general)	-4.214***

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Table A.3 – *Continued from previous page*

	Number of Years of Schooling
	(0.063)
Baccalaureat or Brevet (vocational track)	-4.381***
	(0.062)
Brevet de Technicien, Professionnel	-3.348***
	(0.119)
CAP, BEP	-5.766***
	(0.048)
Brevet des collèges	-6.767***
	(0.059)
CEP	-8.427***
	(0.073)
No degree	-8.319***
	(0.056)
Man=1	0.483***
	(0.055)
Grande Ecole $\times$ Man=1	-0.214+
	(0.114)
1st cycle at University $\times$ Man=1	0.296+
	(0.154)
BTS, DUT $\times$ Man=1	-0.257**
	(0.081)
Paramedical or Social degree $\times$ Man=1	0.406*
	(0.163)
Baccalaureat (general) $\times$ Man=1	-0.182*
	(0.091)
Baccalaureat or Brevet (vocational track) $\times$ Man=1	-0.147+
	(0.080)
Brevet de Technicien, Professionnel $\times$ Man=1	-0.507***
	(0.152)
CAP, BEP $\times$ Man=1	-0.598***
	(0.064)
Brevet des collèges $\times$ Man=1	-0.372***
	(0.083)
CEP $\times$ Man=1	-0.409***

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Table A.3 – *Continued from previous page*

	Number of Years of Schooling
	(0.093)
No degree $\times$ Man=1	-0.225**
	(0.076)
Year of Birth	0.018***
	(0.003)
Grande Ecole $\times$ Year of Birth	0.017**
	(0.005)
1st cycle at University $\times$ Year of Birth	0.042***
	(0.008)
BTS, DUT $\times$ Year of Birth	0.023***
	(0.004)
Paramedical or Social degree $\times$ Year of Birth	0.054***
	(0.006)
Baccalaureat (general) $\times$ Year of Birth	0.013**
	(0.004)
Baccalaureat or Brevet (vocational track) $\times$ Year of Birth	0.041***
	(0.004)
Brevet de Technicien, Professionnel $\times$ Year of Birth	0.054***
	(0.007)
CAP, BEP $\times$ Year of Birth	0.055***
	(0.003)
Brevet des collèges $\times$ Year of Birth	-0.002
	(0.004)
CEP $\times$ Year of Birth	0.055***
	(0.007)
No degree $\times$ Year of Birth	0.090***
	(0.004)
Age	-0.065***
	(0.010)
Age squared	0.001***
	(0.000)
Constant	19.355***
	(0.237)
Observations	43822

Continued on next page

Table A.3 – *Continued from previous page*

Number of Years of Schooling

Notes: Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

Looking at our measure in Table A.4, we can see that the median number of years of schooling for each degree has increased across cohorts, especially for the lowest degrees (no degree, and CEP). Indeed, since 1959, school is compulsory until the age of 16, all the individuals from the sample were younger than 16 at the moment of the reform, but from the estimations, it appears that the oldest cohorts who are less highly educated have left school before the age of 16. Some of them may stop their schooling before the reform, and therefore before the age of 16. Thus, the oldest cohorts could end school before the age of 16, whereas the most recent cohorts have at least 10 years of schooling.

Table A.4 – The Number of Years of Schooling Measure

Cohort	1946 - 1950	1951 - 1960	1961 - 1969	1970 - 1980	1981 - 1989	"Normal Age"
No Degree	6.06	7.33	8.79	9.91	10.58	?
CEP	6.18	7.02	8.31	9.26	9.76	5
Brevet des Collèges	8.62	9.19	9.87	10.15	9.89	9
CAP, BEP	8.82	9.77	10.99	11.78	12.22	11
Brevet de Technicien, Professionnel	11.02	11.96	13.07	14.11	14.74	12
Baccalaureat or Brevet (vocational Track)	10.68	11.52	12.56	13.27	13.50	12
Baccalaureat (general)	11.13	11.71	12.51	13.00	12.85	12
Paramedical or Social degree	13.34	14.10	15.34	16.26	16.54	14
BTS, DUT	12.75	13.42	14.31	14.81	14.88	14
1st cycle of University	13.12	13.67	14.94	15.76	15.87	14
Grande Ecole	15.21	15.83	16.75	17.12	17.18	17
Bachelor or Master	15.49	16.03	16.82	17.06	16.90	15 - 20

Notes: Number of years of schooling for each degree and each cohort.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

As a comparison, the number of years of schooling considered as the "normal age" (minus 6) is reported in the last column of Table A.4, it is the same across the cohorts. The "CEP" is a degree delivered at the end of the primary school, between 11 and 13 years old. The "Brevet des Collèges" is delivered at the age of 15. "CAP" and "BEP" are delivered two years after the end of the Junior High School, at 17 for the normal age. "Brevet de Technicien", "Brevet Professionnel", "Baccalaureat" are delivered three years after the end of the High School, at the age of 18. "BTS", "DUT" and 1st cycle of University are taken 2 years after the Baccalaureat. The *Grandes Ecoles* deliver a Master, 5 years after the Baccalaureat. The "normal age" measure has several issues. First, it is difficult to define a normal age for some degrees. What is the normal age to have no degree? Moreover, some variables gather several degrees in the same category:

Bachelor or more for example groups some degrees where the normal number of years of schooling is between 15 (Bachelor) and 20 (PhD). "Paramedical or Social degree" gathers different kinds of degrees, and it could be done with or without passing the Baccalaureat, we take the normal age as 2 years after the Baccalaureat.²⁵ Second, it is the same across cohorts, whereas the actual number of years at school has increased, and this reflects an increase in education across cohorts. As mentioned earlier, the oldest cohorts could end school before the age of 16, whereas the most recent cohorts have at least 10 years of schooling. Besides, taking the normal age to have the highest degree leads to omit all the years of schooling after this degree. For example, the normal number of years of schooling to have a CEP is 5 years, but the actual number of years of schooling taken by these individuals is much higher, and this reflects their education.

Our measure is not perfect either. As we can see in Table A.4, the number of years of schooling for having no degree is higher than for having a "CEP"²⁶. Staying at school may reflect both doing a better degree *or* a higher probability to repeat classes, this is not perfectly handled by taking the median.

Moreover, for the same number of years of schooling in France, it is possible to obtain degrees of diverse quality or that are differently valued in the society. In an attempt to take into account the quality of the degree, we look at another measure of schooling: the earnings-weighted education.

A2.2 Earnings-weighted education.

Following Ben-Halima et al. (2014) [19] and Björklund and Sundström (2006) [25], the Earnings-weighted education is examined for each degree.

- i) We predict the log of earnings for each gender. On the respondents sample, the log of earnings is regressed on the highest degree, year of birth, its quadratic term, age and its quadratic term, dummies for the profession categories (31 categories) and interaction terms (see Björklund and Jäntti, 1997 [23] for example). The estimation is carried out for full-time workers, using the Heckman procedure to account for the exclusion of part-time workers and the inactive. The selection equation takes into account the marital status and the number of children.

$$Y_1 = \sum_1^{K-1} a^k \delta^k + X\beta + \epsilon \quad (\text{A.2})$$

²⁵This variable is the most detailed we can have, since we do not have more detailed information for the respondent's sibling.

²⁶The "CEP" has been removed in 1989. In the last cohort, we have only 20 individuals who have a CEP.

where a^k denotes each degree. δ^k denotes the effect of having a degree compared to not having any degree on the earnings. Individual is selected only if the individual works full time, i.e., under the following condition (selection equation):

$$Full\ Time_i^* = b_0 + b_1 Number\ of\ children_i + b_2 Marital\ Status + \epsilon_i,$$

$$Full\ Time_i = \begin{cases} 1 & \text{if } Full\ Time_i^* > 0 \\ 0 & \text{if } Full\ Time_i^* \leq 0 \end{cases}$$

Results are presented in columns 3 and 5 of Table A.7, for men and women, respectively.

- ii) The Earnings-weighted education is measured by δ^k , it is the contribution of each degree to the wage compared to someone who does not have any degree. The measure is summarised in Table A.5 for each gender.

Table A.5 – The Earnings-weighted education Measure (when divorce is controlled in the Mincer Equation or not)

	Not controlling for divorce		Controlling for divorce	
	Men	Women	Men	Women
No Degree	0.00	0.00	0.00	0.00
CEP	-0.05	0.03	-0.06	0.02
Brevet des Collèges	0.12	0.05	0.12	0.05
CAP, BEP	0.08	0.05	0.07	0.05
Brevet de Technicien, Professionnel	0.09	-0.03	0.12	-0.02
Baccalaureat or Brevet (vocational Track)	0.06	0.06	0.06	0.06
Baccalaureat (general)	0.17	0.11	0.17	0.12
Paramedical or Social degree	0.25	0.18	0.28	0.19
BTS, DUT	0.24	0.17	0.24	0.16
1st cycle of University	0.18	0.07	0.19	0.07
Grande Ecole	0.51	0.40	0.51	0.41
Bachelor or Master	0.33	0.23	0.32	0.23

Notes: The wage value for each degree, by gender. In the two first columns, earnings-weighted education is estimated from A.2, not controlling for divorce (see Table A.7). In the two last columns, earnings-weighted education is estimated from A.2, but divorce is added as a control.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

One could argue that the earnings-weighted education should be estimated controlling for divorce in Equation A.2. Table A.5 shows the measure of Earnings-weighted Education when divorce is included or not in Equation A.2. The two measures are very close. Table A.6 shows the main results using these two measures of Earnings-Weighted Education.

Results are very similar. In the main body of the chapter, I use the measure not controlling from the Equation that does not control for divorce.

Figure A.1 compares the differences in the hierarchy of the two education measures. To have the same scale, the two variables have been standardised for a mean of 0 and a standard deviation of 1. We can see that the ranking is different. A degree from a Grande Ecole is much more valued when the Earnings-weighted Education is used. On the other hand, the degree from 1st cycle at university and Brevet de technicien, professionnel are much more valued when the number of years of schooling are used.

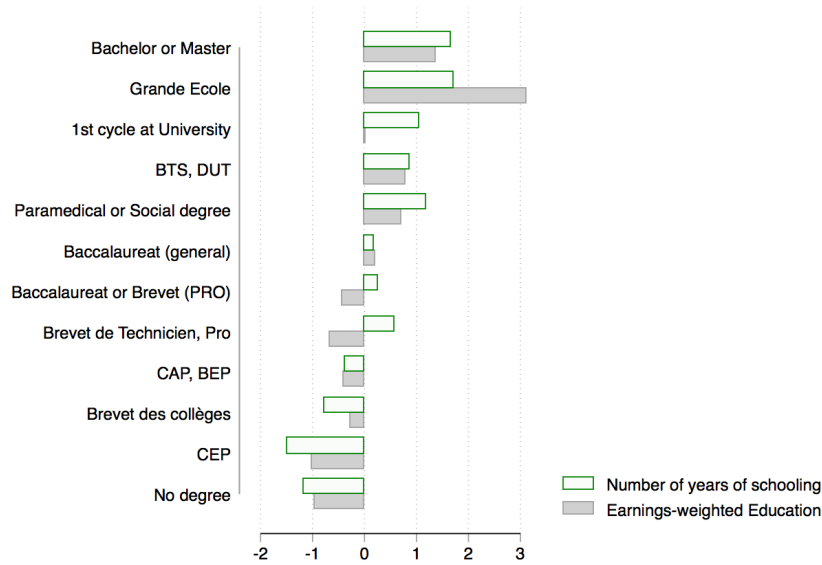


Figure A.1 – Comparison of the two Education measures: number of years of schooling vs Earnings-weighted Education

Table A.6 – Effect of a parental separation on Earnings-weighted Education (when divorce is controlled in the Mincer Equation or not)

	Not controlling for divorce		Controlling for divorce	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.03*** (0.01)	-0.02+ (0.01)	-0.04*** (0.01)	-0.02+ (0.01)
4-6 at divorce	-0.03*** (0.00)	-0.02+ (0.01)	-0.03*** (0.00)	-0.02* (0.01)
7-9 at divorce	-0.03*** (0.00)	-0.02+ (0.01)	-0.03*** (0.00)	-0.02+ (0.01)
10-12 at divorce	-0.02*** (0.00)	-0.01+ (0.01)	-0.02*** (0.00)	-0.02+ (0.01)
13-15 at divorce	-0.02*** (0.00)	-0.02* (0.01)	-0.02*** (0.00)	-0.02* (0.01)
16-18 at divorce	-0.01* (0.00)	-0.01 (0.01)	-0.01* (0.00)	-0.01 (0.01)
Ref. Group : 19+ at divorce	0.00 (0.00)		0.00 (0.00)	
Man	0.03*** (0.00)	0.03*** (0.00)	0.03*** (0.00)	0.03*** (0.00)
Year of birth	0.00*** (0.00)	-0.00 (0.00)	0.00*** (0.00)	-0.00 (0.00)
Year of birth squared	-0.00***	0.00*	-0.00***	0.00*

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Table A.6 – *Continued from previous page*

	Not controlling for divorce		Controlling for divorce	
	(0.00)	(0.00)	(0.00)	(0.00)
Father: Primary, Secondary School Degreee	0.02***		0.02***	
	(0.00)		(0.00)	
Father: CAP, BEP	0.02***		0.02***	
	(0.00)		(0.00)	
Father: Brevet (vocational track)	0.05***		0.05***	
	(0.00)		(0.00)	
Father: Baccalaureat	0.05***		0.05***	
	(0.00)		(0.00)	
Father: BAC + 2	0.06***		0.06***	
	(0.00)		(0.00)	
Father: Supérieur à BAC + 2	0.09***		0.09***	
	(0.00)		(0.00)	
Father: Artisan (Craftman)	0.01***		0.01***	
	(0.00)		(0.00)	
Father: White Collar, Senior Executive	0.03***		0.03***	
	(0.00)		(0.00)	
Father: Intermediate profession	0.01***		0.01***	
	(0.00)		(0.00)	
Father: Employee	-0.00		-0.00+	
	(0.00)		(0.00)	

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Table A.6 – *Continued from previous page*

	Not controlling for divorce	Controlling for divorce
Father: Manual Worker	-0.02*** (0.00)	-0.02*** (0.00)
Father: Retired	0.03*** (0.00)	0.03*** (0.00)
Father: Other	-0.00 (0.00)	-0.00 (0.00)
Mother: Primary, Secondary School Degreee	0.02*** (0.00)	0.02*** (0.00)
Mother: CAP, BEP	0.03*** (0.00)	0.03*** (0.00)
Mother: Brevet (vocational track)	0.05*** (0.00)	0.05*** (0.00)
Mother: Baccalaureat	0.06*** (0.00)	0.06*** (0.00)
Mother: BAC + 2	0.07*** (0.00)	0.07*** (0.00)
Mother: Supérieur à BAC + 2	0.08*** (0.00)	0.08*** (0.00)
Mother: Artisan (Craftman)	0.00 (0.00)	0.00 (0.00)
Mother: White Collar, Senior Executive	0.02***	0.02***

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Table A.6 – *Continued from previous page*

	Not controlling for divorce	Controlling for divorce
	(0.00)	(0.00)
Mother: Intermediate profession	0.01***	0.01***
	(0.00)	(0.00)
Mother: Employee	0.01***	0.01***
	(0.00)	(0.00)
Mother: Manual Worker	-0.01***	-0.01***
	(0.00)	(0.00)
Mother: Retired	-0.00	-0.00
	(0.00)	(0.00)
Mother: Other	0.00**	0.00**
	(0.00)	(0.00)
Sibling Size	-0.01***	-0.01***
	(0.00)	(0.00)
Sibling Size squared	0.00***	0.00***
	(0.00)	(0.00)
Region of birth:North West	-0.00***	-0.00***
	(0.00)	(0.00)
Region of birth:North	0.00	0.00
	(0.00)	(0.00)
Region of birth:East	-0.00+	-0.00*
	(0.00)	(0.00)

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Table A.6 – *Continued from previous page*

	Not controlling for divorce		Controlling for divorce	
Region of birth:West	-0.00 (0.00)		-0.00 (0.00)	
Region of birth:South West	-0.00 (0.00)		-0.00 (0.00)	
Region of birth:South East	0.00 (0.00)		0.00 (0.00)	
Region of birth:Corse	-0.01+ (0.01)		-0.01 (0.01)	
Region of birth:Oversea	0.00 (0.00)		0.00 (0.00)	
Mother Nationality: European	0.01*** (0.00)		0.01*** (0.00)	
Mother Nationality: Other	0.03*** (0.00)		0.03*** (0.00)	
Father Nationality: European	0.01*** (0.00)		0.01*** (0.00)	
Father Nationality: Other	0.00 (0.00)		0.00 (0.00)	
Mother Year of Birth	-0.00*** (0.00)		-0.00*** (0.00)	
Last Born	0.00***	0.00*	0.00***	0.00**

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Table A.6 – *Continued from previous page*

	Not controlling for divorce		Controlling for divorce	
	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.00		0.00	
	(0.00)		(0.00)	
Age squared	0.00*	-0.00*	0.00*	-0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.00***	-0.00**	-0.00***	-0.00**
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=4	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=5	-0.01***	-0.01***	-0.01***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=6	-0.02***	-0.01***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=7	-0.02***	-0.01***	-0.02***	-0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=8	-0.02***	-0.02***	-0.02***	-0.02***
	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=9	-0.02***	-0.02**	-0.02***	-0.02**
	(0.00)	(0.01)	(0.00)	(0.01)

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Table A.6 – *Continued from previous page*

	Not controlling for divorce		Controlling for divorce	
Birth Order=10	-0.02*** (0.00)	-0.01 (0.01)	-0.02*** (0.00)	-0.01 (0.01)
Birth Order=11	-0.03*** (0.01)	-0.03+ (0.01)	-0.03*** (0.01)	-0.03+ (0.01)
Birth Order=12	-0.03*** (0.01)	-0.02+ (0.01)	-0.03*** (0.01)	-0.02* (0.01)
Birth Order=13	-0.02** (0.01)	-0.02 (0.01)	-0.02* (0.01)	-0.02 (0.01)
Birth Order=14	-0.02* (0.01)	0.02 (0.02)	-0.02+ (0.01)	0.01 (0.02)
Birth Order=15	-0.05*** (0.01)	-0.05* (0.02)	-0.05*** (0.01)	-0.05* (0.02)
Birth Order=16	-0.02 (0.03)	0.03 (0.03)	-0.02 (0.03)	0.03 (0.03)
Birth Order=18	-0.05** (0.02)	-0.01*** (0.00)	-0.04** (0.02)	-0.01*** (0.00)
Constant	1.55*** (0.10)	0.16*** (0.03)	1.55*** (0.11)	0.15*** (0.03)
Observations	56876	56876	56876	56876

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Table A.6 – *Continued from previous page*

	Not controlling for divorce	Controlling for divorce
<i>Notes:</i> Earnings-weighted Education is the wage value of the individuals's highest degree. In the two first columns, they are estimated as mentioned previously. In the two last columns, they are estimated with the same equation described earlier, but a dummy for divorce variable has been added. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. <i>Source:</i> Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group are excluded, to avoid identification issues.		

A2.3 Social Position

Since the earnings is not provided for the sibling, we can't look at the earnings directly. We use the social position measured as the average earnings given an occupation and a diploma.

- i) For each gender, we estimate Equation A.2 using an OLS model and an Heckman procedure described earlier. Results are shown in Table A.7.
- ii) We predict it for all individuals

$$\hat{Y}_1 = \Sigma_1^{K-1} a^k \hat{\delta}^k + X \hat{\beta}$$

In Table A.7, we can see that the results obtained with the two models for men are quite similar, but for women, even if they remain qualitatively similar, the magnitude of the coefficients differ, especially looking at the coefficients of the occupation.

Table A.7 – Estimations of the Social Position

	Men		Women	
	OLS	Heckman	OLS	Heckman
main				
Age	0.07*** (0.02)	0.04+ (0.02)	-0.05 (0.11)	0.02 (0.04)
Age squarred	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Year of Birth	-0.00 (0.00)	0.00 (0.00)	0.01*** (0.00)	0.01** (0.00)
Year of birth squarred	0.00+ (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
Bachelor or Master	0.30*** (0.03)	0.33*** (0.04)	0.33*** (0.04)	0.23*** (0.03)
Grande Ecole	0.49*** (0.04)	0.51*** (0.04)	0.44*** (0.06)	0.40*** (0.06)
1st cycle at University	0.23*** (0.06)	0.18*** (0.05)	0.24*** (0.06)	0.07+ (0.04)
BTS, DUT	0.26*** (0.03)	0.24*** (0.03)	0.29*** (0.04)	0.17*** (0.04)
Paramedical or Social degree	0.26** (0.09)	0.25* (0.11)	0.33*** (0.05)	0.18*** (0.04)
Baccalaureat (general)	0.19*** (0.03)	0.17*** (0.03)	0.20*** (0.03)	0.11*** (0.03)
Baccalaureat or Brevet (vocational track)	0.09**	0.06*	0.20***	0.06*

Continued on next page

AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table A.7 – *Continued from previous page*

	Men		Women	
	OLS	Heckman	OLS	Heckman
	(0.03)	(0.03)	(0.03)	(0.03)
Brevet de Technicien, Professionnel	0.05	0.09	0.01	-0.03
	(0.06)	(0.10)	(0.07)	(0.06)
CAP, BEP	0.13***	0.08***	0.13***	0.05*
	(0.02)	(0.02)	(0.02)	(0.02)
Brevet des collèges	0.15***	0.12***	0.11***	0.05+
	(0.03)	(0.03)	(0.03)	(0.03)
CEP	-0.01	-0.05	0.04	0.03
	(0.04)	(0.03)	(0.04)	(0.04)
Grande EcoleXYear of Birth	0.00	-0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
1st cycle at UniversityXYear of Birth	0.00	0.00	-0.01	0.01+
	(0.01)	(0.00)	(0.01)	(0.00)
BTS, DUTXYear of Birth	0.01*	0.01*	0.00+	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)
Paramedical or Social degreeXYear of Birth	0.01+	0.02	0.01**	0.01***
	(0.01)	(0.01)	(0.00)	(0.00)
Baccalaureat (general)XYear of Birth	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Baccalaureat or Brevet (vocational track)XYear of Birth	0.02***	0.01***	0.00	0.01**
	(0.00)	(0.00)	(0.00)	(0.00)
Brevet de Technicien, ProfessionnelXYear of Birth	0.01*	0.00	0.02***	0.01***
	(0.00)	(0.01)	(0.00)	(0.00)
CAP, BEPXYear of Birth	0.01***	0.01***	0.00+	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)
Brevet des collègesXYear of Birth	0.01*	0.01*	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
CEPXYear of Birth	0.00	0.01+	-0.00	0.01*
	(0.00)	(0.00)	(0.01)	(0.00)
No degreeXYear of Birth	0.00	0.01*	-0.01+	0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Middle-scale Farmers	-3.24*	-3.00+	-10.95	-9.34***
	(1.26)	(1.59)	(7.18)	(2.21)
Large-scale Farmers	-2.02*	-2.01+	-6.45	-2.02
	(0.99)	(1.13)	(6.55)	(2.13)
Craftsman	-2.39**	-2.32*	-7.38	-3.49+
	(0.92)	(0.97)	(6.50)	(2.08)
Storekeeper	-2.90**	-2.65**	-8.55	-3.70+
	(0.93)	(0.99)	(6.49)	(2.04)
Firm Manager (> 10 employees)	-1.39	-1.09	-7.57	-2.25
	(0.98)	(1.01)	(6.53)	(2.33)

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Table A.7 – *Continued from previous page*

	Men		Women	
	OLS	Heckman	OLS	Heckman
Liberal profession	-1.55 (0.95)	-1.26 (1.07)	-7.83 (6.49)	-3.35+ (2.03)
Civil servant	-1.42 (0.93)	-1.35 (0.95)	-7.72 (6.49)	-3.30+ (2.00)
Professor, scientific occupation	-2.03* (0.92)	-1.78+ (0.95)	-7.86 (6.49)	-3.50+ (2.00)
Information, Arts professions	-2.48** (0.94)	-1.94+ (1.00)	-8.47 (6.49)	-3.68+ (2.01)
Administrative, sales occupations	-0.96 (0.91)	-1.07 (0.94)	-7.21 (6.49)	-2.91 (2.00)
Engineer	-1.35 (0.91)	-1.40 (0.94)	-7.62 (6.49)	-3.45+ (2.00)
Teachers	-2.29* (0.92)	-2.10* (0.94)	-8.16 (6.49)	-3.56+ (1.99)
Health and Social occupations	-1.68+ (0.92)	-1.33 (0.97)	-8.06 (6.49)	-3.88+ (1.99)
Clerical Occupations	-2.55 (3.03)	-1.83 (1.30)	-9.29 (7.09)	-5.40** (2.00)
Public Sector Intermediate Occupations	-1.69+ (0.93)	-1.64+ (0.94)	-8.29 (6.49)	-3.71+ (2.00)
Private Sector Intermediate Occupations	-1.53+ (0.91)	-1.54+ (0.94)	-7.88 (6.48)	-3.51+ (1.99)
Technician	-1.36 (0.91)	-1.41 (0.94)	-7.97 (6.49)	-3.55+ (2.00)
Walking boss	-1.37 (0.91)	-1.32 (0.94)	-8.43 (6.49)	-3.66+ (2.01)
Public Sector Employee	-1.55+ (0.91)	-1.67+ (0.94)	-7.99 (6.48)	-3.60+ (1.99)
Monitoring Agent	-1.43 (0.92)	-1.48 (0.94)	-7.57 (6.50)	-3.43+ (2.00)
Private Sector Administrative Employee	-1.77+ (0.92)	-1.76+ (0.95)	-8.11 (6.48)	-3.66+ (1.99)
Sales Employee	-1.99* (0.92)	-1.84+ (0.94)	-8.20 (6.48)	-3.73+ (1.99)
Personal Services Employee	-1.96* (0.93)	-1.86+ (0.96)	-8.60 (6.48)	-4.04* (1.99)
Skilled Worker in Industries	-1.32 (0.91)	-1.39 (0.94)	-7.86 (6.49)	-3.56+ (2.00)
Skilled Worker in Crafts	-1.53+ (0.91)	-1.61+ (0.94)	-8.23 (6.49)	-4.04* (2.01)
Skilled Worker in Industries	-1.36	-1.45	-8.13	-3.07

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table A.7 – Continued from previous page

	Men		Women	
	OLS	Heckman	OLS	Heckman
	(0.91)	(0.94)	(6.50)	(2.09)
Driver	-1.48	-1.56+	-8.19	-3.57+
	(0.92)	(0.94)	(6.50)	(2.01)
Unskilled Worker in Industries	-1.98*	-1.95*	-8.38	-3.90+
	(0.91)	(0.94)	(6.49)	(1.99)
Unskilled Worker in Crafts	-1.72+	-1.85+	-8.45	-3.89+
	(0.92)	(0.94)	(6.49)	(2.00)
Unskilled Worker in Farms	-2.52**	-2.29*	-8.14	-3.82+
	(0.93)	(0.96)	(6.49)	(2.01)
Middle-scale FarmersXAge	0.08**	0.07*	0.22	0.23***
	(0.03)	(0.04)	(0.14)	(0.04)
Large-scale FarmersXAge	0.06**	0.05*	0.10	0.02
	(0.02)	(0.03)	(0.12)	(0.04)
CraftsmanXAge	0.08***	0.07***	0.13	0.08*
	(0.02)	(0.02)	(0.11)	(0.04)
StorekeeperXAge	0.09***	0.08***	0.16	0.08*
	(0.02)	(0.02)	(0.11)	(0.04)
Firm Manager (> 10 employees)XAge	0.08***	0.07**	0.16	0.07+
	(0.02)	(0.02)	(0.12)	(0.04)
Liberal professionXAge	0.07***	0.06*	0.16	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Civil servantXAge	0.08***	0.06**	0.16	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Professor, scientific occupationXAge	0.09***	0.07**	0.17	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Information, Arts professionsXAge	0.09***	0.07**	0.17	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Administrative, sales occupationsXAge	0.07***	0.06**	0.16	0.08*
	(0.02)	(0.02)	(0.11)	(0.04)
EngineerXAge	0.08***	0.07**	0.17	0.09**
	(0.02)	(0.02)	(0.11)	(0.04)
TeachersXAge	0.08***	0.07**	0.16	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Health and Social occupationsXAge	0.07***	0.06*	0.16	0.09**
	(0.02)	(0.02)	(0.11)	(0.04)
Clerical OccupationsXAge	0.08	0.06*	0.19	0.11**
	(0.06)	(0.03)	(0.13)	(0.04)
Public Sector Intermediate OccupationsXAge	0.08***	0.06**	0.17	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)
Private Sector Intermediate OccupationsXAge	0.07***	0.06**	0.16	0.09*
	(0.02)	(0.02)	(0.11)	(0.04)

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Table A.7 – *Continued from previous page*

	Men		Women	
	OLS	Heckman	OLS	Heckman
TechnicianXAge	0.07*** (0.02)	0.06** (0.02)	0.16 (0.11)	0.09* (0.04)
Walking bossXAge	0.07*** (0.02)	0.06** (0.02)	0.17 (0.11)	0.09* (0.04)
Public Sector EmployeeXAge	0.06*** (0.02)	0.06** (0.02)	0.16 (0.11)	0.08* (0.04)
Monitoring AgentXAge	0.07*** (0.02)	0.06** (0.02)	0.15 (0.11)	0.08* (0.04)
Private Sector Administrative EmployeeXAge	0.07*** (0.02)	0.06** (0.02)	0.16 (0.11)	0.09* (0.04)
Sales EmployeeXAge	0.07*** (0.02)	0.06** (0.02)	0.16 (0.11)	0.08* (0.04)
Personal Services EmployeeXAge	0.07*** (0.02)	0.06** (0.02)	0.15 (0.11)	0.08* (0.04)
Skilled Worker in IndustriesXAge	0.06*** (0.02)	0.05* (0.02)	0.15 (0.11)	0.08* (0.04)
Skilled Worker in CraftsXAge	0.06*** (0.02)	0.06* (0.02)	0.16 (0.11)	0.09* (0.04)
Skilled Worker in IndustriesXAge	0.06** (0.02)	0.05* (0.02)	0.15 (0.11)	0.07+ (0.04)
DriverXAge	0.06*** (0.02)	0.06* (0.02)	0.16 (0.11)	0.08* (0.04)
Unskilled Worker in IndustriesXAge	0.07*** (0.02)	0.06** (0.02)	0.16 (0.11)	0.08* (0.04)
Unskilled Worker in CraftsXAge	0.06** (0.02)	0.06** (0.02)	0.15 (0.11)	0.08* (0.04)
Unskilled Worker in FarmsXAge	0.08*** (0.02)	0.07** (0.02)	0.14 (0.11)	0.08* (0.04)
Constant	8.07*** (0.92)	9.02*** (0.94)	14.61* (6.49)	11.10*** (2.00)
select				
Married		0.14*** (0.02)		-0.07*** (0.01)
Widowed		-0.17* (0.07)		-0.11** (0.04)
Divorced		-0.08** (0.03)		0.03+ (0.02)
Number of children		-0.00 (0.01)		-0.12*** (0.01)
Constant		0.57***		0.22***

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Table A.7 – *Continued from previous page*

	Men		Women	
	OLS	Heckman	OLS	Heckman
		(0.02)		(0.02)
athrho				
Constant		-1.43*** (0.03)		-1.81*** (0.04)
lnsigma				
Constant		-0.16*** (0.02)		0.05* (0.02)
Observations	18963	23203	18814	25624
R^2	0.235		0.255	
Adjusted R^2	0.231		0.252	

Notes: Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

Some summary statistics for the two measures and the observed log of earnings for each gender are reported in Table A.8. We recover the same mean than the observed one with a smaller variance. Their distributions for each gender are shown in Figure A.2. In the main body of the chapter, we use the prediction from Heckman estimation. We compare the results using the two different measures in Tables A.9 and A.10. Results are qualitatively similar, but the effects are slightly less negative using the Heckman procedure.

I add residual from a normal distribution to the actual measures. Main results for the main model using these noisy measures are in Table A.11. Results are qualitatively similar.

Table A.8 – Observed Earnings and Predicted Earnings (Social Position)

Panel A : Men

	mean	sd	min	max
Observed	9.91	0.80	0.00	14.87
Predicted with Heckman model	10.18	0.38	7.91	11.70
Predicted with OLS model	9.87	0.41	6.81	11.25
Observations	15421			

Panel B : Women

	mean	sd	min	max
Observed	9.66	0.89	0.69	12.53
Predicted with Heckman model	10.39	0.38	8.41	11.64
Predicted with OLS model	9.53	0.47	7.64	10.70
Observations	11079			

Source: Respondents to "Formation et Qualification Professionnelle" survey (INSEE), waves 2003 and 2014.

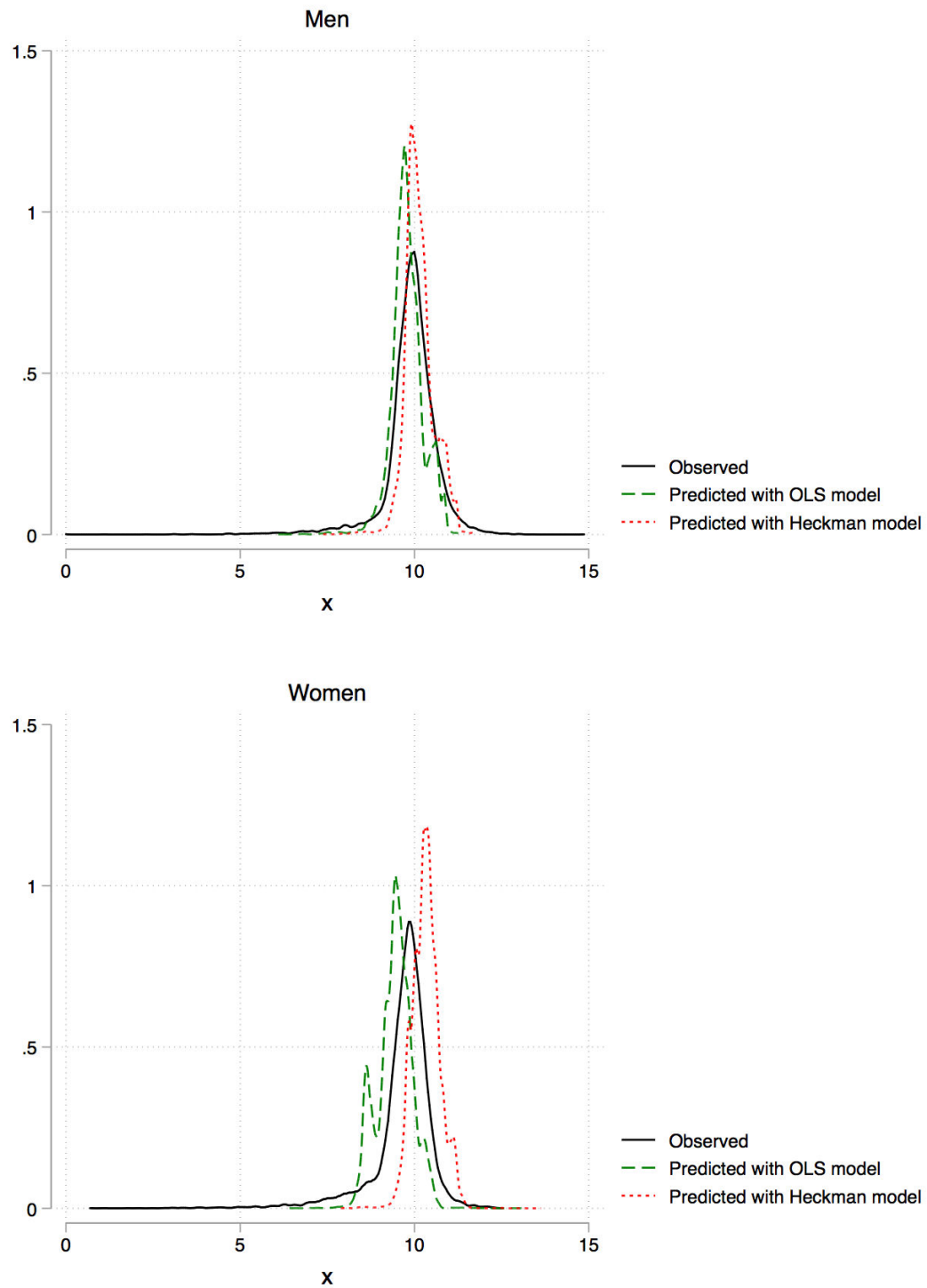


Figure A.2 – Comparison of the two Social Position measures and the observed Earnings.

Table A.9 – Effect of a parental separation on Social Position

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.09*** (0.02)	-0.07 (0.06)	-0.08*** (0.02)	-0.05 (0.04)
4-6 at divorce	-0.10*** (0.02)	-0.12* (0.05)	-0.09*** (0.01)	-0.09* (0.03)
7-9 at divorce	-0.04* (0.02)	-0.04 (0.04)	-0.05*** (0.01)	-0.04 (0.03)
10-12 at divorce	-0.06*** (0.02)	-0.10* (0.04)	-0.06*** (0.01)	-0.08** (0.03)
13-15 at divorce	-0.06*** (0.02)	-0.06 (0.04)	-0.05*** (0.01)	-0.05* (0.02)
16-18 at divorce	-0.04** (0.02)	-0.04 (0.03)	-0.04** (0.01)	-0.04 (0.02)
Ref. Group : 19+ at divorce	0.00 (0.01)		0.01 (0.01)	
Man	0.34*** (0.00)	0.33*** (0.01)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.01*** (0.00)	-0.12*** (0.01)	0.02*** (0.00)	-0.10*** (0.00)
Year of birth squared	0.00*** (0.00)	0.00+ (0.00)	0.00 (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.07*** (0.00)		0.05*** (0.00)	
Father: CAP, BEP	0.08*** (0.00)		0.06*** (0.00)	

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Table A.9 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Father: Brevet (vocational track)	0.15*** (0.01)		0.13*** (0.01)	
Father: Baccalaureat	0.16*** (0.01)		0.14*** (0.00)	
Father: BAC + 2	0.16*** (0.01)		0.15*** (0.01)	
Father: Supérieur à BAC + 2	0.22*** (0.01)		0.21*** (0.00)	
Father: Artisan (Craftman)	0.19*** (0.01)		0.18*** (0.01)	
Father: White Collar, Senior Executive	0.28*** (0.01)		0.24*** (0.01)	
Father: Intermediate profession	0.20*** (0.01)		0.17*** (0.01)	
Father: Employee	0.16*** (0.01)		0.13*** (0.01)	
Father: Manual Worker	0.09*** (0.01)		0.07*** (0.01)	
Father: Retired	0.24*** (0.01)		0.21*** (0.01)	
Father: Other	0.12*** (0.01)		0.10*** (0.01)	
Mother: Primary, Secondary School Degreee	0.09*** (0.00)		0.07*** (0.00)	
Mother: CAP, BEP	0.12*** (0.00)		0.10*** (0.00)	

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Table A.9 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Mother: Brevet (vocational track)	0.19*** (0.01)		0.16*** (0.01)	
Mother: Baccalaureat	0.19*** (0.01)		0.17*** (0.00)	
Mother: BAC + 2	0.20*** (0.01)		0.18*** (0.01)	
Mother: Supérieur à BAC + 2	0.20*** (0.01)		0.18*** (0.01)	
Mother: Artisan (Craftman)	0.04** (0.01)		0.05*** (0.01)	
Mother: White Collar, Senior Executive	0.08*** (0.01)		0.08*** (0.01)	
Mother: Intermediate profession	0.08*** (0.01)		0.08*** (0.01)	
Mother: Employee	0.08*** (0.01)		0.07*** (0.01)	
Mother: Manual Worker	0.03** (0.01)		0.03*** (0.01)	
Mother: Retired	0.01 (0.01)		0.01 (0.01)	
Mother: Other	0.06*** (0.01)		0.06*** (0.01)	
Sibling Size	-0.03*** (0.00)		-0.02*** (0.00)	
Sibling Size squared	0.00** (0.00)		0.00*** (0.00)	

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Table A.9 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Region of birth:North West	-0.05*** (0.00)		-0.05*** (0.00)	
Region of birth:North	-0.03*** (0.00)		-0.04*** (0.00)	
Region of birth:East	-0.04*** (0.00)		-0.04*** (0.00)	
Region of birth:West	-0.05*** (0.00)		-0.05*** (0.00)	
Region of birth:South West	-0.07*** (0.00)		-0.06*** (0.00)	
Region of birth:South East	-0.04*** (0.00)		-0.04*** (0.00)	
Region of birth:Corse	-0.11*** (0.03)		-0.07*** (0.02)	
Region of birth:Oversea	-0.00 (0.01)		-0.01+ (0.01)	
Mother Nationality: European	0.04*** (0.01)		0.03*** (0.01)	
Mother Nationality: Other	0.08*** (0.01)		0.08*** (0.01)	
Father Nationality: European	0.03*** (0.01)		0.03*** (0.00)	
Father Nationality: Other	0.02+ (0.01)		0.03** (0.01)	
Mother Year of Birth	-0.00*** (0.00)		-0.00*** (0.00)	

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Table A.9 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Last Born	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Age	0.13*** (0.00)		0.11*** (0.00)	
Age squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Birth Order=2	0.01*** (0.00)	0.01** (0.01)	0.01*** (0.00)	0.01*** (0.00)
Birth Order=3	0.01+ (0.00)	0.02* (0.01)	0.01* (0.00)	0.02** (0.01)
Birth Order=4	-0.02** (0.01)	-0.01 (0.01)	-0.01+ (0.00)	0.00 (0.01)
Birth Order=5	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.03* (0.01)
Birth Order=6	-0.01 (0.01)	0.03 (0.02)	0.01 (0.01)	0.04** (0.01)
Birth Order=7	-0.02 (0.01)	0.03 (0.03)	-0.00 (0.01)	0.03 (0.02)
Birth Order=8	-0.02 (0.01)	0.02 (0.03)	0.01 (0.01)	0.04* (0.02)
Birth Order=9	-0.01 (0.02)	0.04 (0.05)	0.02 (0.02)	0.05 (0.03)
Birth Order=10	0.01 (0.03)	0.07 (0.06)	0.02 (0.02)	0.07 (0.04)
Birth Order=11	0.04 (0.03)	0.03 (0.07)	0.05+ (0.03)	0.06 (0.06)

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Table A.9 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Birth Order=12	-0.06 (0.05)	-0.01 (0.11)	-0.04 (0.03)	0.03 (0.08)
Birth Order=13	0.02 (0.05)	0.10 (0.11)	0.02 (0.06)	0.00 (0.14)
Birth Order=14	0.19* (0.09)	0.56* (0.25)	0.36+ (0.19)	0.65+ (0.37)
Birth Order=15	0.03 (0.05)	-0.02 (0.13)	0.04 (0.09)	-0.08 (0.24)
Birth Order=16	-0.56*** (0.07)	-0.67*** (0.14)	-0.14 (0.16)	-0.17 (0.13)
Birth Order=18	0.12*** (0.03)		0.03 (0.02)	
Constant	11.00*** (0.46)	12.52*** (0.15)	11.12*** (0.36)	12.64*** (0.12)
Observations	54570	54570	54570	54570

Notes: Social position is the average earnings estimated separately for each gender by OLS (Columns 1 and 2), or on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals (Columns 3 and 4). Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group are excluded, to avoid identification issues.

Table A.10 – Effect of a parental separation on Social Position (Excluding Siblings with a large age difference)

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.09** (0.03)	-0.04 (0.07)	-0.08*** (0.02)	-0.03 (0.05)
4-6 at divorce	-0.10*** (0.02)	-0.09 (0.06)	-0.09*** (0.02)	-0.07+ (0.04)
7-9 at divorce	-0.04* (0.02)	-0.01 (0.05)	-0.05** (0.02)	-0.02 (0.04)
10-12 at divorce	-0.06*** (0.02)	-0.08+ (0.04)	-0.06*** (0.02)	-0.07* (0.03)
13-15 at divorce	-0.05** (0.02)	-0.04 (0.04)	-0.05*** (0.01)	-0.04 (0.03)
16-18 at divorce	-0.05* (0.02)	-0.03 (0.03)	-0.04** (0.01)	-0.03 (0.02)
Ref. Group : 19+ at divorce	0.00 (0.01)		0.01 (0.01)	
Man	0.34*** (0.00)	0.33*** (0.01)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.01*** (0.00)	-0.13*** (0.01)	0.01*** (0.00)	-0.10*** (0.01)
Year of birth squared	0.00*** (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.07*** (0.00)		0.05*** (0.00)	
Father: CAP, BEP	0.08*** (0.00)		0.06*** (0.00)	

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Table A.10 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Father: Brevet (vocational track)	0.16*** (0.01)		0.13*** (0.01)	
Father: Baccalaureat	0.16*** (0.01)		0.14*** (0.00)	
Father: BAC + 2	0.17*** (0.01)		0.15*** (0.01)	
Father: Supérieur à BAC + 2	0.22*** (0.01)		0.21*** (0.00)	
Father: Artisan (Craftman)	0.20*** (0.01)		0.18*** (0.01)	
Father: White Collar, Senior Executive	0.29*** (0.01)		0.25*** (0.01)	
Father: Intermediate profession	0.21*** (0.01)		0.17*** (0.01)	
Father: Employee	0.16*** (0.01)		0.13*** (0.01)	
Father: Manual Worker	0.10*** (0.01)		0.08*** (0.01)	
Father: Retired	0.25*** (0.01)		0.21*** (0.01)	
Father: Other	0.12*** (0.01)		0.11*** (0.01)	
Mother: Primary, Secondary School Degreee	0.09*** (0.00)		0.07*** (0.00)	
Mother: CAP, BEP	0.12*** (0.00)		0.10*** (0.00)	

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Table A.10 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Mother: Brevet (vocational track)	0.18*** (0.01)		0.15*** (0.01)	
Mother: Baccalaureat	0.19*** (0.01)		0.17*** (0.00)	
Mother: BAC + 2	0.21*** (0.01)		0.18*** (0.01)	
Mother: Supérieur à BAC + 2	0.20*** (0.01)		0.18*** (0.01)	
Mother: Artisan (Craftman)	0.03* (0.01)		0.04*** (0.01)	
Mother: White Collar, Senior Executive	0.08*** (0.01)		0.07*** (0.01)	
Mother: Intermediate profession	0.07*** (0.01)		0.07*** (0.01)	
Mother: Employee	0.07*** (0.01)		0.06*** (0.01)	
Mother: Manual Worker	0.03* (0.01)		0.03*** (0.01)	
Mother: Retired	-0.01 (0.01)		0.00 (0.01)	
Mother: Other	0.05*** (0.01)		0.05*** (0.01)	
Sibling Size	-0.03*** (0.00)		-0.03*** (0.00)	
Sibling Size squared	0.00*** (0.00)		0.00*** (0.00)	

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Table A.10 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Region of birth:North West	-0.05*** (0.00)		-0.05*** (0.00)	
Region of birth:North	-0.04*** (0.00)		-0.04*** (0.00)	
Region of birth:East	-0.04*** (0.00)		-0.04*** (0.00)	
Region of birth:West	-0.05*** (0.00)		-0.05*** (0.00)	
Region of birth:South West	-0.08*** (0.01)		-0.06*** (0.00)	
Region of birth:South East	-0.04*** (0.00)		-0.04*** (0.00)	
Region of birth:Corse	-0.09*** (0.02)		-0.06** (0.02)	
Region of birth:Oversea	-0.01 (0.01)		-0.02* (0.01)	
Mother Nationality: European	0.04*** (0.01)		0.03*** (0.01)	
Mother Nationality: Other	0.08*** (0.01)		0.07*** (0.01)	
Father Nationality: European	0.04*** (0.01)		0.03*** (0.01)	
Father Nationality: Other	0.04** (0.01)		0.03*** (0.01)	
Mother Year of Birth	-0.00*** (0.00)		-0.00*** (0.00)	

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Table A.10 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Last Born	-0.00 (0.00)	-0.01 (0.00)	-0.00 (0.00)	-0.01 (0.00)
Age	0.14*** (0.00)		0.11*** (0.00)	
Age squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)
Birth Order=2	0.01*** (0.00)	0.02** (0.00)	0.01*** (0.00)	0.02*** (0.00)
Birth Order=3	0.01+ (0.00)	0.02* (0.01)	0.01** (0.00)	0.02*** (0.01)
Birth Order=4	-0.02** (0.01)	-0.01 (0.01)	-0.01 (0.00)	0.00 (0.01)
Birth Order=5	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.03* (0.01)
Birth Order=6	-0.01 (0.01)	0.03 (0.02)	0.01 (0.01)	0.05** (0.02)
Birth Order=7	-0.02 (0.01)	0.04 (0.03)	-0.00 (0.01)	0.04+ (0.02)
Birth Order=8	-0.03+ (0.02)	0.02 (0.04)	0.02 (0.01)	0.06* (0.03)
Birth Order=9	-0.05* (0.02)	-0.01 (0.05)	-0.01 (0.02)	0.03 (0.03)
Birth Order=10	-0.04 (0.03)	0.06 (0.08)	-0.02 (0.02)	0.06 (0.06)
Birth Order=11	0.02 (0.04)	0.01 (0.09)	0.04 (0.03)	0.06 (0.08)

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Table A.10 – *Continued from previous page*

	Social Position estimated by OLS		Social Position estimated by Heckman procedure	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Birth Order=12	-0.06 (0.05)	0.06 (0.10)	-0.03 (0.03)	0.10 (0.07)
Birth Order=13	0.00 (0.06)	0.06 (0.14)	-0.00 (0.06)	-0.03 (0.15)
Birth Order=14	0.34** (0.13)	0.61+ (0.34)	0.57+ (0.33)	0.75 (0.56)
Birth Order=15	0.00 (0.05)	-0.04 (0.14)	0.02 (0.08)	-0.08 (0.23)
Birth Order=16	-0.59*** (0.07)	-0.64*** (0.13)	-0.16 (0.16)	-0.14 (0.12)
Birth Order=18	0.08* (0.04)		-0.00 (0.03)	
Constant	10.18*** (0.52)	12.66*** (0.18)	10.31*** (0.40)	12.76*** (0.14)
Observations	50516	50516	50516	50516

Notes: Social position is the average earnings estimated separately for each gender by OLS (Columns 1 and 2), or on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals (Columns 3 and 4). Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table A.11 – Effect of a parental separation (measures with noise)

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.90*** (0.13)	-0.46+ (0.27)	-0.04** (0.01)	-0.03 (0.03)	-0.11*** (0.02)	-0.09+ (0.05)
4-6 at divorce	-0.88*** (0.11)	-0.56* (0.23)	-0.05*** (0.01)	-0.04 (0.03)	-0.12*** (0.02)	-0.11** (0.04)
7-9 at divorce	-0.60*** (0.10)	-0.34+ (0.19)	-0.02* (0.01)	-0.03 (0.03)	-0.07*** (0.02)	-0.07+ (0.04)
10-12 at divorce	-0.70*** (0.10)	-0.57*** (0.17)	-0.03*** (0.01)	-0.03 (0.02)	-0.10*** (0.02)	-0.11** (0.03)
13-15 at divorce	-0.68*** (0.09)	-0.56*** (0.16)	-0.02** (0.01)	-0.03 (0.02)	-0.07*** (0.02)	-0.06+ (0.03)
16-18 at divorce	-0.34*** (0.09)	-0.31* (0.15)	-0.01 (0.01)	-0.01 (0.02)	-0.05** (0.02)	-0.03 (0.03)
Ref. Group : 19+ at divorce	0.10 (0.07)		0.00 (0.01)		0.03* (0.01)	
Constant	40.73*** (2.41)	13.46*** (0.03)	1.50*** (0.24)	0.10*** (0.00)	13.33*** (0.40)	10.45*** (0.01)
Observations	56876	56876	56876	56876	54570	54570

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Table A.11 – *Continued from previous page*

Schooling		Earnings-weighted Education		Social Position	
Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. A noise is added to each outcome variable. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group are excluded, to avoid identification issues.

A3 More descriptive statistics

Table A.12 presents the summary statistics for three samples: “All” which refers to the entire population of the dataset, “Sample 1” which refers to the sample excluding the only children, and “Sample 2” which refers to the sample use in the main body of the chapter, that excludes siblings experiencing a divorce in the same age group. As we can see, the subsamples are quite similar. Therefore the sample I am using is still representative of the whole population.

Table A.12 – Comparison of our sample to whole population of the dataset

	All mean	Sample 1 mean	Sample 2 mean
Schooling	13.47	13.48	13.47
Social Position	10.24	10.24	10.24
Earnings-weighted Education	0.12	0.12	0.12
0-3 at divorce	0.01	0.01	0.00
4-6 at divorce	0.01	0.01	0.01
7-9 at divorce	0.01	0.01	0.01
10-12 at divorce	0.01	0.01	0.01
13-15 at divorce	0.01	0.01	0.01
16-18 at divorce	0.01	0.01	0.01
Man	0.49	0.49	0.49
Year of birth	1964.22	1964.22	1964.13
Father: No degree	0.29	0.29	0.29
Father: Primary, Secondary School Degreee	0.35	0.35	0.35
Father: CAP, BEP	0.19	0.19	0.19
Father: Brevet (vocational track)	0.01	0.01	0.01
Father: Baccalaureat	0.05	0.05	0.05
Father: BAC + 2	0.03	0.03	0.03
Father: Supérieur à BAC + 2	0.07	0.08	0.07
Father: Farmer	0.10	0.10	0.11
Father: Self-employed	0.12	0.12	0.12
Father: White Collars	0.10	0.10	0.10
Father: Mid-level Profession	0.14	0.14	0.14
Father: Employee	0.09	0.09	0.09
Father: Manual Worker	0.37	0.37	0.37
Father: Retired	0.06	0.06	0.06

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Table A.12 – *Continued from previous page*

	All	Sample 1	Sample 2
Father: Other	0.02	0.02	0.02
Mother: No degree	0.34	0.34	0.34
Mother: Primary, Secondary School Degreee	0.40	0.40	0.40
Mother: CAP, BEP	0.12	0.12	0.12
Mother: Brevet (vocational track)	0.01	0.01	0.01
Mother: Baccalaureat	0.06	0.06	0.06
Mother: BAC + 2	0.04	0.04	0.04
Mother: Supérieur à BAC + 2	0.04	0.04	0.04
Mother: Farmer	0.08	0.08	0.08
Mother: Self-employed	0.05	0.05	0.05
Mother: White Collars	0.02	0.02	0.02
Mother: Mid-level Profession	0.07	0.07	0.07
Mother: Employee	0.21	0.21	0.21
Mother: Manual Worker	0.08	0.08	0.08
Mother: Retired	0.02	0.02	0.02
Mother: Other	0.46	0.46	0.46
Sibling Size	2.73	2.72	2.73
Sibling Size squarred	11.45	11.34	11.40
Region of birth: Ile de France	0.14	0.14	0.14
Region of birth: North West	0.20	0.20	0.20
Region of birth: North	0.10	0.10	0.10
Region of birth: East	0.11	0.11	0.11
Region of birth: West	0.17	0.17	0.17
Region of birth: South West	0.09	0.09	0.09
Region of birth: South East	0.18	0.18	0.18
Region of birth: Corse	0.00	0.00	0.00
Region of birth: Oversea	0.01	0.01	0.01
Mother nationality: French	0.94	0.94	0.94
Mother nationality: European	0.04	0.04	0.04
Mother nationality: Other	0.02	0.02	0.02
Father nationality: French	0.93	0.93	0.93
Father nationality: European	0.05	0.05	0.05
Father nationality: Other	0.02	0.02	0.02
Mother Year of Birth	1937.35	1937.36	1937.22

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Table A.12 – *Continued from previous page*

	All	Sample 1	Sample 2
Last born	0.38	0.38	0.38
Age	43.21	43.12	43.18
1st born	0.37	0.37	0.37
2nd born	0.31	0.31	0.31
3rd born	0.16	0.16	0.16
4th born	0.07	0.07	0.07
5th born	0.04	0.04	0.04
6th born	0.02	0.02	0.02
7th born	0.01	0.01	0.01
8th born	0.01	0.01	0.01
Observations	58903	57932	56876
Only_Child	Included	Excluded	Excluded
Same_age_group	Included	Included	Excluded

Notes: Summary statistics for the three samples. “All” refers to the entire population of the dataset, “Sample 1” refers to the sample excluding the only children, and “Sample 2” refers to the sample used in the main body of the chapter, that excludes siblings experiencing a divorce in the same age group. *Source:* Estimation sample drawn from the Dataset “Formation et Qualification Professionnelle” (INSEE), waves 2003 and 2014.

Question bias

Table A.14 compares the age at divorce of the respondents and their siblings. The respondents’ siblings are 8 months older in average at the moment of the divorce. They are more represented in the 0-3 year-olds and over the age of 19. Table A.15 compares the family characteristics of the respondents who declare a divorce after age 16, and respondents’ siblings who experience a divorce after age 16. Respondents who declare a parental separation after the age of 16 are in average younger. Their father are more likely to be white collars, and less likely to be manual workers, their family is smaller, than Siblings who were older than 16 at the moment of their parents separation. These differences are significant, but robustness checks show that the question bias is negligible.

AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table A.13 – Differences between respondents whose parents are separated or not.

	Non separated parents	Separated parents	Gap (b/se)
Year of birth	1964.09	1969.31	-5.217** (0.18)
Mother: No degree	0.40	0.32	0.071** (0.01)
Mother: Primary, Secondary School Degree	0.36	0.30	0.064** (0.01)
Mother: CAP, BEP	0.11	0.14	-0.036** (0.01)
Mother: Brevet (vocational track)	0.01	0.01	-0.002 (0.00)
Mother: Baccalaureat	0.05	0.09	-0.034** (0.00)
Mother: BAC + 2	0.04	0.07	-0.029** (0.00)
Mother: Supérieur à BAC + 2	0.03	0.07	-0.035** (0.00)
Mother: Farmer	0.08	0.01	0.066** (0.00)
Mother: Self-employed	0.05	0.05	0.000 (0.00)
Mother: White Collars	0.02	0.04	-0.023** (0.00)
Mother: Mid-level Profession	0.07	0.13	-0.065** (0.00)
Mother: Employee	0.20	0.35	-0.153** (0.01)
Mother: Manual Worker	0.08	0.11	-0.029** (0.00)
Mother: Retired	0.02	0.02	0.001 (0.00)
Mother: Other	0.49	0.29	0.203** (0.01)
Father: No degree	0.33	0.28	0.046** (0.01)
Father: Primary, Secondary School Degree	0.33	0.26	0.065** (0.01)
Father: CAP, BEP	0.18	0.21	-0.031** (0.01)
Father: Brevet (vocational track)	0.01	0.01	-0.002 (0.00)
Father: Baccalaureat	0.05	0.08	-0.025**

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Table A.13 – *Continued from previous page*

	Non separated parents	Separated parents	Gap (b/se)
			(0.00)
Father: BAC + 2	0.03	0.04	-0.014**
			(0.00)
Father: Supérieur à BAC + 2	0.08	0.12	-0.038**
			(0.01)
Father: Farmer	0.10	0.02	0.080**
			(0.01)
Father: Self-employed	0.12	0.14	-0.029**
			(0.01)
Father: White Collars	0.10	0.14	-0.039**
			(0.01)
Father: Mid-level Profession	0.13	0.16	-0.029**
			(0.01)
Father: Employee	0.09	0.11	-0.024**
			(0.01)
Father: Manual Worker	0.38	0.35	0.032**
			(0.01)
Father: Retired	0.07	0.05	0.018**
			(0.00)
Father: Other	0.01	0.02	-0.009**
			(0.00)
Sibling Size	2.93	2.61	0.324**
			(0.04)
Region of birth: Ile de France	0.13	0.19	-0.056**
			(0.01)
Region of birth: North West	0.20	0.20	0.002
			(0.01)
Region of birth: North	0.10	0.09	0.012*
			(0.01)
Region of birth: East	0.11	0.09	0.015*
			(0.01)
Region of birth: West	0.17	0.13	0.042**
			(0.01)
Region of birth: South West	0.09	0.09	0.001
			(0.01)
Region of birth: South East	0.18	0.18	-0.003
			(0.01)
Region of birth: Corse	0.00	0.00	0.000
			(0.00)
Region of birth: Oversea	0.01	0.02	-0.012**
			(0.00)
Observations	40657		

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table A.13 – Continued from previous page

	Non separated parents	Separated parents	Gap (b/se)

Notes: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The first column shows the means for respondents whose parents are not separated, the second column shows the means for respondents whose parents are separated, the last column is a t-test. *Source:* Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014.

Table A.14 – Differences in age at divorce between Respondents and Respondents' Siblings

	Respondents' Siblings	Respondents	Gap (b/se)
Age at divorce	13.17	12.62	0.544** (0.19)
0-3 at divorce	0.09	0.07	0.015+ (0.01)
4-6 at divorce	0.10	0.10	-0.000 (0.01)
7-9 at divorce	0.14	0.13	0.001 (0.01)
10-12 at divorce	0.15	0.16	-0.013 (0.01)
13-15 at divorce	0.16	0.21	-0.054** (0.01)
16-18 at divorce	0.14	0.17	-0.037** (0.01)
19 and more at divorce	0.23	0.14	0.087** (0.01)
Observations	4405		

Notes: The first column is the average age at separation for respondents' siblings, the second column shows the average age at separation for respondents. The last column shows the results of a t-test. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Only individuals whose parents are separated are included.

Table A.15 – Differences between Respondents and Siblings older than 16 at the moment of the divorce among divorced families.

	Respondents' Siblings	Respondents	Gap (b/se)
Year of birth	1966.88	1969.72	-2.845** (0.55)
Mother: No degree	0.22	0.19	0.033 (0.02)
Mother: Primary, Secondary School Degreee	0.36	0.36	0.007 (0.03)
Mother: CAP, BEP	0.17	0.17	-0.004 (0.02)
Mother: Brevet (vocational track)	0.02	0.02	-0.000 (0.01)
Mother: Baccalaureat	0.08	0.09	-0.013 (0.02)
Mother: BAC + 2	0.08	0.10	-0.014 (0.02)
Mother: Supérieur à BAC + 2	0.07	0.07	-0.008 (0.01)
Mother: Farmer	0.01	0.02	-0.005 (0.01)
Mother: Self-employed	0.05	0.06	-0.007 (0.01)
Mother: White Collars	0.04	0.06	-0.014 (0.01)
Mother: Mid-level Profession	0.14	0.16	-0.025 (0.02)
Mother: Employee	0.37	0.33	0.032 (0.03)
Mother: Manual Worker	0.08	0.06	0.013 (0.01)
Mother: Retired	0.03	0.02	0.009 (0.01)
Mother: Other	0.28	0.29	-0.004 (0.03)
Father: No degree	0.23	0.19	0.035 (0.02)
Father: Primary, Secondary School Degreee	0.29	0.26	0.024 (0.02)
Father: CAP, BEP	0.22	0.24	-0.025 (0.02)
Father: Brevet (vocational track)	0.02	0.02	0.003 (0.01)

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AGE AT PARENTS' SEPARATION AND INDIVIDUAL'S ACHIEVEMENT

Table A.15 – *Continued from previous page*

	Respondents' Siblings	Respondents	Gap (b/se)
Father: Baccalaureat	0.08	0.10	-0.020 (0.02)
Father: BAC + 2	0.05	0.05	-0.005 (0.01)
Father: Supérieur à BAC + 2	0.12	0.13	-0.013 (0.02)
Father: Farmer	0.03	0.03	0.004 (0.01)
Father: Self-employed	0.13	0.16	-0.028 (0.02)
Father: White Collars	0.15	0.19	-0.049* (0.02)
Father: Mid-level Profession	0.17	0.18	-0.014 (0.02)
Father: Employee	0.12	0.12	-0.002 (0.02)
Father: Manual Worker	0.30	0.23	0.069** (0.02)
Father: Retired	0.07	0.05	0.016 (0.01)
Father: Other	0.04	0.04	0.005 (0.01)
Sibling Size	2.41	2.20	0.208* (0.09)
Region of birth: Ile de France	0.19	0.20	-0.012 (0.02)
Region of birth: North West	0.20	0.18	0.015 (0.02)
Region of birth: North	0.08	0.07	0.009 (0.01)
Region of birth: East	0.10	0.08	0.017 (0.02)
Region of birth: West	0.12	0.13	-0.010 (0.02)
Region of birth: South West	0.09	0.10	-0.005 (0.02)
Region of birth: South East	0.20	0.20	-0.005 (0.02)
Region of birth: Corse	0.00	0.00	-0.002 (0.00)
Region of birth: Oversea	0.01	0.02	-0.006 (0.01)

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Table A.15 – Continued from previous page

	Respondents' Siblings	Respondents	Gap (b/se)
Observations	1293		

Notes: + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

The first column shows the means for respondents' siblings who were older than 16 when their parents separated, the second columns shows the means for respondents who were older than 16 at the moment of the separation. This last group might be concerned by a question bias.

The last column is a t-test.

Sources: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Only those whose parents are separated after the age of 16 are included

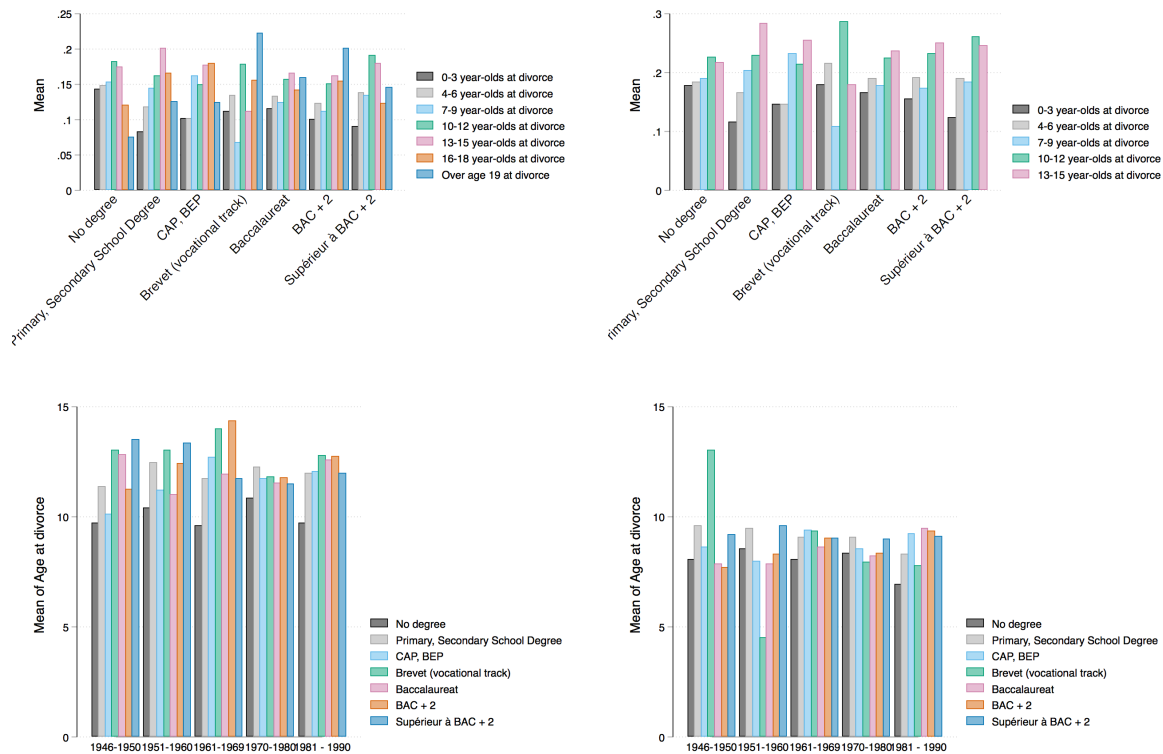


Figure A.3 – Child's age at separation across parents' education and cohorts.

Notes: The upper graph shows the distribution of children of divorced families by age group over mother's education. (In the graph on the left, among divorced families children with a mother with BAC+2 and more, 15% are over age 18 when the separation occurs). The bottom graph shows child's age at divorce across generations and across mother's education. (Children of divorced families, born in 1946-1950, with mothers with no degree are on average 10 years old when the divorce occurs) In the two graph at the right, all the individuals who declare a divorce after age 16 are excluded from the sample.

A4 More results : Continuous models

Table A.16 – Continuous model

Panel A:						
	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Age at divorce	-0.0209*** (0.00192)	0.0175 (0.0134)	-0.000877*** (0.0000974)	0.000946+ (0.000573)	-0.00179*** (0.000256)	0.00338+ (0.00193)
Man	-0.232*** (0.0126)	-0.217*** (0.0234)	0.0340*** (0.000560)	0.0348*** (0.00103)	-0.195*** (0.00200)	-0.199*** (0.00407)
Year of birth	0.135*** (0.00177)	0.0704* (0.0282)	0.00272*** (0.0000758)	-0.00121 (0.00118)	0.0152*** (0.000322)	-0.0975*** (0.00464)
Year of birth squared	-0.00179*** (0.0000672)	-0.00112*** (0.000281)	-0.0000144*** (0.00000294)	0.0000236+ (0.0000126)	0.00000686 (0.0000106)	0.0000231 (0.0000445)
Father: Primary, Secondary School Degreee	0.528*** (0.0156)		0.0164*** (0.000629)		0.0541*** (0.00255)	
Father: CAP, BEP	0.567*** (0.0175)		0.0159*** (0.000760)		0.0627*** (0.00274)	
Father: Brevet (vocational track)	1.217*** (0.0539)		0.0470*** (0.00315)		0.129*** (0.00848)	
Father: Baccalaureat	1.375*** (0.0319)		0.0519*** (0.00159)		0.143*** (0.00445)	
Father: BAC + 2	1.451*** (0.0376)		0.0603*** (0.00209)		0.146*** (0.00597)	
Father: Supérieur à BAC + 2	1.859*** (0.0341)		0.0866*** (0.00186)		0.208*** (0.00495)	
Father: Artisan (Craftman)	0.185*** (0.0305)		0.0109*** (0.00149)		0.178*** (0.00768)	
Father: White Collar, Senior Executive	0.718*** (0.0355)		0.0334*** (0.00180)		0.245*** (0.00784)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Father: Intermediate profession	0.246*** (0.0311)		0.0109*** (0.00142)		0.170*** (0.00738)	
Father: Employee	-0.0851** (0.0327)		-0.00240+ (0.00144)		0.126*** (0.00756)	
Father: Manual Worker	-0.483*** (0.0269)		-0.0163*** (0.00119)		0.0715*** (0.00719)	
Father: Retired	0.826*** (0.0357)		0.0350*** (0.00171)		0.207*** (0.00786)	
Father: Other	-0.205*** (0.0464)		-0.00237 (0.00212)		0.102*** (0.00899)	
Mother: Primary, Secondary School Degreee	0.711*** (0.0138)		0.0232*** (0.000605)		0.0755*** (0.00248)	
Mother: CAP, BEP	0.883*** (0.0215)		0.0295*** (0.000921)		0.0999*** (0.00318)	
Mother: Brevet (vocational track)	1.329*** (0.0654)		0.0512*** (0.00329)		0.163*** (0.0103)	
Mother: Baccalaureat	1.533*** (0.0304)		0.0612*** (0.00163)		0.167*** (0.00466)	
Mother: BAC + 2	1.577*** (0.0352)		0.0704*** (0.00184)		0.180*** (0.00513)	
Mother: Supérieur à BAC + 2	1.700*** (0.0423)		0.0810*** (0.00229)		0.182*** (0.00629)	
Mother: Artisan (Craftman)	0.00258 (0.0381)		0.0000667 (0.00175)		0.0467*** (0.00887)	
Mother: White Collar, Senior Executive	0.235*** (0.0472)		0.0182*** (0.00263)		0.0751*** (0.0104)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Mother: Intermediate profession	0.294*** (0.0360)		0.0120*** (0.00192)		0.0761*** (0.00824)	
Mother: Employee	0.149*** (0.0279)		0.00563*** (0.00137)		0.0690*** (0.00810)	
Mother: Manual Worker	-0.159*** (0.0317)		-0.00700*** (0.00144)		0.0322*** (0.00824)	
Mother: Retired	-0.0177 (0.0447)		-0.000233 (0.00221)		0.0144 (0.0100)	
Mother: Other	0.0797** (0.0265)		0.00378** (0.00124)		0.0583*** (0.00798)	
Sibling Size	-0.190*** (0.00961)		-0.00708*** (0.000412)		-0.0251*** (0.00184)	
Sibling Size squared	0.00601*** (0.000905)		0.000323*** (0.0000366)		0.000638*** (0.000178)	
Region of birth:North West	-0.0553** (0.0207)		-0.00404*** (0.000954)		-0.0493*** (0.00299)	
Region of birth:North	0.0399+ (0.0228)		0.000878 (0.00107)		-0.0383*** (0.00349)	
Region of birth:East	0.0149 (0.0218)		-0.00211* (0.00104)		-0.0421*** (0.00345)	
Region of birth:West	0.0794*** (0.0221)		-0.000236 (0.000969)		-0.0459*** (0.00336)	
Region of birth:South West	0.0707** (0.0229)		-0.00101 (0.00108)		-0.0593*** (0.00391)	
Region of birth:South East	0.0828*** (0.0211)		0.000687 (0.000957)		-0.0384*** (0.00304)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Region of birth:Corse	-0.280*		-0.0104+		-0.0683***	
	(0.135)		(0.00611)		(0.0199)	
Region of birth:Oversea	0.0433		0.000686		-0.0165+	
	(0.0587)		(0.00273)		(0.00849)	
Mother Nationality: European	0.324***		0.0103***		0.0336***	
	(0.0318)		(0.00143)		(0.00528)	
Mother Nationality: Other	0.908***		0.0268***		0.0769***	
	(0.0731)		(0.00351)		(0.00974)	
Father Nationality: European	0.202***		0.00612***		0.0324***	
	(0.0327)		(0.00150)		(0.00502)	
Father Nationality: Other	0.0486		0.00224		0.0258**	
	(0.0656)		(0.00327)		(0.00939)	
Mother Year of Birth	-0.0135***		-0.000746***		-0.00200***	
	(0.00121)		(0.0000514)		(0.000186)	
Last Born	0.0502***	0.0489*	0.00230***	0.00241**	-0.00179	-0.00449
	(0.0138)	(0.0200)	(0.000637)	(0.000892)	(0.00201)	(0.00387)
Age	0.00110		0.000284		0.113***	
	(0.00676)		(0.000302)		(0.00109)	
Age squared	0.000361***	-0.000136	0.00000656*	-0.0000248+	-0.00101***	-0.000977***
	(0.0000754)	(0.000303)	(0.00000330)	(0.0000129)	(0.0000124)	(0.0000510)
Birth Order=2	-0.0521***	-0.0459+	-0.00314***	-0.00296**	0.00938***	0.0136***
	(0.0149)	(0.0242)	(0.000682)	(0.00102)	(0.00244)	(0.00397)
Birth Order=3	-0.166***	-0.138***	-0.00834***	-0.00777***	0.00767*	0.0162**
	(0.0205)	(0.0322)	(0.000901)	(0.00144)	(0.00327)	(0.00558)
Birth Order=4	-0.240***	-0.221***	-0.0124***	-0.0127***	-0.00860*	0.000640
	(0.0284)	(0.0499)	(0.00123)	(0.00199)	(0.00422)	(0.00811)

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Birth Order=5	-0.318*** (0.0352)	-0.261*** (0.0579)	-0.0146*** (0.00141)	-0.0129*** (0.00219)	0.00676 (0.00532)	0.0259** (0.00945)
Birth Order=6	-0.348*** (0.0469)	-0.284*** (0.0824)	-0.0164*** (0.00176)	-0.0143*** (0.00335)	0.00858 (0.00716)	0.0406** (0.0126)
Birth Order=7	-0.405*** (0.0598)	-0.367*** (0.0894)	-0.0170*** (0.00224)	-0.0146*** (0.00406)	-0.00274 (0.00974)	0.0311+ (0.0182)
Birth Order=8	-0.326*** (0.0807)	-0.362** (0.129)	-0.0163*** (0.00262)	-0.0183*** (0.00472)	0.0143 (0.0106)	0.0444* (0.0225)
Birth Order=9	-0.337*** (0.102)	-0.418* (0.174)	-0.0185*** (0.00394)	-0.0181** (0.00629)	0.0212 (0.0151)	0.0519+ (0.0314)
Birth Order=10	-0.330** (0.123)	-0.316 (0.212)	-0.0164*** (0.00404)	-0.0108 (0.00712)	0.0187 (0.0212)	0.0709 (0.0433)
Birth Order=11	-0.224 (0.171)	-0.397 (0.317)	-0.0253*** (0.00680)	-0.0275* (0.0136)	0.0499* (0.0248)	0.0553 (0.0568)
Birth Order=12	-0.652** (0.213)	-0.543 (0.394)	-0.0315*** (0.00642)	-0.0216+ (0.0124)	-0.0354 (0.0313)	0.0314 (0.0772)
Birth Order=13	-0.134 (0.248)	-0.0248 (0.444)	-0.0184* (0.00763)	-0.0155 (0.0135)	0.0200 (0.0590)	0.00243 (0.153)
Birth Order=14	-0.890** (0.281)	0.130 (0.431)	-0.0212+ (0.0122)	0.0174 (0.0189)	0.364+ (0.187)	0.652 (0.518)
Birth Order=15	-1.621* (0.680)	-1.822 (1.236)	-0.0498*** (0.0119)	-0.0475* (0.0228)	0.0371 (0.0887)	-0.0773 (0.230)
Birth Order=16	-0.0591 (0.575)	0.573 (0.881)	-0.0233 (0.0280)	0.0298 (0.0355)	-0.135 (0.161)	-0.175 (0.114)
Birth Order=18	-1.284* (0.635)	0.0741 (0.0830)	-0.0454** (0.0152)	-0.0106** (0.00335)	0.0285 (0.0272)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Constant	37.92*** (2.333)	13.73*** (0.685)	1.481*** (0.100)	0.154*** (0.0291)	11.00*** (0.359)	12.64*** (0.115)
Observations	56876	56876	56876	56876	54570	54570
Panel B: With Squarred Age at divorce						
	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Age at divorce	-0.0998*** (0.00747)	0.000924 (0.0373)	-0.00419*** (0.000328)	0.000323 (0.00145)	-0.00898*** (0.000990)	0.00158 (0.00586)
Age at divorce squarred	0.00461*** (0.000439)	0.000621 (0.00137)	0.000195*** (0.0000193)	0.0000233 (0.0000528)	0.000426*** (0.0000590)	0.0000668 (0.000199)
Man	-0.231*** (0.0129)	-0.217*** (0.0219)	0.0340*** (0.000533)	0.0348*** (0.00105)	-0.195*** (0.00194)	-0.199*** (0.00385)
Year of birth	0.135*** (0.00196)	0.0702** (0.0257)	0.00274*** (0.0000818)	-0.00122 (0.00119)	0.0152*** (0.000325)	-0.0975*** (0.00471)
Year of birth squarred	-0.00178*** (0.0000662)	-0.00111*** (0.000270)	-0.0000141*** (0.00000286)	0.0000236* (0.0000119)	0.00000743 (0.0000106)	0.0000232 (0.0000472)
Father: Primary, Secondary School Degreee	0.527*** (0.0155)		0.0164*** (0.000656)		0.0542*** (0.00263)	
Father: CAP, BEP	0.567*** (0.0178)		0.0159*** (0.000766)		0.0627*** (0.00286)	
Father: Brevet (vocational track)	1.216*** (0.0527)		0.0470*** (0.00311)		0.129*** (0.00886)	
Father: Baccalaureat	1.377*** (0.0344)		0.0520*** (0.00150)		0.144*** (0.00490)	
Father: BAC + 2	1.448*** (0.0415)		0.0602*** (0.00201)		0.146*** (0.00600)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Father: Supérieur à BAC + 2	1.856*** (0.0341)		0.0865*** (0.00185)		0.208*** (0.00480)	
Father: Artisan (Craftman)	0.189*** (0.0330)		0.0111*** (0.00141)		0.178*** (0.00725)	
Father: White Collar, Senior Executive	0.720*** (0.0367)		0.0335*** (0.00178)		0.245*** (0.00741)	
Father: Intermediate profession	0.246*** (0.0324)		0.0109*** (0.00138)		0.170*** (0.00687)	
Father: Employee	-0.0844** (0.0322)		-0.00237 (0.00145)		0.126*** (0.00695)	
Father: Manual Worker	-0.483*** (0.0268)		-0.0163*** (0.00119)		0.0715*** (0.00664)	
Father: Retired	0.821*** (0.0344)		0.0348*** (0.00174)		0.207*** (0.00770)	
Father: Other	-0.211*** (0.0443)		-0.00264 (0.00206)		0.101*** (0.00881)	
Mother: Primary, Secondary School Degreee	0.707*** (0.0148)		0.0230*** (0.000610)		0.0751*** (0.00247)	
Mother: CAP, BEP	0.880*** (0.0196)		0.0294*** (0.000965)		0.0995*** (0.00322)	
Mother: Brevet (vocational track)	1.315*** (0.0585)		0.0506*** (0.00325)		0.162*** (0.0101)	
Mother: Baccalaureat	1.533*** (0.0301)		0.0612*** (0.00161)		0.167*** (0.00486)	
Mother: BAC + 2	1.573*** (0.0349)		0.0703*** (0.00197)		0.179*** (0.00537)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Mother: Supérieur à BAC + 2	1.697*** (0.0376)		0.0809*** (0.00239)		0.182*** (0.00642)	
Mother: Artisan (Craftman)	0.00458 (0.0433)		0.000145 (0.00181)		0.0469*** (0.00901)	
Mother: White Collar, Senior Executive	0.240*** (0.0507)		0.0184*** (0.00273)		0.0755*** (0.0104)	
Mother: Intermediate profession	0.305*** (0.0396)		0.0125*** (0.00190)		0.0771*** (0.00870)	
Mother: Employee	0.157*** (0.0332)		0.00599*** (0.00142)		0.0698*** (0.00780)	
Mother: Manual Worker	-0.147*** (0.0327)		-0.00654*** (0.00157)		0.0332*** (0.00827)	
Mother: Retired	-0.0215 (0.0486)		-0.000397 (0.00216)		0.0139 (0.0102)	
Mother: Other	0.0814** (0.0304)		0.00385** (0.00133)		0.0585*** (0.00785)	
Sibling Size	-0.191*** (0.00953)		-0.00710*** (0.000423)		-0.0251*** (0.00161)	
Sibling Size squared	0.00598*** (0.000875)		0.000322*** (0.0000391)		0.000637*** (0.000156)	
Region of birth:North West	-0.0566** (0.0201)		-0.00410*** (0.000895)		-0.0494*** (0.00310)	
Region of birth:North	0.0388 (0.0246)		0.000836 (0.00108)		-0.0384*** (0.00363)	
Region of birth:East	0.0143 (0.0231)		-0.00213+ (0.00109)		-0.0421*** (0.00370)	

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Region of birth:West	0.0770*** (0.0216)		-0.000332 (0.000987)		-0.0461*** (0.00323)	
Region of birth:South West	0.0698** (0.0248)		-0.00104 (0.00109)		-0.0594*** (0.00406)	
Region of birth:South East	0.0809*** (0.0215)		0.000609 (0.000947)		-0.0386*** (0.00314)	
Region of birth:Corse	-0.275* (0.131)		-0.0102 (0.00645)		-0.0678*** (0.0199)	
Region of birth:Oversea	0.0570 (0.0587)		0.00126 (0.00285)		-0.0153+ (0.00871)	
Mother Nationality: European	0.321*** (0.0356)		0.0102*** (0.00151)		0.0333*** (0.00526)	
Mother Nationality: Other	0.900*** (0.0764)		0.0265*** (0.00368)		0.0762*** (0.0104)	
Father Nationality: European	0.203*** (0.0350)		0.00614*** (0.00153)		0.0325*** (0.00484)	
Father Nationality: Other	0.0517 (0.0683)		0.00237 (0.00358)		0.0261** (0.00932)	
Mother Year of Birth	-0.0140*** (0.00119)		-0.000766*** (0.0000530)		-0.00203*** (0.000177)	
Last Born	0.0481*** (0.0135)	0.0486* (0.0225)	0.00222*** (0.000653)	0.00240** (0.000906)	-0.00194 (0.00215)	-0.00451 (0.00366)
Age	-0.00113 (0.00704)		0.000193 (0.000309)		0.113*** (0.00118)	
Age squared	0.000380*** (0.0000780)	-0.000137 (0.000277)	0.00000734* (0.00000334)	-0.0000249+ (0.0000128)	-0.00100*** (0.0000135)	-0.000977*** (0.0000513)

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Birth Order=2	-0.0484*** (0.0146)	-0.0456* (0.0230)	-0.00299*** (0.000673)	-0.00295* (0.00115)	0.00972*** (0.00236)	0.0137*** (0.00393)
Birth Order=3	-0.161*** (0.0196)	-0.138*** (0.0323)	-0.00815*** (0.000879)	-0.00776*** (0.00151)	0.00810** (0.00302)	0.0163** (0.00570)
Birth Order=4	-0.232*** (0.0248)	-0.220*** (0.0427)	-0.0121*** (0.00108)	-0.0126*** (0.00201)	-0.00793+ (0.00413)	0.000735 (0.00751)
Birth Order=5	-0.311*** (0.0334)	-0.259*** (0.0608)	-0.0143*** (0.00142)	-0.0128*** (0.00266)	0.00738 (0.00534)	0.0260** (0.00920)
Birth Order=6	-0.337*** (0.0470)	-0.282*** (0.0709)	-0.0159*** (0.00179)	-0.0142*** (0.00361)	0.00944 (0.00727)	0.0408** (0.0137)
Birth Order=7	-0.391*** (0.0556)	-0.365*** (0.0977)	-0.0165*** (0.00215)	-0.0145*** (0.00391)	-0.00175 (0.00959)	0.0313 (0.0201)
Birth Order=8	-0.321*** (0.0749)	-0.360** (0.133)	-0.0161*** (0.00266)	-0.0182*** (0.00419)	0.0146 (0.0106)	0.0447* (0.0227)
Birth Order=9	-0.327** (0.101)	-0.415* (0.181)	-0.0181*** (0.00363)	-0.0180* (0.00742)	0.0218 (0.0148)	0.0521 (0.0319)
Birth Order=10	-0.323** (0.118)	-0.314 (0.197)	-0.0161*** (0.00420)	-0.0107 (0.00715)	0.0192 (0.0195)	0.0711 (0.0455)
Birth Order=11	-0.221 (0.169)	-0.395 (0.302)	-0.0252*** (0.00663)	-0.0274* (0.0126)	0.0499* (0.0252)	0.0554 (0.0558)
Birth Order=12	-0.646** (0.213)	-0.541 (0.351)	-0.0313*** (0.00664)	-0.0215+ (0.0120)	-0.0351 (0.0323)	0.0316 (0.0811)
Birth Order=13	-0.134 (0.246)	-0.0232 (0.454)	-0.0184* (0.00778)	-0.0155 (0.0123)	0.0199 (0.0574)	0.00259 (0.141)
Birth Order=14	-0.885** (0.294)	0.132 (0.421)	-0.0211+ (0.0119)	0.0175 (0.0183)	0.364+ (0.198)	0.652+ (0.371)

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Table A.16 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
Birth Order=15	-1.620*	-1.820	-0.0498***	-0.0475*	0.0369	-0.0771
	(0.697)	(1.274)	(0.0123)	(0.0214)	(0.0829)	(0.235)
Birth Order=16	-0.0498	0.574	-0.0230	0.0299	-0.134	-0.175
	(0.712)	(0.796)	(0.0304)	(0.0344)	(0.162)	(0.125)
Birth Order=18	-1.270+	0.0758	-0.0448**	-0.0105**	0.0296	
	(0.665)	(0.0713)	(0.0157)	(0.00356)	(0.0252)	
Constant	38.96***	13.73***	1.523***	0.154***	11.07***	12.64***
	(2.284)	(0.625)	(0.103)	(0.0290)	(0.340)	(0.116)
Observations	56876	56876	56876	56876	54570	54570

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. The sample used is the same than for the previous specification. Siblings who experience a parental separation in the same age group are excluded.

A5 Detailed heterogeneity of the effect of divorce

Table A.17 – Heterogeneous divorce effect according to gender

	Schooling		Earnings-weighted Education		Social Position	
	Boys	Girls	Boys	Girls	Boys	Girls
0-3 at divorce	-1.03*** (0.14)	-0.91*** (0.11)	-0.05*** (0.01)	-0.03*** (0.00)	-0.06*** (0.02)	-0.08*** (0.01)
0-3 at divorce=1		-0.92*** (0.13)		-0.04*** (0.01)		-0.08*** (0.02)
0-3 at divorce=1XMale=1		-0.11 (0.21)		-0.01 (0.01)		0.04 (0.03)
4-6 at divorce	-0.77*** (0.08)	-0.79*** (0.08)	-0.04*** (0.00)	-0.03*** (0.00)	-0.07*** (0.01)	-0.08*** (0.01)
4-6 at divorce=1		-0.75*** (0.12)		-0.03*** (0.00)		-0.09*** (0.02)
4-6 at divorce=1XMale=1		-0.07 (0.17)		-0.01 (0.01)		0.03 (0.02)
7-9 at divorce	-0.64*** (0.07)	-0.34*** (0.07)	-0.04*** (0.00)	-0.01*** (0.00)	-0.07*** (0.01)	-0.00 (0.01)
7-9 at divorce=1		-0.30*** (0.09)		-0.01** (0.00)		-0.02 (0.01)
7-9 at divorce=1XMale=1		-0.44** (0.14)		-0.03*** (0.01)		-0.04* (0.02)
10-12 at divorce	-0.71*** (0.06)	-0.48*** (0.07)	-0.03*** (0.00)	-0.01*** (0.00)	-0.07*** (0.01)	-0.03*** (0.01)
10-12 at divorce=1		-0.44*** (0.08)		-0.01*** (0.00)		-0.04*** (0.01)
10-12 at divorce=1XMale=1		-0.33** (0.13)		-0.02*** (0.01)		-0.02 (0.02)
13-15 at divorce	-0.61***	-0.51***	-0.03***	-0.01***	-0.03**	-0.04***

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Table A.17 – *Continued from previous page*

	Schooling		Earnings-weighted Education				Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
	(0.07)	(0.06)		(0.00)	(0.00)		(0.01)	(0.01)	
13-15 at divorce=1			-0.49***			-0.02***			-0.05***
			(0.08)			(0.00)			(0.01)
13-15 at divorce=1XMale=1			-0.16			-0.01			0.03
			(0.13)			(0.01)			(0.02)
16-18 at divorce	-0.18**	-0.26***		-0.01	-0.01***		-0.03**	-0.03***	
	(0.07)	(0.07)		(0.00)	(0.00)		(0.01)	(0.01)	
16-18 at divorce=1			-0.22*			-0.01**			-0.04**
			(0.10)			(0.00)			(0.01)
16-18 at divorce=1XMale=1			-0.08			0.01			0.02
			(0.14)			(0.01)			(0.02)
19 and more at divorce	0.19**	0.06		0.00	-0.00		0.01	0.01	
	(0.06)	(0.08)		(0.00)	(0.00)		(0.01)	(0.01)	
19 and more at divorce=1			0.17			-0.00			0.00
			(0.12)			(0.01)			(0.01)
19 and more at divorce=1XMale=1			0.03			0.01+			0.02
			(0.17)			(0.01)			(0.02)
Year of birth	0.12***	0.15***	0.13***	0.00***	0.00***	0.00***	0.01***	0.02***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year of birth squared	-0.00***	-0.00***	-0.00***	-0.00***	0.00	-0.00***	0.00***	-0.00***	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Primary, Secondary School Degreee	0.48***	0.57***	0.53***	0.02***	0.01***	0.02***	0.05***	0.05***	0.05***
	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: CAP, BEP	0.50***	0.62***	0.57***	0.02***	0.01***	0.02***	0.06***	0.06***	0.06***
	(0.01)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Brevet (vocational track)	1.24***	1.13***	1.21***	0.06***	0.03***	0.05***	0.15***	0.12***	0.13***

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Table A.17 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
Father: Baccalaureat	(0.04)	(0.04)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	1.31***	1.38***	1.36***	0.06***	0.04***	0.05***	0.16***	0.13***	0.14***
Father: BAC + 2	(0.03)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1.50***	1.48***	1.49***	0.08***	0.05***	0.06***	0.16***	0.14***	0.15***
Father: Supérieur à BAC + 2	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	1.90***	1.79***	1.86***	0.11***	0.06***	0.09***	0.23***	0.19***	0.21***
Father: Artisan (Craftman)	(0.03)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
	0.25***	0.20***	0.21***	0.02***	0.01***	0.01***	0.30***	0.07***	0.18***
Father: White Collar, Senior Executive	(0.02)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	0.78***	0.72***	0.73***	0.05***	0.02***	0.03***	0.37***	0.12***	0.25***
Father: Intermediate profession	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	0.33***	0.24***	0.27***	0.02***	0.01***	0.01***	0.29***	0.06***	0.17***
Father: Employee	(0.02)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	-0.06*	-0.08**	-0.08*	-0.00	-0.00**	-0.00	0.24***	0.02***	0.13***
Father: Manual Worker	(0.02)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	-0.39***	-0.50***	-0.47***	-0.02***	-0.01***	-0.02***	0.18***	-0.03***	0.08***
Father: Retired	(0.02)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	0.89***	0.84***	0.87***	0.05***	0.03***	0.04***	0.32***	0.10***	0.21***
Father: Other	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
	0.01	-0.36***	-0.22***	0.01***	-0.01***	-0.00	0.22***	-0.01	0.11***
Mother: Primary, Secondary School Degreee	(0.03)	(0.03)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.64***	0.76***	0.70***	0.03***	0.02***	0.02***	0.08***	0.08***	0.07***
Mother: CAP, BEP	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.83***	0.94***	0.89***	0.04***	0.02***	0.03***	0.10***	0.10***	0.10***
Mother: Brevet (vocational track)	(0.02)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	1.16***	1.41***	1.30***	0.05***	0.04***	0.05***	0.18***	0.14***	0.15***

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Table A.17 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
	(0.04)	(0.05)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Baccalaureat	1.42***	1.69***	1.55***	0.07***	0.05***	0.06***	0.17***	0.17***	0.17***
	(0.02)	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Mother: BAC + 2	1.52***	1.63***	1.60***	0.08***	0.06***	0.07***	0.18***	0.18***	0.18***
	(0.03)	(0.02)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Mother: Supérieur à BAC + 2	1.62***	1.76***	1.69***	0.09***	0.07***	0.08***	0.17***	0.20***	0.18***
	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Mother: Artisan (Craftman)	0.02	-0.08*	-0.04	0.01***	-0.01***	-0.00	0.08***	0.02**	0.04***
	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: White Collar, Senior Executive	0.34***	0.08*	0.21***	0.03***	0.00**	0.02***	0.10***	0.05***	0.07***
	(0.04)	(0.04)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Intermediate profession	0.27***	0.27***	0.27***	0.02***	0.01***	0.01***	0.09***	0.06***	0.07***
	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Employee	0.14***	0.11***	0.13***	0.01***	-0.00	0.00**	0.10***	0.05***	0.06***
	(0.02)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Manual Worker	-0.13***	-0.19***	-0.16***	-0.01***	-0.01***	-0.01***	0.06***	0.01+	0.03***
	(0.03)	(0.03)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Retired	-0.03	-0.14**	-0.07	0.00	-0.01***	-0.00	-0.00	0.01*	0.00
	(0.04)	(0.04)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Other	0.12***	0.00	0.06*	0.01***	-0.00***	0.00*	0.09***	0.03***	0.05***
	(0.02)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
Sibling Size	-0.20***	-0.19***	-0.19***	-0.01***	-0.01***	-0.01***	-0.03***	-0.02***	-0.03***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sibling Size squared	0.01***	0.00***	0.01***	0.00***	0.00***	0.00***	0.00***	0.00***	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:North West	-0.08***	-0.05***	-0.07***	-0.01***	-0.00**	-0.00***	-0.05***	-0.05***	-0.05***

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Table A.17 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
Region of birth:North	(0.02)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.06***	-0.01	0.03	0.00	0.00	0.00	-0.04***	-0.05***	-0.04***
Region of birth:East	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.03	-0.03+	0.01	-0.00**	-0.00***	-0.00*	-0.04***	-0.05***	-0.04***
Region of birth:West	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.06***	0.05**	0.06*	-0.00***	0.00	-0.00	-0.04***	-0.06***	-0.05***
Region of birth:South West	(0.02)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.01	0.10***	0.05*	-0.00***	0.00	-0.00	-0.08***	-0.04***	-0.06***
Region of birth:South East	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.02	0.11***	0.07***	-0.00*	0.00***	0.00	-0.04***	-0.04***	-0.04***
Region of birth:Corse	(0.02)	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.13	-0.44***	-0.23+	0.00	-0.02***	-0.01	-0.03*	-0.09***	-0.06**
Region of birth:Oversea	(0.13)	(0.10)	(0.13)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)
	-0.08*	0.10*	0.04	-0.00	0.00	0.00	-0.03***	-0.01*	-0.02*
Mother Nationality: European	(0.04)	(0.04)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.26***	0.36***	0.32***	0.01***	0.01***	0.01***	0.03***	0.04***	0.03***
Mother Nationality: Other	(0.02)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
	0.78***	0.85***	0.80***	0.02***	0.02***	0.02***	0.07***	0.07***	0.07***
Father Nationality: European	(0.04)	(0.05)	(0.07)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	0.21***	0.19***	0.22***	0.01***	0.00***	0.01***	0.06***	0.00	0.03***
Father Nationality: Other	(0.03)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
	0.11**	0.21***	0.16*	0.01***	0.01***	0.01*	0.02***	0.05***	0.03***
Mother Year of Birth	(0.03)	(0.04)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.02***	-0.02***	-0.01***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
Last Born	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.05**	0.02	0.04**	0.00***	-0.00	0.00**	-0.00	-0.01*	-0.00

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Table A.17 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
Age	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.03***	0.02**	-0.00	-0.00***	0.00***	0.00	0.11***	0.12***	0.11***
Age squared	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.00***	0.00**	0.00***	0.00***	-0.00	0.00*	-0.00***	-0.00***	-0.00***
Birth Order=2	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.09***	-0.02	-0.05***	-0.00***	-0.00**	-0.00***	0.02***	0.00	0.01***
Birth Order=3	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.22***	-0.14***	-0.18***	-0.01***	-0.01***	-0.01***	0.03***	-0.01***	0.01**
Birth Order=4	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.30***	-0.19***	-0.24***	-0.02***	-0.01***	-0.01***	0.02***	-0.02***	-0.01
Birth Order=5	(0.03)	(0.03)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	-0.48***	-0.30***	-0.37***	-0.02***	-0.01***	-0.02***	0.03***	-0.01*	0.01
Birth Order=6	(0.04)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.40***	-0.47***	-0.43***	-0.02***	-0.02***	-0.02***	0.05***	-0.03***	0.01
Birth Order=7	(0.06)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.63***	-0.45***	-0.52***	-0.02***	-0.02***	-0.02***	0.05***	-0.06***	-0.00
Birth Order=8	(0.07)	(0.07)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.58***	-0.27**	-0.42***	-0.03***	-0.01***	-0.02***	0.06***	-0.01	0.02
Birth Order=9	(0.10)	(0.09)	(0.09)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.01)
	-0.78***	-0.17	-0.48***	-0.04***	-0.02***	-0.02***	0.02	-0.05*	-0.01
Birth Order=10	(0.09)	(0.13)	(0.12)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.02)
	-0.80***	-0.30+	-0.51***	-0.03***	-0.01**	-0.02***	0.01	-0.03	-0.02
Birth Order=11	(0.12)	(0.18)	(0.14)	(0.00)	(0.01)	(0.00)	(0.03)	(0.02)	(0.02)
	-0.77**	0.21	-0.23	-0.04***	-0.02**	-0.03***	0.10*	-0.00	0.04
Birth Order=12	(0.24)	(0.20)	(0.20)	(0.01)	(0.01)	(0.01)	(0.04)	(0.03)	(0.03)
	-0.84***	-0.64**	-0.64**	-0.05***	-0.03***	-0.04***	0.01	-0.09**	-0.03

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Table A.17 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Boys	Girls		Boys	Girls		Boys	Girls	
Birth Order=13	(0.16)	(0.21)	(0.22)	(0.01)	(0.00)	(0.01)	(0.04)	(0.03)	(0.03)
	-0.81**	0.49*	-0.06	-0.05***	0.00	-0.02*	0.05	-0.05	-0.00
Birth Order=14	(0.30)	(0.22)	(0.31)	(0.01)	(0.01)	(0.01)	(0.05)	(0.10)	(0.06)
		-0.37+	-0.74**		-0.01	-0.01		0.55+	0.57
Birth Order=15		(0.20)	(0.29)		(0.01)	(0.01)		(0.30)	(0.35)
		-1.10*	-1.69*		-0.05***	-0.05***		0.02	0.02
Birth Order=16		(0.51)	(0.67)		(0.01)	(0.01)		(0.06)	(0.08)
		0.09	-0.10		-0.03	-0.03		-0.14	-0.16
Birth Order=18		(0.56)	(0.70)		(0.02)	(0.03)		(0.13)	(0.16)
		-0.70+	-1.36*		-0.04**	-0.05**		0.04	-0.00
Male		(0.41)	(0.64)		(0.01)	(0.02)		(0.02)	(0.03)
			-0.23***			0.04***			-0.20***
Constant			(0.01)			(0.00)			(0.00)
	42.36***	41.13***	36.79***	2.05***	1.39***	1.53***	8.75***	11.88***	10.31***
	(2.58)	(2.56)	(2.61)	(0.13)	(0.08)	(0.11)	(0.38)	(0.36)	(0.40)
Observations	25933	26669	52602	25933	26669	52602	25204	25312	50516

Notes: Random effects results. See previous tables for the description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table A.18 – Heterogeneous divorce effect according to mother's education (Random Effects)

	Schooling		Earnings-weighted Education		Social Position	
	Less educated	Educated	Less educated	Educated	Less educated	Educated
0-3 at divorce	-0.54*** (0.15)	-1.20*** (0.15)	-0.02*** (0.01)	-0.05*** (0.01)	-0.04 (0.02)	-0.08*** (0.02)
0-3 at divorce=1						
		-1.24*** (0.14)		-0.05*** (0.01)		-0.08*** (0.02)
0-3 at divorce=1X Less Highly Educated = 1		0.76*** (0.19)		0.03*** (0.01)		0.06* (0.03)
4-6 at divorce	-0.63*** (0.11)	-0.87*** (0.11)	-0.02*** (0.00)	-0.04*** (0.00)	-0.05* (0.02)	-0.10*** (0.01)
4-6 at divorce=1						
		-0.90*** (0.10)		-0.04*** (0.00)		-0.10*** (0.01)
4-6 at divorce=1X Less Highly Educated = 1		0.35* (0.15)		0.02* (0.01)		0.07** (0.02)
7-9 at divorce	-0.29** (0.11)	-0.64*** (0.08)	-0.01*** (0.00)	-0.03*** (0.00)	-0.03* (0.02)	-0.04*** (0.01)
7-9 at divorce=1						
		-0.66*** (0.09)		-0.03*** (0.00)		-0.04*** (0.01)
7-9 at divorce=1X Less Highly Educated = 1		0.45** (0.14)		0.02*** (0.01)		0.02 (0.02)
10-12 at divorce	-0.48*** (0.09)	-0.67*** (0.08)	-0.02*** (0.00)	-0.02*** (0.00)	-0.01 (0.01)	-0.07*** (0.01)
10-12 at divorce=1						
		-0.70*** (0.08)		-0.02*** (0.00)		-0.08*** (0.01)
10-12 at divorce=1X Less Highly Educated = 1		0.30** (0.11)		0.01* (0.00)		0.08*** (0.02)
13-15 at divorce	-0.48***	-0.60***	-0.01**	-0.03***	-0.01	-0.05***

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Table A.18 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
	(0.09)	(0.07)		(0.00)	(0.00)		(0.02)	(0.01)	
13-15 at divorce=1			-0.62***			-0.03***			-0.06***
			(0.07)			(0.00)			(0.01)
13-15 at divorce=1X Less Highly Educated = 1			0.22+			0.02**			0.06**
			(0.11)			(0.00)			(0.02)
16-18 at divorce	0.22	-0.41***		0.01	-0.01***		0.03	-0.05***	
	(0.13)	(0.08)		(0.01)	(0.00)		(0.02)	(0.01)	
16-18 at divorce=1			-0.45***			-0.02***			-0.05***
			(0.08)			(0.00)			(0.01)
16-18 at divorce=1X Less Highly Educated = 1			0.75***			0.03***			0.09***
			(0.17)			(0.01)			(0.02)
19 and more at divorce	0.65***	0.02		0.02*	-0.00		0.08***	-0.01	
	(0.18)	(0.10)		(0.01)	(0.00)		(0.03)	(0.01)	
19 and more at divorce=1			0.00			-0.00			-0.01
			(0.09)			(0.00)			(0.01)
19 and more at divorce=1X Less Highly Educated = 1			0.75***			0.02**			0.10***
			(0.19)			(0.01)			(0.03)
Male	-0.07***	-0.32***	-0.24***	0.02***	0.04***	0.03***	-0.19***	-0.20***	-0.20***
	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year of birth	0.14***	0.13***	0.14***	0.00***	0.00***	0.00***	0.01***	0.02***	0.01***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Year of birth squared	-0.00***	-0.00***	-0.00***	-0.00	-0.00***	-0.00+	0.00***	-0.00	0.00**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Primary, Secondary School Degreee	0.57***	0.45***	0.50***	0.02***	0.02***	0.01***	0.06***	0.04***	0.05***
	(0.02)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: CAP, BEP	0.57***	0.51***	0.57***	0.02***	0.01***	0.02***	0.06***	0.06***	0.06***

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Table A.18 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Father: Brevet (vocational track)	1.41***	1.09***	1.31***	0.05***	0.04***	0.05***	0.12***	0.13***	0.15***
	(0.15)	(0.06)	(0.05)	(0.01)	(0.00)	(0.00)	(0.03)	(0.01)	(0.01)
Father: Baccalaureat	1.42***	1.27***	1.52***	0.05***	0.05***	0.06***	0.20***	0.13***	0.16***
	(0.09)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Father: BAC + 2	1.27***	1.43***	1.71***	0.04***	0.06***	0.07***	0.13***	0.15***	0.18***
	(0.14)	(0.05)	(0.04)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
Father: Supérieur à BAC + 2	2.11***	1.76***	2.23***	0.09***	0.08***	0.11***	0.18***	0.20***	0.25***
	(0.11)	(0.04)	(0.03)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)	(0.00)
Father: Artisan (Craftman)	0.21***	0.18***	0.23***	0.01**	0.01***	0.01***	0.15***	0.19***	0.18***
	(0.06)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: White Collar, Senior Executive	1.34***	0.59***	0.77***	0.05***	0.03***	0.04***	0.28***	0.25***	0.25***
	(0.08)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
Father: Intermediate profession	0.38***	0.20***	0.27***	0.01***	0.01***	0.01***	0.15***	0.18***	0.18***
	(0.06)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Employee	0.13*	-0.18***	-0.09**	0.00+	-0.00*	-0.00+	0.11***	0.14***	0.13***
	(0.06)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Manual Worker	-0.26***	-0.57***	-0.48***	-0.01***	-0.02***	-0.02***	0.06***	0.08***	0.07***
	(0.05)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Retired	0.84***	0.88***	0.86***	0.03***	0.04***	0.04***	0.15***	0.24***	0.21***
	(0.07)	(0.05)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father: Other	-0.12+	-0.25***	-0.23***	-0.00	-0.00	-0.00	0.06***	0.13***	0.10***
	(0.07)	(0.07)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Artisan (Craftman)	0.05	-0.05	-0.01	0.01*	-0.00	0.00	0.06***	0.04***	0.05***
	(0.09)	(0.05)	(0.05)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
Mother: White Collar, Senior Executive	1.11***	0.29***	0.63***	0.07***	0.02***	0.04***	0.15*	0.08***	0.12***

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Table A.18 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
	(0.31)	(0.06)	(0.05)	(0.02)	(0.00)	(0.00)	(0.08)	(0.01)	(0.01)
Mother: Intermediate profession	0.09	0.35***	0.67***	0.01+	0.01***	0.03***	0.09***	0.07***	0.12***
	(0.12)	(0.05)	(0.04)	(0.01)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
Mother: Employee	0.02	0.19***	0.17***	0.00*	0.00*	0.01***	0.06***	0.07***	0.07***
	(0.05)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Manual Worker	-0.24***	-0.18***	-0.16***	-0.00+	-0.01***	-0.01***	0.03*	0.02+	0.03***
	(0.06)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother: Retired	-0.42***	0.05	0.08	-0.01**	-0.00	0.01*	-0.02	0.01	0.02+
	(0.09)	(0.06)	(0.06)	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.01)
Mother: Other	-0.15**	0.16***	0.09**	-0.00	0.00**	0.00**	0.04**	0.06***	0.06***
	(0.05)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Sibling Size	-0.21***	-0.15***	-0.19***	-0.01***	-0.01***	-0.01***	-0.03***	-0.02***	-0.03***
	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Sibling Size squared	0.01***	-0.00	0.01***	0.00***	0.00*	0.00***	0.00***	0.00	0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Region of birth:North West	-0.22***	0.00	-0.09***	-0.01***	-0.00+	-0.01***	-0.07***	-0.04***	-0.05***
	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Region of birth:North	-0.22***	0.19***	0.02	-0.01***	0.01***	0.00	-0.07***	-0.02***	-0.04***
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Region of birth:East	-0.08+	0.04	-0.00	-0.00*	-0.00	-0.00*	-0.06***	-0.03***	-0.04***
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Region of birth:West	-0.10**	0.14***	0.04+	-0.01***	0.00	-0.00	-0.08***	-0.03***	-0.05***
	(0.04)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Region of birth:South West	0.00	0.08**	0.05*	-0.00*	-0.00	-0.00	-0.07***	-0.06***	-0.06***
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Region of birth:South East	-0.01	0.11***	0.08***	-0.00+	0.00	0.00	-0.05***	-0.04***	-0.04***

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Table A.18 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
	(0.04)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Region of birth:Corse	-0.01	-0.31+	-0.24+	-0.01	-0.01	-0.01+	-0.03	-0.07*	-0.06**
	(0.22)	(0.16)	(0.13)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.02)
Region of birth:Oversea	0.08	-0.16+	0.04	0.00	-0.00	0.00	-0.02	-0.05***	-0.02*
	(0.08)	(0.09)	(0.06)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)
Mother Nationality: European	0.45***	0.04	0.35***	0.02***	-0.00	0.01***	0.06***	-0.01	0.04***
	(0.04)	(0.05)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mother Nationality: Other	0.77***	0.53***	0.79***	0.03***	0.01+	0.02***	0.04***	0.08***	0.07***
	(0.10)	(0.12)	(0.08)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
Father Nationality: European	0.19***	0.15**	0.19***	0.00+	0.01**	0.01***	0.02***	0.03***	0.03***
	(0.04)	(0.06)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Father Nationality: Other	0.09	0.12	0.14*	0.00	0.01+	0.01	0.05***	0.01	0.03**
	(0.09)	(0.09)	(0.07)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
Mother Year of Birth	-0.01***	-0.02***	-0.01***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.06**	0.03+	0.04**	0.00+	0.00+	0.00*	-0.00	-0.00	-0.00
	(0.02)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age	0.03*	-0.02*	0.00	0.00*	-0.00	0.00	0.11***	0.11***	0.11***
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Age squarred	0.00	0.00***	0.00***	-0.00	0.00**	0.00	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.07*	-0.05**	-0.06***	-0.00*	-0.00***	-0.00***	0.01	0.01***	0.01***
	(0.03)	(0.02)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.19***	-0.19***	-0.19***	-0.01***	-0.01***	-0.01***	0.01	0.01+	0.01*
	(0.03)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Birth Order=4	-0.20***	-0.28***	-0.25***	-0.01***	-0.01***	-0.01***	-0.00	-0.01	-0.01

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Table A.18 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
Birth Order=5	(0.04) -0.30***	(0.04) -0.44***	(0.03) -0.38***	(0.00) -0.01***	(0.00) -0.02***	(0.00) -0.02***	(0.01) 0.01	(0.01) 0.01	(0.00) 0.01
Birth Order=6	(0.05) -0.42***	(0.06) -0.44***	(0.04) -0.44***	(0.00) -0.01***	(0.00) -0.02***	(0.00) -0.02***	(0.01) 0.01	(0.01) 0.00	(0.01) 0.01
Birth Order=7	(0.06) -0.51***	(0.09) -0.50***	(0.05) -0.53***	(0.00) -0.02***	(0.00) -0.02***	(0.00) -0.02***	(0.01) -0.02	(0.01) 0.02	(0.01) -0.00
Birth Order=8	(0.08) -0.38***	(0.11) -0.57***	(0.06) -0.43***	(0.00) -0.01***	(0.00) -0.03***	(0.00) -0.02***	(0.01) 0.01	(0.02) 0.03	(0.01) 0.02
Birth Order=9	(0.10) -0.59***	(0.17) -0.30	(0.10) -0.49***	(0.00) -0.02***	(0.01) -0.02***	(0.00) -0.02***	(0.02) -0.03+	(0.03) 0.01	(0.01) -0.01
Birth Order=10	(0.11) -0.47**	(0.23) -0.63*	(0.11) -0.51***	(0.00) -0.02**	(0.01) -0.02+	(0.00) -0.02***	(0.02) -0.01	(0.03) -0.05	(0.02) -0.02
Birth Order=11	(0.16) -0.36+	(0.30) -0.15	(0.14) -0.21	(0.01) -0.02**	(0.01) -0.04	(0.00) -0.03**	(0.03) -0.02	(0.04) 0.29*	(0.02) 0.05
Birth Order=12	(0.21) -0.80***	(0.75) -0.44	(0.19) -0.64**	(0.01) -0.03***	(0.04) -0.05***	(0.01) -0.04***	(0.03) -0.06	(0.12) -0.00	(0.03) -0.03
Birth Order=13	(0.24) -0.27	(0.57)	(0.22) -0.05	(0.01) -0.02*	(0.01)	(0.01) -0.02*	(0.04) -0.04	(0.05)	(0.03) -0.00
Birth Order=14	(0.32) -0.85*		(0.31) -0.72*	(0.01) -0.02+		(0.01) -0.01	(0.07) 0.54		(0.06) 0.57+
Birth Order=15	(0.35) -2.06***		(0.33) -1.67*	(0.01) -0.07***		(0.01) -0.05***	(0.34) -0.06		(0.32) 0.02
Birth Order=16	(0.60) -0.45		(0.70) -0.12	(0.01) -0.04		(0.01) -0.03	(0.09) -0.23		(0.08) -0.16
	(0.83)		(0.69)	(0.03)		(0.03)	(0.19)		(0.17)
Mother: CAP, BEP		0.24***			0.01***			0.03***	

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Table A.18 – *Continued from previous page*

	Schooling		Earnings-weighted Education				Social Position		
	Less educated	Educated	Less educated	Educated			Less educated	Educated	
Mother: Brevet (vocational track)		(0.02) 0.66***		(0.00) 0.03***				(0.00) 0.08***	
Mother: Baccaalaureat		(0.07) 0.91***		(0.00) 0.04***				(0.01) 0.10***	
Mother: BAC + 2		(0.03) 0.96***		(0.00) 0.05***				(0.00) 0.12***	
Mother: Supérieur à BAC + 2		(0.04) 1.10***		(0.00) 0.06***				(0.01) 0.12***	
Birth Order=18		(0.04) -0.54 -1.39*		(0.00) -0.02* -0.05**				(0.01) 0.13** -0.01	
Less=1		(0.34) -0.83***		(0.01) -0.03***				(0.05) -0.09***	(0.03)
Constant	23.81*** (3.58)	46.56*** (3.49)	37.67*** (2.69)	0.83*** (0.15)	2.00*** (0.16)	1.59*** (0.11)	9.80*** (0.59)	10.88*** (0.56)	10.48*** (0.43)
Observations	17494	35108	52602	17494	35108	52602	16534	33982	50516

Notes: Random effects results. See previous tables for the description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table A.19 – Heterogeneous divorce effect according to mother’s education (Fixed Effects)

	Schooling		Earnings-weighted Education		Social Position	
	Less educated	Educated	Less educated	Educated	Less educated	Educated
0-3 at divorce	-0.37 (0.48)	-0.72+ (0.41)	-0.02 (0.02)	-0.03 (0.02)	-0.07 (0.08)	-0.02 (0.06)
0-3 at divorce=1						
0-3 at divorce=1X Less Highly Educated						
4-6 at divorce	-0.72 (0.48)	-0.49 (0.33)	-0.03 (0.02)	-0.02 (0.02)	-0.13+ (0.08)	-0.05 (0.05)
4-6 at divorce=1						
4-6 at divorce=1X Less Highly Educated						
7-9 at divorce	-0.50 (0.44)	-0.29 (0.26)	-0.02 (0.02)	-0.01 (0.01)	-0.10 (0.07)	0.01 (0.04)
7-9 at divorce=1						
7-9 at divorce=1X Less Highly Educated						
10-12 at divorce	-0.82* (0.40)	-0.48* (0.22)	-0.02 (0.02)	-0.01 (0.01)	-0.09 (0.07)	-0.06 (0.04)
10-12 at divorce=1						
10-12 at divorce=1X Less Highly Educated						
13-15 at divorce	-0.89* (0.42)	-0.42* (0.25)	-0.02 (0.02)	-0.02 (0.02)	-0.09 (0.02)	-0.02 (0.07)

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Table A.19 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
	(0.38)	(0.18)		(0.02)	(0.01)		(0.07)	(0.03)	
13-15 at divorce=1			-0.45*			-0.02			-0.03
			(0.19)			(0.01)			(0.03)
13-15 at divorce=1X Less Highly Educated			-0.39			-0.00			-0.04
			(0.38)			(0.02)			(0.07)
16-18 at divorce	-0.33	-0.35*		-0.01	-0.01		-0.05	-0.02	
	(0.33)	(0.18)		(0.01)	(0.01)		(0.05)	(0.03)	
16-18 at divorce=1			-0.37*			-0.01			-0.03
			(0.18)			(0.01)			(0.03)
16-18 at divorce=1X Less Highly Educated			0.05			0.00			-0.02
			(0.34)			(0.02)			(0.06)
Man	-0.08*	-0.30***	-0.23***	0.02***	0.04***	0.04***	-0.20***	-0.20***	-0.20***
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Year of Birth	0.13*	0.00	0.05	0.00	-0.01**	-0.00*	-0.10***	-0.11***	-0.10***
	(0.05)	(0.04)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Year of birth squarred	-0.00**	-0.00	-0.00**	-0.00	0.00***	0.00**	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.04	0.03	0.03	0.00	0.00+	0.00+	-0.00	-0.01	-0.01
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Age squarred	0.00	-0.00	-0.00	0.00	-0.00**	-0.00*	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.07	-0.03	-0.04+	-0.00	-0.00*	-0.00**	0.01+	0.02***	0.02***
	(0.04)	(0.03)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Birth Order=3	-0.15**	-0.16***	-0.15***	-0.01***	-0.01***	-0.01***	0.02*	0.02*	0.02***
	(0.05)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Birth Order=4	-0.20**	-0.25***	-0.22***	-0.01***	-0.02***	-0.01***	0.00	0.01	0.00

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Table A.19 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
Birth Order=5	(0.06)	(0.07)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.30***	-0.34***	-0.32***	-0.01***	-0.02***	-0.01***	0.02	0.04**	0.03**
Birth Order=6	(0.08)	(0.10)	(0.06)	(0.00)	(0.00)	(0.00)	(0.02)	(0.02)	(0.01)
	-0.39***	-0.35*	-0.37***	-0.01***	-0.02*	-0.02***	0.05*	0.04+	0.05**
Birth Order=7	(0.11)	(0.16)	(0.08)	(0.00)	(0.01)	(0.00)	(0.02)	(0.03)	(0.02)
	-0.51***	-0.51*	-0.51***	-0.01**	-0.02*	-0.02***	0.02	0.07+	0.04*
Birth Order=8	(0.13)	(0.20)	(0.10)	(0.00)	(0.01)	(0.00)	(0.03)	(0.04)	(0.02)
	-0.44*	-0.58+	-0.49**	-0.02**	-0.02	-0.02***	0.03	0.12*	0.06+
Birth Order=9	(0.19)	(0.32)	(0.15)	(0.01)	(0.01)	(0.01)	(0.03)	(0.05)	(0.03)
	-0.62**	-0.67	-0.64***	-0.02**	-0.03+	-0.02***	0.00	0.08	0.03
Birth Order=10	(0.21)	(0.47)	(0.19)	(0.01)	(0.01)	(0.01)	(0.04)	(0.07)	(0.04)
	-0.38	-0.69	-0.47+	-0.01	-0.01	-0.02+	0.08	-0.02	0.06
Birth Order=11	(0.31)	(0.52)	(0.25)	(0.01)	(0.02)	(0.01)	(0.07)	(0.07)	(0.05)
	-0.19	-1.00	-0.31	-0.01	-0.09	-0.03	0.05	0.04	0.06
Birth Order=12	(0.41)	(1.85)	(0.39)	(0.01)	(0.09)	(0.02)	(0.09)	(0.15)	(0.07)
	-0.52	0.35	-0.42	-0.01	-0.02	-0.02	0.05	0.23*	0.10
Birth Order=13	(0.40)	(1.00)	(0.35)	(0.01)	(0.01)	(0.01)	(0.09)	(0.09)	(0.08)
	0.05		0.05	-0.02		-0.01	-0.06		-0.03
Birth Order=14	(0.59)		(0.60)	(0.02)		(0.02)	(0.18)		(0.17)
	0.26		0.14	0.01		0.01	0.75		0.75
Birth Order=15	(0.56)		(0.49)	(0.02)		(0.02)	(0.59)		(0.64)
	-1.71		-1.82	-0.05+		-0.05+	-0.07		-0.08
Birth Order=16	(1.22)		(1.34)	(0.02)		(0.03)	(0.24)		(0.24)
	0.58		0.57	0.02		0.03	-0.17		-0.14
Birth Order=18	(0.91)		(0.86)	(0.03)		(0.04)	(0.14)		(0.14)
		-0.09	-0.08		-0.02*	-0.01***			

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Table A.19 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Less educated	Educated		Less educated	Educated		Less educated	Educated	
Constant	11.08*** (1.23)	(0.16) 15.68*** (1.01)	(0.09) 14.09*** (0.85)	0.06 (0.05)	(0.01) 0.26*** (0.05)	(0.00) 0.19*** (0.04)	12.44*** (0.24)	12.93*** (0.17)	12.76*** (0.15)
Observations	17494	35108	52602	17494	35108	52602	16534	33982	50516

Notes: Fixed effects results. See previous tables for the description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table A.20 – Heterogeneous divorce effect according to divorce rate (Fixed Effects)

	Schooling		Earnings-weighted Education			Social Position	
	Low Rate	High Rate	Low Rate	High Rate		Low Rate	High Rate
0-3 at divorce	-0.32 (0.53)	-0.57 (0.45)	-0.03 (0.02)	-0.02 (0.02)		-0.05 (0.09)	0.02 (0.07)
0-3 at divorce=1					-0.02 (0.02)		-0.02 (0.07)
0-3 at divorce=1X High Divorce Rate					0.00 (0.02)		-0.02 (0.07)
4-6 at divorce	-0.22 (0.50)	-0.48 (0.36)	-0.02 (0.02)	-0.01 (0.02)		-0.11 (0.08)	-0.01 (0.06)
4-6 at divorce=1					-0.02 (0.02)		-0.08 (0.06)
4-6 at divorce=1X High Divorce Rate					-0.01 (0.02)		0.02 (0.06)
7-9 at divorce	-0.15 (0.39)	-0.26 (0.33)	-0.02 (0.02)	-0.01 (0.02)		-0.06 (0.08)	0.03 (0.05)
7-9 at divorce=1					-0.01 (0.01)		-0.05 (0.05)
7-9 at divorce=1X High Divorce Rate					-0.01 (0.01)		0.04 (0.04)
10-12 at divorce	-0.71+ (0.37)	-0.30 (0.28)	-0.04** (0.01)	-0.01 (0.01)		-0.09 (0.07)	-0.03 (0.04)
10-12 at divorce=1					-0.02+ (0.01)		-0.07+ (0.04)
10-12 at divorce=1X High Divorce Rate					0.01 (0.01)		0.01 (0.04)
13-15 at divorce	-0.70* (0.34)	-0.28 (0.25)	-0.03* (0.01)	-0.01 (0.01)		-0.01 (0.07)	-0.04 (0.03)
13-15 at divorce=1					-0.02+ (0.01)		-0.03 (0.05)
13-15 at divorce=1X High Divorce Rate					0.01 (0.01)		-0.03 (0.04)
16-18 at divorce	-0.38 (0.29)	-0.38+ (0.20)	-0.02 (0.01)	-0.02 (0.01)		-0.04 (0.06)	-0.00 (0.03)
16-18 at divorce=1					-0.01		-0.04

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Table A.20 – *Continued from previous page*

	Schooling		Earnings-weighted Education				Social Position		
	Low Divorce rate	High Divorce rate		Low Divorce rate	High Divorce rate		Low Divorce rate	High Divorce rate	
			(0.24)			(0.01)			(0.04)
16-18 at divorce=1X High Divorce Rate			-0.10			-0.01			0.02
			(0.25)			(0.01)			(0.04)
Man	-0.10***	-0.49***	-0.23***	0.03***	0.04***	0.04***	-0.20***	-0.19***	-0.20***
	(0.03)	(0.04)	(0.02)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Year of Birth	-0.09+	0.16*	0.02	-0.01***	0.00	-0.00*	-0.11***	-0.10***	-0.10***
	(0.04)	(0.08)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Year of birth squarred	0.00	-0.00***	-0.00**	0.00**	-0.00+	0.00*	0.00	-0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Last Born	0.08**	-0.01	0.03	0.00*	0.00	0.00*	-0.00	-0.01	-0.01
	(0.03)	(0.04)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
Age squarred	-0.00***	0.00	-0.00	-0.00***	0.00	-0.00*	-0.00***	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.10***	0.07+	-0.04+	-0.00**	0.00	-0.00*	0.02***	0.01	0.02***
	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
Birth Order=3	-0.23***	0.04	-0.15***	-0.01***	-0.00	-0.01***	0.03***	0.00	0.02***
	(0.04)	(0.07)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Birth Order=4	-0.31***	0.08	-0.22***	-0.02***	-0.00	-0.01***	0.01	-0.00	0.00
	(0.06)	(0.12)	(0.05)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
Birth Order=5	-0.36***	-0.46*	-0.32***	-0.01***	-0.02*	-0.01***	0.05***	-0.03	0.03**
	(0.07)	(0.18)	(0.06)	(0.00)	(0.01)	(0.00)	(0.01)	(0.03)	(0.01)
Birth Order=6	-0.48***	-0.26	-0.37***	-0.02***	-0.01	-0.02***	0.07***	-0.03	0.05**
	(0.09)	(0.30)	(0.09)	(0.00)	(0.01)	(0.00)	(0.02)	(0.05)	(0.02)
Birth Order=7	-0.67***	-0.11	-0.51***	-0.02***	0.00	-0.02***	0.03	0.05	0.04*
	(0.13)	(0.35)	(0.10)	(0.00)	(0.01)	(0.00)	(0.03)	(0.05)	(0.02)
Birth Order=8	-0.68***	-0.61	-0.49**	-0.02***	-0.01	-0.02**	0.09**	-0.10	0.06*
	(0.17)	(0.55)	(0.16)	(0.01)	(0.02)	(0.01)	(0.03)	(0.10)	(0.03)
Birth Order=9	-0.55**	-0.77	-0.64**	-0.02**	-0.01	-0.02***	0.06	-0.02	0.03
	(0.20)	(0.72)	(0.20)	(0.01)	(0.02)	(0.01)	(0.04)	(0.12)	(0.04)
Birth Order=10	-0.75**	0.10	-0.50+	-0.03**	0.07	-0.02+	0.05	0.14	0.06
	(0.25)	(1.18)	(0.26)	(0.01)	(0.04)	(0.01)	(0.07)	(0.21)	(0.06)
Birth Order=11	-1.04*	0.05	-0.34	-0.05*	0.04	-0.03	0.06	0.13	0.06
	(0.45)	(1.69)	(0.37)	(0.02)	(0.06)	(0.02)	(0.09)	(0.38)	(0.07)
Birth Order=12	-0.55	-1.66	-0.41	-0.02	-0.03	-0.02	0.08	0.30	0.10

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Table A.20 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Low Divorce rate	High Divorce rate		Low Divorce rate	High Divorce rate		Low Divorce rate	High Divorce rate	
	(0.37)	(1.39)	(0.35)	(0.01)	(0.05)	(0.01)	(0.09)	(0.53)	(0.07)
Birth Order=13	-0.68		0.01	-0.04*		-0.02	-0.10		-0.03
	(0.49)		(0.55)	(0.02)		(0.02)	(0.26)		(0.16)
Birth Order=14	-0.34		0.07	-0.00		0.01	0.74		0.75
	(0.62)		(0.55)	(0.03)		(0.02)	(0.60)		(0.62)
Birth Order=15	-3.50***		-1.92+	-0.09***		-0.05*	-0.09		-0.08
	(0.62)		(1.12)	(0.02)		(0.02)	(0.23)		(0.23)
Birth Order=16	1.65***		0.69	0.07***		0.03	-0.28***		-0.14
	(0.08)		(0.80)	(0.00)		(0.03)	(0.02)		(0.14)
Birth Order=18	-0.25*		-0.11	-0.02***		-0.02***			
	(0.10)		(0.09)	(0.00)		(0.00)			
X High Divorce Rate			0.27***			0.00+			0.01
			(0.05)			(0.00)			(0.01)
Constant	16.62***	12.88***	14.50***	0.24***	0.10	0.20***	12.68***	13.01***	12.77***
	(1.03)	(2.02)	(0.81)	(0.04)	(0.10)	(0.04)	(0.18)	(0.30)	(0.15)
Observations	35020	17582	52602	35020	17582	52602	33700	16816	50516

Notes: Fixed effects results. See previous tables for the description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

Table A.21 – Heterogeneous divorce effect according to year of birth (Fixed Effects)

	Schooling		Earnings-weighted Education		Social Position	
	Before 1970	After 1970	Before 1970	After 1970	Before 1970	After 1970
0-3 at divorce	-0.25	-1.40***	-0.02	-0.05*	-0.05	-0.05
	(0.46)	(0.39)	(0.02)	(0.02)	(0.07)	(0.07)
0-3 at divorce=1						
		-0.42		-0.02		-0.02
		(0.46)		(0.02)		(0.06)
0-3 at divorce=1X1.Born After 1970						
		-0.49		-0.01		-0.04
		(0.47)		(0.02)		(0.06)
4-6 at divorce	-0.39	-1.14***	-0.02	-0.04*	-0.12+	-0.05

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Table A.21 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Born before 1970	Born after 1970		Born before 1970	Born after 1970		Born before 1970	Born after 1970	
	(0.41)	(0.33)		(0.02)	(0.02)		(0.07)	(0.06)	
4-6 at divorce=1			-0.54 (0.35)			-0.02 (0.02)			-0.09 (0.06)
4-6 at divorce=1X1.Born After 1970			-0.28 (0.33)			-0.01 (0.02)			0.03 (0.05)
7-9 at divorce	-0.23 (0.34)	-0.69* (0.31)		-0.02 (0.02)	-0.03+ (0.02)		-0.08 (0.07)	0.03 (0.05)	
7-9 at divorce=1			-0.40 (0.33)			-0.02 (0.01)			-0.06 (0.05)
7-9 at divorce=1X1.Born After 1970			-0.18 (0.27)			-0.01 (0.01)			0.06 (0.05)
10-12 at divorce	-0.73* (0.31)	-0.66* (0.28)		-0.03+ (0.02)	-0.02 (0.01)		-0.11+ (0.06)	-0.04 (0.04)	
10-12 at divorce=1			-0.87** (0.27)			-0.02* (0.01)			-0.09* (0.04)
10-12 at divorce=1X1.Born After 1970			0.35 (0.25)			0.01 (0.01)			0.03 (0.04)
13-15 at divorce	-0.81** (0.30)	-0.53* (0.21)		-0.03* (0.01)	-0.02+ (0.01)		-0.03 (0.05)	-0.05 (0.04)	
13-15 at divorce=1			-0.87*** (0.25)			-0.03* (0.01)			-0.03 (0.04)
13-15 at divorce=1X1.Born After 1970			0.49+ (0.26)			0.02 (0.01)			-0.02 (0.04)
16-18 at divorce	-0.48+ (0.28)	-0.44* (0.20)		-0.02 (0.01)	-0.02* (0.01)		-0.06 (0.04)	-0.01 (0.03)	
16-18 at divorce=1			-0.48+ (0.26)			-0.01 (0.01)			-0.04 (0.04)
16-18 at divorce=1X1.Born After 1970			0.18 (0.29)			0.00 (0.01)			0.02 (0.04)
Man	-0.09** (0.03)	-0.52*** (0.05)	-0.23*** (0.02)	0.03*** (0.00)	0.04*** (0.00)	0.04*** (0.00)	-0.21*** (0.01)	-0.19*** (0.01)	-0.20*** (0.00)
Year of Birth	-0.08+ (0.04)	0.09 (0.08)	-0.01 (0.03)	-0.01*** (0.00)	0.00 (0.00)	-0.00** (0.00)	-0.11*** (0.01)	-0.10*** (0.01)	-0.11*** (0.01)
Year of birth squarred	-0.00	-0.00**	-0.00**	0.00*	-0.00	0.00*	0.00	-0.00	0.00

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Table A.21 – *Continued from previous page*

	Schooling			Earnings-weighted Education			Social Position		
	Born before 1970	Born after 1970		Born before 1970	Born after 1970		Born before 1970	Born after 1970	
Last Born	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	0.07*	-0.00	0.03	0.00**	0.00	0.00+	-0.00	-0.01	-0.01
Age squared	(0.03)	(0.04)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)
	-0.00**	0.00	-0.00*	-0.00***	-0.00	-0.00**	-0.00***	-0.00***	-0.00***
Birth Order=2	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	-0.11***	0.06	-0.04+	-0.00***	0.00	-0.00**	0.02***	-0.00	0.02***
Birth Order=3	(0.03)	(0.04)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)
	-0.23***	0.04	-0.15***	-0.01***	-0.00	-0.01***	0.03***	-0.01	0.02**
Birth Order=4	(0.04)	(0.08)	(0.04)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	-0.32***	0.10	-0.22***	-0.02***	-0.00	-0.01***	0.01	-0.02	0.00
Birth Order=5	(0.06)	(0.14)	(0.05)	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.01)
	-0.42***	-0.21	-0.33***	-0.02***	-0.01	-0.01***	0.04**	-0.03	0.03*
Birth Order=6	(0.07)	(0.22)	(0.06)	(0.00)	(0.01)	(0.00)	(0.01)	(0.04)	(0.01)
	-0.48***	-0.06	-0.38***	-0.02***	-0.01	-0.02***	0.07***	-0.08	0.05**
Birth Order=7	(0.09)	(0.42)	(0.09)	(0.00)	(0.02)	(0.00)	(0.02)	(0.07)	(0.02)
	-0.72***	0.75+	-0.51***	-0.02***	0.03	-0.02***	0.03	0.05	0.04*
Birth Order=8	(0.11)	(0.43)	(0.11)	(0.00)	(0.02)	(0.00)	(0.02)	(0.08)	(0.02)
	-0.65***	0.36	-0.50**	-0.02***	0.01	-0.02***	0.08**	-0.12	0.06*
Birth Order=9	(0.17)	(0.96)	(0.15)	(0.01)	(0.04)	(0.01)	(0.03)	(0.20)	(0.03)
	-0.67***	0.80	-0.64**	-0.03***	0.02	-0.02***	0.04	0.00	0.03
Birth Order=10	(0.20)	(1.20)	(0.21)	(0.01)	(0.03)	(0.01)	(0.04)	(0.21)	(0.03)
	-0.77**	2.54*	-0.50*	-0.03***	0.14**	-0.02+	0.07	0.22	0.06
Birth Order=11	(0.24)	(1.08)	(0.22)	(0.01)	(0.05)	(0.01)	(0.06)	(0.21)	(0.05)
	-0.67	0.36	-0.35	-0.04+	0.01	-0.03+	0.07	0.02	0.06
Birth Order=12	(0.50)	(1.93)	(0.39)	(0.02)	(0.04)	(0.02)	(0.09)	(0.36)	(0.08)
	-0.69*	0.65	-0.44	-0.03*	-0.01	-0.02	0.11		0.10
Birth Order=13	(0.34)	(1.20)	(0.39)	(0.01)	(0.03)	(0.01)	(0.08)		(0.08)
	-0.45		0.01	-0.03+		-0.02	-0.06		-0.03
Birth Order=14	(0.51)		(0.58)	(0.02)		(0.02)	(0.21)		(0.16)
	-0.19		0.04	0.00		0.01	0.75		0.75
Birth Order=15	(0.60)		(0.51)	(0.03)		(0.03)	(0.59)		(0.62)
	-3.33***		-1.99	-0.09***		-0.05*	-0.07		-0.08
Birth Order=16	(0.47)		(1.25)	(0.01)		(0.02)	(0.25)		(0.23)
	1.65***		0.76	0.07***		0.03	-0.29***		-0.14

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Table A.21 – Continued from previous page

	Schooling		Earnings-weighted Education			Social Position		
	Born before 1970	Born after 1970	Born before 1970	Born after 1970		Born before 1970	Born after 1970	
	(0.08)		(0.78)	(0.00)	(0.03)	(0.02)		(0.14)
Birth Order=18	-0.25**		-0.13	-0.02***	-0.02***			
	(0.09)		(0.09)	(0.00)	(0.00)			
1.Born After 1970			0.46***		0.01***			0.02*
			(0.05)		(0.00)			(0.01)
Constant	16.40***	14.22***	15.21***	0.23***	0.17	0.21***	12.64***	13.09***
	(1.06)	(2.30)	(0.78)	(0.04)	(0.12)	(0.04)	(0.18)	(0.33)
Observations	36150	16452	52602	36150	16452	52602	34813	15703
								50516

Notes: Fixed effects results. See previous tables for the description of the outcomes and the controls. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988.

Siblings who experience a parental separation in the same age group or with an age difference larger than ten years are excluded.

A6 Other Sensitivity Checks

Table A.22 – Effect of a parental separation (without controlling for Mother’s occupation)

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
0-3 at divorce	-0.92*** (0.13)	-0.45 (0.28)	-0.04*** (0.01)	-0.02 (0.01)	-0.08*** (0.02)	-0.05 (0.04)
4-6 at divorce	-0.88*** (0.11)	-0.54* (0.24)	-0.03*** (0.00)	-0.02* (0.01)	-0.09*** (0.02)	-0.09* (0.04)
7-9 at divorce	-0.60*** (0.10)	-0.32 (0.22)	-0.03*** (0.00)	-0.02+ (0.01)	-0.05*** (0.01)	-0.04 (0.03)
10-12 at divorce	-0.70*** (0.10)	-0.55** (0.19)	-0.02*** (0.00)	-0.01* (0.01)	-0.06*** (0.01)	-0.08** (0.03)
13-15 at divorce	-0.68*** (0.09)	-0.55** (0.17)	-0.02*** (0.00)	-0.02* (0.01)	-0.05*** (0.01)	-0.05* (0.03)
16-18 at divorce	-0.35*** (0.09)	-0.32* (0.16)	-0.01* (0.00)	-0.01 (0.01)	-0.04** (0.01)	-0.04 (0.02)
Ref. Group : 19+ at divorce	0.11 (0.07)		0.00 (0.00)		0.01 (0.01)	
Man	-0.23*** (0.01)	-0.22*** (0.02)	0.03*** (0.00)	0.03*** (0.00)	-0.20*** (0.00)	-0.20*** (0.00)
Year of birth	0.14*** (0.00)	0.07** (0.02)	0.00*** (0.00)	-0.00 (0.00)	0.02*** (0.00)	-0.10*** (0.00)
Year of birth squared	-0.00*** (0.00)	-0.00*** (0.00)	-0.00*** (0.00)	0.00* (0.00)	0.00 (0.00)	0.00 (0.00)
Father: Primary, Secondary School Degreee	0.53***		0.02***		0.05***	

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Table A.22 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.01)		(0.00)		(0.00)	
Father: CAP, BEP	0.57***		0.02***		0.06***	
	(0.02)		(0.00)		(0.00)	
Father: Brevet (vocational track)	1.21***		0.05***		0.13***	
	(0.05)		(0.00)		(0.01)	
Father: Baccalaureat	1.38***		0.05***		0.14***	
	(0.03)		(0.00)		(0.00)	
Father: BAC + 2	1.46***		0.06***		0.15***	
	(0.04)		(0.00)		(0.01)	
Father: Supérieur à BAC + 2	1.84***		0.09***		0.21***	
	(0.03)		(0.00)		(0.00)	
Father: Artisan (Craftman)	0.23***		0.01***		0.21***	
	(0.03)		(0.00)		(0.01)	
Father: White Collar, Senior Executive	0.79***		0.04***		0.29***	
	(0.03)		(0.00)		(0.01)	
Father: Mid-level Profession	0.32***		0.01***		0.21***	
	(0.02)		(0.00)		(0.01)	
Father: Employee	-0.01		0.00		0.17***	
	(0.02)		(0.00)		(0.01)	
Father: Manual Worker	-0.43***		-0.01***		0.11***	
	(0.02)		(0.00)		(0.01)	
Father: Retired	0.86***		0.04***		0.24***	

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Table A.22 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.03)		(0.00)		(0.01)	
Father: Other	-0.16***		-0.00		0.14***	
	(0.04)		(0.00)		(0.01)	
Mother: Primary, Secondary School Degree	0.71***		0.02***		0.08***	
	(0.01)		(0.00)		(0.00)	
Mother: CAP, BEP	0.90***		0.03***		0.10***	
	(0.02)		(0.00)		(0.00)	
Mother: Brevet (vocational track)	1.36***		0.05***		0.17***	
	(0.07)		(0.00)		(0.01)	
Mother: Baccaureat	1.61***		0.06***		0.17***	
	(0.03)		(0.00)		(0.00)	
Mother: BAC + 2	1.70***		0.08***		0.19***	
	(0.03)		(0.00)		(0.00)	
Mother: Supérieur à BAC + 2	1.82***		0.09***		0.19***	
	(0.04)		(0.00)		(0.01)	
Sibling Size	-0.19***		-0.01***		-0.03***	
	(0.01)		(0.00)		(0.00)	
Sibling Size squared	0.01***		0.00***		0.00***	
	(0.00)		(0.00)		(0.00)	
Ile de France	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
North West	-0.07***		-0.00***		-0.05***	

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Table A.22 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.02)		(0.00)		(0.00)	
Region of birth: North	0.03		0.00		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth: East	-0.00		-0.00**		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth: West	0.06**		-0.00		-0.05***	
	(0.02)		(0.00)		(0.00)	
Region of birth: South West	0.06*		-0.00		-0.06***	
	(0.02)		(0.00)		(0.00)	
Region of birth: South East	0.07**		0.00		-0.04***	
	(0.02)		(0.00)		(0.00)	
Region of birth: Corse	-0.29*		-0.01		-0.07***	
	(0.13)		(0.01)		(0.02)	
Region of birth: Oversea	0.06		0.00		-0.01	
	(0.06)		(0.00)		(0.01)	
Mother Nationality: European	0.31***		0.01***		0.03***	
	(0.03)		(0.00)		(0.01)	
Mother Nationality: Other	0.88***		0.03***		0.07***	
	(0.07)		(0.00)		(0.01)	
Father Nationality: European	0.20***		0.01***		0.03***	
	(0.03)		(0.00)		(0.00)	
Father Nationality: Other	0.07		0.00		0.03**	

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Table A.22 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.07)		(0.00)		(0.01)	
Mother Year of Birth	-0.01***		-0.00***		-0.00***	
	(0.00)		(0.00)		(0.00)	
Last born	0.05***	0.05*	0.00***	0.00*	-0.00	-0.00
	(0.01)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)
Age	-0.00		0.00		0.11***	
	(0.01)		(0.00)		(0.00)	
Age squared	0.00***	-0.00	0.00*	-0.00*	-0.00***	-0.00***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=1	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=2	-0.05**	-0.04+	-0.00***	-0.00**	0.01***	0.01***
	(0.01)	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)
Birth Order=3	-0.16***	-0.13***	-0.01***	-0.01***	0.01*	0.02**
	(0.02)	(0.03)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=4	-0.23***	-0.22***	-0.01***	-0.01***	-0.01+	0.00
	(0.03)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)
Birth Order=5	-0.31***	-0.26***	-0.01***	-0.01***	0.01	0.03**
	(0.03)	(0.06)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=6	-0.34***	-0.28***	-0.02***	-0.01***	0.01	0.04**
	(0.05)	(0.08)	(0.00)	(0.00)	(0.01)	(0.01)
Birth Order=7	-0.40***	-0.36***	-0.02***	-0.01***	-0.00	0.03

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Table A.22 – *Continued from previous page*

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(0.06)	(0.10)	(0.00)	(0.00)	(0.01)	(0.02)
Birth Order=8	-0.33***	-0.36**	-0.02***	-0.02***	0.01	0.04*
	(0.07)	(0.13)	(0.00)	(0.01)	(0.01)	(0.02)
Birth Order=9	-0.34***	-0.41*	-0.02***	-0.02**	0.02	0.05
	(0.10)	(0.17)	(0.00)	(0.01)	(0.01)	(0.03)
Birth Order=10	-0.33**	-0.30	-0.02***	-0.01	0.02	0.07
	(0.12)	(0.23)	(0.00)	(0.01)	(0.02)	(0.05)
Birth Order=11	-0.22	-0.39	-0.03***	-0.03*	0.05+	0.06
	(0.17)	(0.29)	(0.01)	(0.01)	(0.03)	(0.06)
Birth Order=12	-0.64**	-0.53	-0.03***	-0.02+	-0.03	0.03
	(0.22)	(0.37)	(0.01)	(0.01)	(0.03)	(0.08)
Birth Order=13	-0.16	-0.02	-0.02**	-0.02	0.02	0.00
	(0.25)	(0.47)	(0.01)	(0.01)	(0.06)	(0.15)
Birth Order=14	-0.89**	0.14	-0.02+	0.02	0.37+	0.65
	(0.34)	(0.45)	(0.01)	(0.02)	(0.20)	(0.47)
Birth Order=15	-1.69**	-1.81	-0.05***	-0.05*	0.03	-0.08
	(0.65)	(1.19)	(0.01)	(0.02)	(0.08)	(0.24)
Birth Order=16	-0.08	0.58	-0.02	0.03	-0.14	-0.17
	(0.64)	(0.78)	(0.03)	(0.03)	(0.17)	(0.11)
Birth Order=18	-1.30*	0.08	-0.05**	-0.01**	0.02	
	(0.64)	(0.08)	(0.02)	(0.00)	(0.02)	
Constant	39.10***	13.76***	1.54***	0.16***	10.87***	12.64***

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Table A.22 – Continued from previous page

	Schooling		Earnings-weighted Education		Social Position	
	Random Effects	Sibling Difference	Random Effects	Sibling Difference	Random Effects	Sibling Difference
	(2.36)	(0.60)	(0.11)	(0.03)	(0.37)	(0.12)
Observations	56876	56876	56876	56876	54570	54570

Notes: Schooling is a proxy for the number of years of schooling. Earnings-weighted education is the wage value of the individual's highest degree (compared to no degree at all). Social position is the average earnings estimated separately for each gender on full-time workers with an Heckman procedure to account for the absence of part-time workers and inactive individuals. See Section A2 for a more detailed description. Individual characteristics, such as sex, year of birth and its quadratic term, his age and its quadratic term, birth order and a dummy indicating if the individual is the last born of the sibship are all controlled for, as are family background variables, such as parents degree and father's profession, parents' country of birth, mother's year of birth, family size and its quadratic term, and region of birth. Standard errors in parentheses, clustered at the family level and bootstrapped using 500 replications. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation sample drawn from the Dataset "Formation et Qualification Professionnelle" (INSEE), waves 2003 and 2014. Individuals are born between 1946 and 1988. Siblings who experience a parental separation in the same age group are excluded, to avoid identification issues.

Chapter 2

Time investments as a driving channel for the effect of parental separation on child development

Summary of the chapter

While many studies report a negative effect of parental separation on child development, little attention has been paid to the channels of this effect. This chapter shows that child and parental time investment may be one of the driving channels at stake. Using detailed time-use diaries from the PSID-Child Development Supplement, I estimate an individual fixed-effects model and find that being in a single parent family has a negative impact on time spent with at least one parent present. Time with parents together and alone with fathers is greatly affected, but mothers compensate partially for this decrease. In the second part, to see if this matters for child development, I estimate cognitive and non-cognitive skills production functions using a number of specifications. I shed light on the heterogeneity of parental time investment for cognitive and non-cognitive skills. Child and parental time investment appear to be a possible driving channel for the effect of parental separation on child's non-cognitive skills.

Classification

JEL Classification: I21, J12, J13, J24

Keywords: Child Development; Child's Time Investments; parental time investment; Family Structure; Cognitive Skills; Non-cognitive Skills.

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1. Introduction

This chapter analyses whether child and parental time investment are a driving channel for the negative effect of parental separation on child development. Though it is largely admitted that parental separation negatively impacts child development (see Ermisch and Francesconi 2001 [59]; Frimmel et al. 2016 [67]; Gruber 2004 [75]; Francesconi et al. 2010 [66]; Clark et al. 2015 [42]; and Ribar et al. 2017 [114]), little is known about the possible channels for this effect. I focus here on child and parental time investment. This analysis is in three parts. First, it estimates how family structure impacts child and parental time investment. This is useful for estimating whether parental time is a complement or substitute. The substitution of time with the non-custodial parent is a key element in this analysis. I also discuss in what extent this substitution is the same according to the child's age at parental separation, the number of siblings and the PCG's education. Second, using cognitive and non-cognitive skills production functions, I estimate what activities are relevant for a child's cognitive and non-cognitive skills, and whether this is affected by the presence or the involvement of parents. Since parental time composition is likely to be highly affected by being in a single parent family, this chapter investigates whether it is of equal value to spend time with the mother alone rather than with the father or both parents together. I also allow for production functions to vary across gender, family background and age. Third, I look how much the effect of a change in family structure is affected when time investments are controlled for.

This chapter offers three main contributions. First, it investigates the driving forces of the effect of parental separation on child development. Second, it extends the parental time literature (see Fiorini and Keane 2014 [61]; Del Bono et al. 2016 [55]; Funk and Kemper 2016 [68]; Del Boca et al. 2017 [54]) to time spent with fathers and with both parents, two key variables for understanding the impact on parental time investment of being in a single parent family. I also provide evidence that parental time is a substitute rather than complement. Third, this chapter improves the understanding of cognitive and non-cognitive skill production functions by exploring the possible heterogeneity of parental time.

I use the Panel Study of Income Dynamics - Child Development Supplement (PSID-CDS). It provides time-use diaries for 2,600 children first interviewed in 1997 and followed up in 2002 and 2007. It collects the activity, the duration, and who was present or involved during the activity. Cognitive and non-cognitive skills are also available. I consider five activities: (house)work, personal needs and care, education, active and passive leisure. Within time with at least one parent, we can distinguish time with the mother alone, the father alone and both parents together. I use an individual fixed-effect model to estimate

the impact of being in a single parent family on child and parental time investment. In the second part of the study, to account for child's unobserved characteristics in the cognitive and non-cognitive skill production functions, I consider three strategies commonly adopted: the value-added, the fixed-effect model and the cumulative value-added model. I also use the GMM framework to account for the presence of feedback effects.

I draw attention to two new findings. First, being in a single parent family has a negative impact on time with at least one parent present; substitution between parental time is not perfect. The composition of parental time is highly affected. Second, all parental time does not have the same impact on reading and non-cognitive skills: time spent with both parents together does not have the same impact as time spent with the mother. Also, results suggest that the effect of time investments on child development vary across gender and parents' education.

Therefore, based on the empirical evidence gathered here, it appears that time investment could be a driving channel for the effect of parental separation on child development. On the one hand, the decrease in the accessible time of parents may explain the negative effect on non-cognitive skills. Also, the channel of time allocation may be of particular importance for children whose parents separate in their early childhood.

The remainder of the chapter proceeds as follows. Previous related literature is presented in the next section. In Section 3, a description of data, main variables and some descriptive statistics are provided. The identification strategy is explained in Section 4. Section 5 shows the results of the estimations of a change in family structure on time investments. Section 6 shows the estimations of the time input production functions. Robustness checks are reported in Section 7. The importance of time investments as a driving channel is discussed in Section 8. Section 9 concludes.

2. Previous Findings

Parental separation seems to negatively impact child development. Separation is costly for parents, it involves losing the production and consumption complementarity or risk pooling achieved as a couple. Parental separation can also have a psychological impact on children. However, parental separation is probably correlated with parent's unobserved characteristics, the main example being the level of conflict between parents. Researchers have employed several methods to handle this selection issue: sibling-differences, instrumental variables, control for conflicts. Some studies still find a negative effect even after taking into account the endogeneity problem (see Ermisch and Francesconi 2001 [59]; Frimmel et al. 2016 [67]; Gruber 2004 [75]; Francesconi et al. 2010 [66]; Clark et al. 2015 [42]; and Ribar et al. 2017 [114]). However, not much is known about the channels

for this negative effect.

Becker and Tomes (1965, 1979) [13] [17] have pointed out the importance of parental time in determining child attainment. Yet there are surprisingly few empirical studies that analyse the effect of time allocation and parents' time investment on child's human capital. Many of the existing findings are based on the mother's employment used as a proxy for maternal time. A burgeoning literature attempts to fill this gap using time diary data or at least direct measures of parental time. Using time diaries from LSAC¹, Fiorini and Keane (2014) [61] find that educational activities, particularly with parents, are the most productive input for cognitive skills. Non-cognitive skills seem insensitive to differences in time allocation. Del Bono et al. (2016) [55] show that maternal time is a productive input for both cognitive and non-cognitive skills, especially in early childhood. They note a feedback effect, meaning that mothers invest less on time inputs when children are doing well cognitively; maternal time has a long-term impact.

Other studies focus also on child's own time investments. Using time-use diaries from the Panel Study of Income Dynamics-Child Development Supplement (PSID-CDS), Funk and Kemper (2016) [68] note the effect of listening to music and learning for both math and reading skills. Del Boca et al. (2017) [54] show that time input production functions vary across age: maternal time matters in childhood, but the child's own time investment is more productive during adolescence.

This chapter aims to bridge the gap between these two strands of the literature, examining how child and parental time investment can be a channel for the negative effect of divorce. Using the United States and United Kingdom Time-Use Surveys (ATUS and UKTUS), Kalenkoski et al. (2007) [89] show that single parents spend more time with their children, when observed selection is controlled. Kendig and Bianchi (2008) [90] and Le Bourdais and Rapoport (2001) [94] find similar results for the United States and Canada respectively. Mencarini et al. (2014) [104] is the closest paper to this one. Instrumenting single parent families by parents' religious practice, they find that being in a single parent household reduces the amount of time spent reading and studying; this effect is driven by poorer families, only children and boys.

Most studies focus on maternal time. Paternal time and time spent with both parents together are two key missing variables in these analyses, although they are highly affected by parental separation. Responses by the custodial parent are uncertain. She may compensate for the decrease in the other parent's time investments. Hsin and Felfe (2014) [83] suggest that working mothers protect productive maternal time. Clark et al. (2015) [43] find little evidence of an effect of early maternal employment on a child's emotional outcomes; fathers may compensate with an increase in their own time investments,

¹Longitudinal Study of Australian Children

or parents may adopt alternative childcare arrangements. On the other hand, Pailhé and Solaz (2004) [107] find evidence of complementarity of leisure time; parents have a preference for spending leisure time together with children.

Besides, if there is total substitution, we may ask if all parental time investment have the same impact on child development. Spending one hour with parents together may have the same impact as one hour with each parent if it is the time spent with the parent that matters rather than time spent in a particular activity, or even more valued if family time matters.

3. Data

The Panel Study of Income Dynamics began in 1968 in the United States with a nationally representative sample. Information on these individuals and their descendants has been collected continuously. We have been able to recover inter-generational information for all families.

The PSID - Child Development Supplement (PSID-CDS) follows 2,650 children first

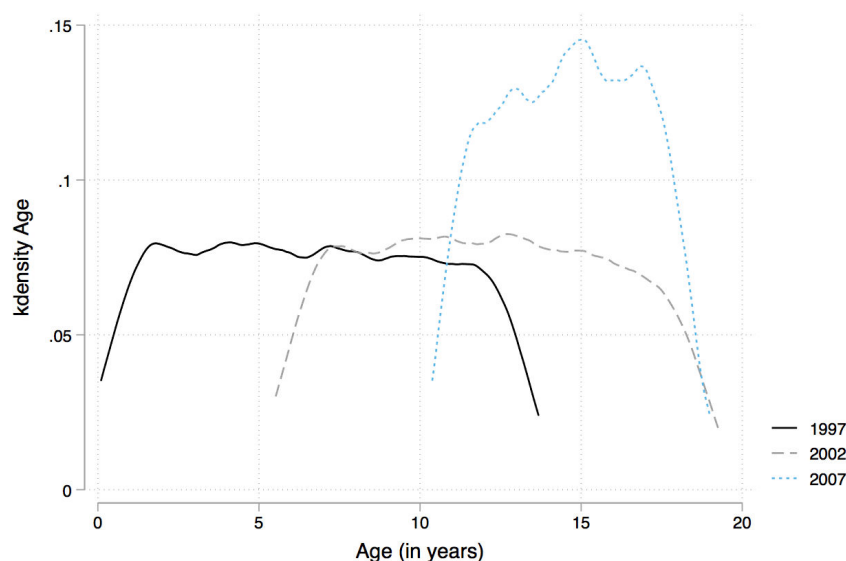


Figure 1 – Age distribution for each wave

interviewed in 1997, then in 2002 and 2007. Figure 1 shows that children are between 0 and 14 years old in the first wave, 5 and 19 in the second wave (2002), and between 10 and 19 in the third wave (2007). A large number leave the sample in the third wave due to the age limit (they are above the age of 19, see Figure 1).² The sample is not large,

²A more detailed description of attrition is done in Section 7.2.

but the survey does collect a rich set of information about children's cognitive skills, non-cognitive skills, demographics and parental background, along with time-use diaries for two days, one during the week and one at the weekend. The child fills in the time diary where possible, and the primary care giver if necessary. Time diaries provide information on the activity, where the activity took place, and with whom. As far as we know, the only panel data with time-use diaries is the Longitudinal Study of Australian Children (LSAC). Despite the larger sample of the LSAC, and the advantage of being biannually surveyed, there is no distinction between parent and step-parent in the time use diary, which makes the CDS a more appropriate dataset for studying the channels for the effect of parental separation.

3.1. Time investment variables

There are three main methods to record information on time use: stylized measures, time diary, and experiential sampling method. In stylized measures, a respondent is asked to provide typical amounts of time to a particular activity. This measure is subject to recall error biases, activities that are socially valuable are often over-estimated and the total amount of time often exceeds the 24 hours daily basis. Recall errors are much lower using time diaries; therefore, time diaries are more appropriate to children who are more subject to recall errors. But this comes at the cost of day-to-day variation bias. Since the time diary takes a lot of time (18 minutes according to Juster et al. (2003) [87]), the dataset only provides diaries for two days, therefore, except for routine activities, time use information are subject to classical measurement errors. In experiential sampling method (ESM), respondents report the exact activity whenever an electronic pager activates a signal at a random point. The measurement errors are much smaller, but not excluded, especially for social activities where the presence of others might bias the response. This latter method is very costly, and the samples are often quite small³. Because children are subject to recall errors, and because time spent with parents is socially valuable and therefore subject to a bias of over-estimation in stylized measures, the time diary appears to be the most appropriate way to measure children time use, in spite of a cost of day-to-day variation.

To reduce the measurement error due to day-to-day variation, children fill in the time-use diary for one day during the week and one day at the weekend, picked randomly at the beginning of the survey; no substitution is possible. They fill in the time diary on a 24-hour continuous basis, to avoid measurement errors. The child has to provide the activity, the duration, the location, who was present at the moment of the activity and

³For a detailed discussion of pros and cons of all these measures, see Juster et al. (2003) [87]

who was involved.⁴ This can be used to measure time investments in each activity for a representative week (in hours), using a weighted average of time investments during the week and at the weekend.

I use five categories: Work and housework; Personal needs and care including sleeping time; Education including reading time; Active leisure (sports, dance, going to the theatre) and Passive Leisure (Watching TV, Arguing). Figure 2 shows how children spend their week in these five categories. Note that the study focuses on the primary activity. Children spend a small part on housework and work activities. They spend half the day on personal needs and care (including sleeping). The rest of the representative day is divided between educational activities, active and passive leisure.

For each activity, time is distinguished between that spent alone, with the mother only,

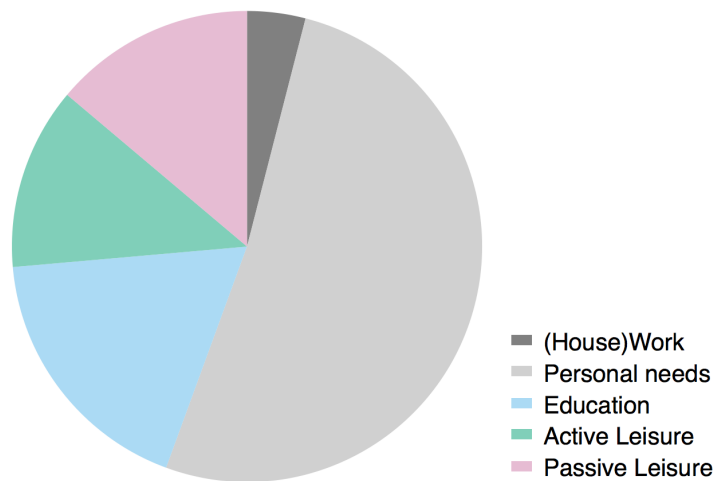
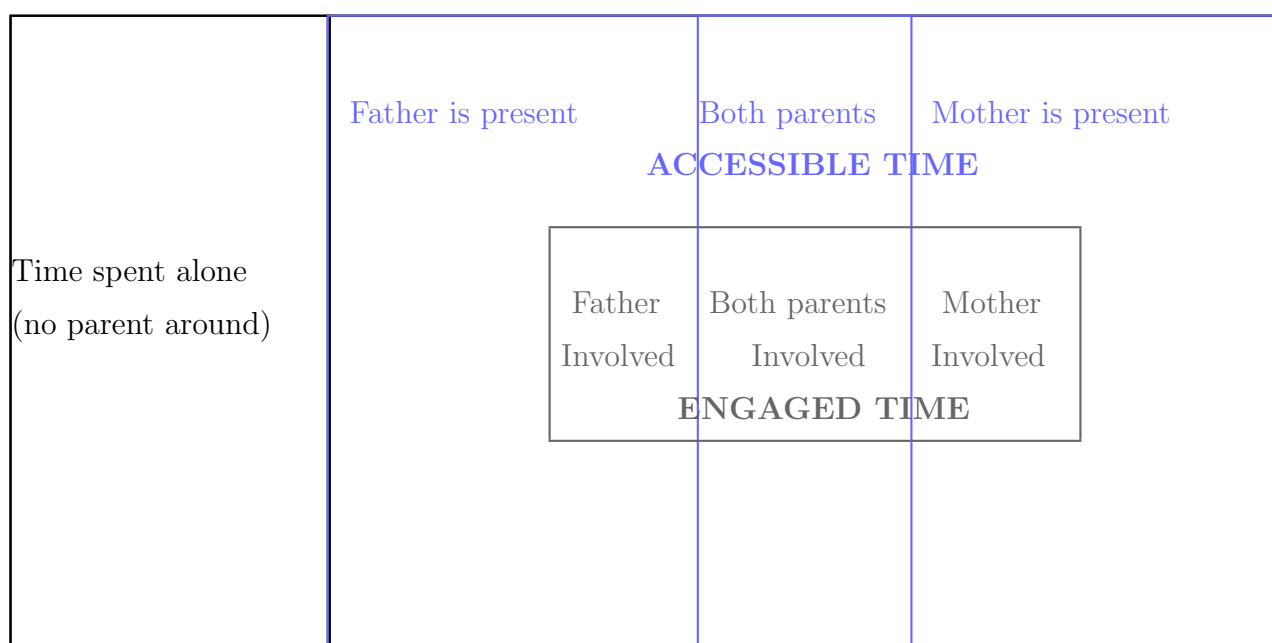


Figure 2 – Breakdown of Time Allocation into 5 activities

with the father only and with both parents. We also consider time spent with at least one parent. We analyse time spent with a parent involved in the activity (engaged time) and also present during the activity (accessible time) (see Hofferth and Sandberg (2001) [81]). Before looking at parental time investment, I first look at time investments whoever is with the child. Then, among time investments, I distinguish time spent alone from time with at least one parent, the latter can be broken down again into three different types of parental time: time with the mother only, time with the father only and time with parents together. Time with other adults, such as step-parents and grand parents, is also measured. The diagram below shows the breakdown of parental time.

⁴An example of the Time Diary is provided In Appendix A5



As far as we know, this is the first study analysing time spent with parents together as a particular input. Not much attention has previously been paid to paternal time either. Figure 3 shows the breakdown of time according to who is involved in the activity. The first graph shows the breakdown of time for a representative day. "Not relevant" means that children are assumed to do the activity on their own. The child may be doing the activity alone, with at least one adult, or with someone else ("other"): a sibling, a half-sibling, other relative or non-relative. I exclude this latter category in the rest of the study because we do not have much information (age, sex, etc.) on these individuals. In the second graph, we can see the breakdown of time with at least one adult. It is mainly time with at least one parent, time with grand-parent (only) or time with one parent and someone else (grand-parent or step-parent). The last graph shows the breakdown of time with at least one adult. More than half of parental time investment is time with the mother only, and more than 75% of the time with at least one parent is time with at least the mother. In the rest of the chapter, we exclude other parental time (time spent with at least one parent and someone else) from parental time, because we do not have much information on the effect of time spent with a step-parent on child development, but it is controlled for.

3.2. Child development measures

Cognitive skills. Cognitive skills measure the ability to perform mental activities. Cognitive tests come from the Woodcock-Johnson Revised Tests of Achievement (WJ-R). These go from the easiest question to the most difficult. The PSID-CDS dataset provides

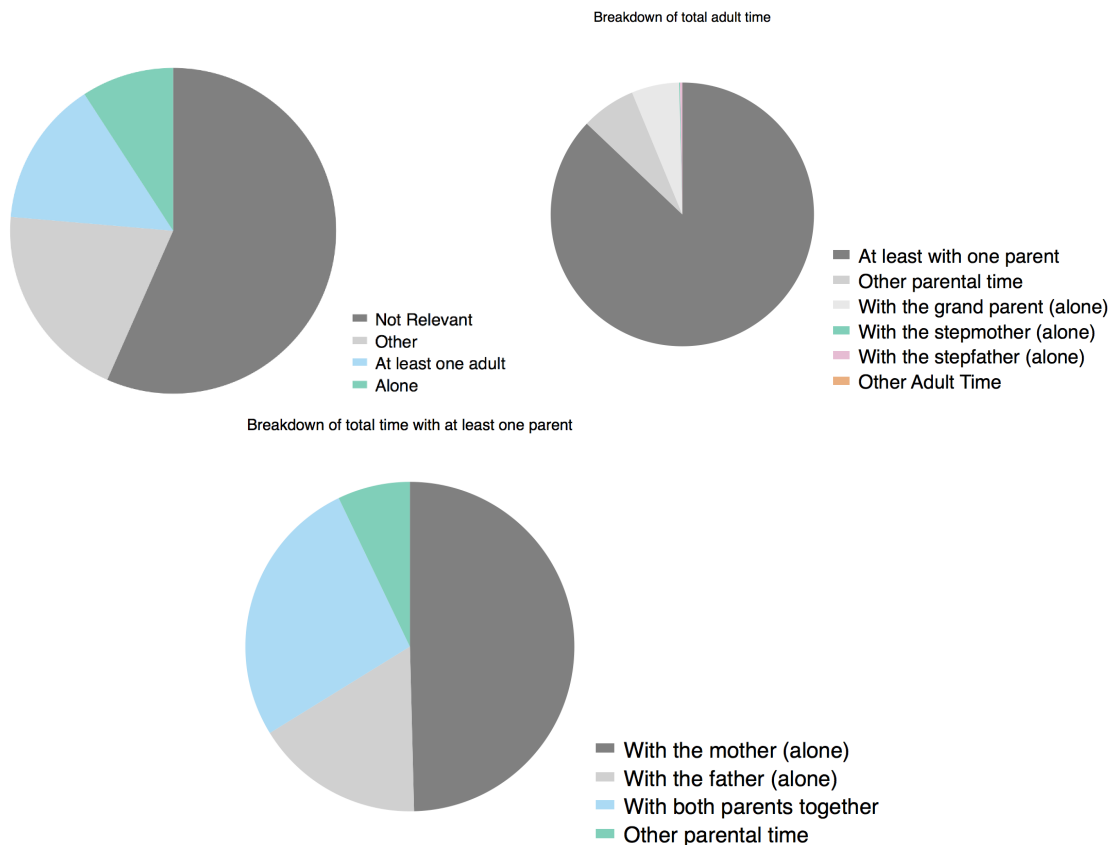


Figure 3 – Breakdown of Time Investments (engaged time)

two tests of reading and verbal abilities and another test of logical abilities. Scores on the Letter-Word Identification test (from the age of three) and the Passage Comprehension test (from the age of six) give the Broad Reading test score. The Broad Math test score is the score on the Applied Problem Test, administered from the age of three. The scores are available in four formats: raw score, standardized score on the national average for an age group with a mean of 100 and a standard deviation of 15, W score that accounts for the difficulty of the question, and the percentile rank. The standardized test scores are used in the rest of this analysis.

Non-Cognitive skills. Non-cognitive skills are other skills including emotional maturity, empathy, non-verbal communication, and social behaviour. To measure the non-cognitive skills, I use the Behavior Problems Index (BPI), designed by Peterson and Zill (1986) to measure the frequency and type of childhood behaviour problems for children aged 3 and older. The BPI is based on responses from the primary care giver about the child's behaviour and feelings. The BPI can be divided into two parts: internalizing BPI (goes from 0 to 14 initially) and externalizing BPI (goes from 0 to 17 initially). The former accounts for how the child feels and takes into account problems of self-

esteem, reveals feelings of not feeling loved, feeling anxious, easily confused, feeling inferior, depressed, too dependent or if they worry too much; while the latter accounts for how child behaves, taking into account nervousness, arguing or lying, concentration problems, social problems, and hyper-activity.⁵ For ease of the interpretation, scales have been reversed: a positive effect on this re-scaled BPI means higher non-cognitive skills. I only report results on Total BPI, denoted as "non-cognitive skills" is the rest of the chapter. All the child development variables are standardized to a mean of 0 and a standard deviation of 1.⁶

3.3. Family Structure

For family structure, I use five family types: children who are living with both parents; with their mother only; with their mother who has a partner living or not with the child; with their father and others (child does not live either with their mother, or with their father). Dummies are also included to control for the absence of father at birth and for the death of parents. But there are too few observations for these latter variables to be able to draw any conclusion.

Table 1 shows the transition matrices for family structure from Wave 1 to Wave 2, and from Wave 2 to Wave 3. All the families who remain single mother families with a step-parent or not, or single father families or others (on the diagonal) are excluded from the fixed-effect analysis. The rest of the observations are used to identify the effect of family structure.

3.4. Other controls

Controls on individual's and family's characteristics are included. Sex, Age, Ethnicity, Primary Care Giver (PCG)'s employment status, education and earnings; and Number of siblings. Table 2 shows the summary statistics for these control variables for the whole sample, for each wave. The average age is around 6 years old, 12 years old and 14.5 years old for each wave, respectively. 65% of the sample is white. The proportion of children who are living with both parents is around 73% in the first wave and decreases across waves; on the other hand, the proportion of children living with their single mother increases.

⁵The details of the questions are provided in Table A5.1

⁶Section A1.1 reports the correlations between the 5 outcomes, and evolutions of the three dimensions of non-cognitive skills over child's age.

Table 1 – Transitions in family structures from 1997 to 2002 and from 2002 to 2007

Family structure in wave 1		Family structure in wave 2						
		Two parents	Single Mother	Single Mother with SP	Single Father	Other	Attrition	Total
	Two parents	1131	132	29	21	10	350	1673
	Single Mother	34	299	81	7	18	204	643
	Single Mother with a step parent	7	25	41	1	6	49	129
	Single Father	3	0	4	19	6	17	49
	Other	2	12	11	5	28	42	100
	New individuals	86	76	13	9	13		197
	Total	1263	544	179	62	81	662	2791
Family structure in wave 2		Family structure in wave 3						
		Two parents	Single Mother	Single Mother with SP	Single Father	Other	Attrition	Total
	Two parents	569	63	6	10	10	605	1263
	Single Mother	18	199	38	3	10	276	544
	Single Mother with a step parent	2	15	54	0	6	102	179
	Single Father	3	2	0	17	3	37	62
	Other	0	10	5	2	23	41	81
	Unknown (A_13)	56	45	18	6	14		139
	New individuals (A_3)	15	15	3	1	3		37
	Total	663	349	124	39	69	1061	2305

Notes: This Table shows the number of observations by family structure, according to their family structure in the previous wave.

Source: PSID-CDS, waves 1997, 2002 and 2007

Table 2 – Summary Statistics

	1st wave				2nd wave				3rd wave			
	mean	sd	min	max	mean	sd	min	max	mean	sd	min	max
Age	6.66	3.77	0	14	12.12	3.70	6	19	14.62	2.21	10	19
Female	0.50	0.50	0	1	0.51	0.50	0	1	0.50	0.50	0	1
White	0.66	0.47	0	1	0.65	0.48	0	1	0.65	0.48	0	1
African american	0.15	0.35	0	1	0.13	0.34	0	1	0.13	0.33	0	1
Hispanic	0.12	0.32	0	1	0.14	0.35	0	1	0.15	0.35	0	1
Asian Pacific	0.03	0.17	0	1	0.03	0.18	0	1	0.04	0.19	0	1
American Indian	0.01	0.09	0	1	0.01	0.07	0	1	0.00	0.03	0	1
Other	0.04	0.19	0	1	0.04	0.19	0	1	0.03	0.18	0	1
Two Parents	0.73	0.45	0	1	0.69	0.46	0	1	0.65	0.48	0	1
Single Mother	0.20	0.40	0	1	0.19	0.39	0	1	0.19	0.39	0	1
Single Mother (step-parent)	0.04	0.19	0	1	0.07	0.26	0	1	0.08	0.28	0	1
Single Father	0.01	0.12	0	1	0.03	0.16	0	1	0.04	0.19	0	1
Other	0.02	0.16	0	1	0.03	0.16	0	1	0.04	0.19	0	1
PCG - Worker	0.61	0.49	0	1	0.71	0.45	0	1	0.77	0.42	0	1
PCG - Looking for work	0.05	0.22	0	1	0.04	0.19	0	1	0.04	0.20	0	1
PCG - Housewife	0.30	0.46	0	1	0.22	0.41	0	1	0.17	0.38	0	1
PCG - Student	0.03	0.17	0	1	0.01	0.12	0	1	0.02	0.13	0	1
PCG - Other	0.01	0.10	0	1	0.02	0.14	0	1	0.00	0.07	0	1
Earnings	9.48	1.06	3	13	9.78	1.03	4	13	9.84	1.30	2	12
Observations	2599				2134				1237			

Notes: This Table shows the summary statistics for all individuals for each wave. Weight are used to have a representative sample of the US population.

Source: PSID-CDS, waves 1997, 2002 and 2007

4. Estimation

4.1. Estimating the effect of family structure on children's and parents' time investment

I estimate the effect of a change in family structure on child and parental time investment using an individual fixed-effect analysis. A common identification problem comes from the correlation between family structure and unobserved variables that may affect child and parental time investment. Selection into separation has long been recognized as an estimation issue by economists (see Section 2.). A fixed-effect model copes with selection due to time-invariant variables, observed or not.

Let TI_{it}^k be a vector of time inputs measured by the total amount of time spent on activity k at time t (no matter who was there); and PTI_{it}^{kP} a vector of parental time inputs spent with parent P on activity k . These two variables are standardized to a mean of 0 and a standard deviation of 1. FS_{it}^k is a set of dummies indicating family structure at time t . X_{it} denotes all control variables described above such as child's age, their primary care giver's working status and earnings, and the number of siblings. The individual fixed-effect is denoted α_i , and absorbs the rest of time invariant controls. The effect of family structure can be estimated following this equation:

$$(P)TI_{it}^k = \delta_1 FS_{it} + \delta_2 X_{it} + \alpha_i + \epsilon_{it} \quad (1)$$

where δ_1 measures the effect of a change in the family structure on the amount of time spent on the activities.

The fixed-effect model rules out endogeneity issues due to correlation between family structure and invariant variables. Nevertheless, the fixed effect estimator still relies on strong assumptions. **i)** Measurement errors in time investments should not be correlated with family structure. To prevent from this issue, children are asked to fill the time diaries for two days in the week that are picked randomly and no substitution is possible. Therefore, they should not be more likely to fill the time diary when they are with one of their parents. It enables to prevent from large measurement errors; however, this assumption is still very strong. **ii)** The fixed effect estimator does not deal with unobserved time varying variables. Examples of such variables are multiple: parents' characteristics such as their behaviour (alcohol addiction), their mental health, or parental conflict. We don't know to which degree this assumption is violated. **iii)** Reverse causality might also be a source of endogeneity. It is possible that parents separate because one of them is not present enough at home. **iv)** Parental time investments must follow the same trends

before the parental separation in two-parents families and in single-parent families.

In Figure A2.1 in the Appendix, I compare parental time investments before and after the parental separation using an event study. Until separation, results show that time investments follow the same trend in these two groups. Results suggest that assumptions **iii)** and **iv)** hold.

If one of this assumption is not true, the fixed effect estimator only indicates suggestive associations between family structure and parental time investments.

Once we estimate the effect of family structure on child and parental time investment, we examine if these changes matter for the child's development.

4.2. Estimating Time Input Production Functions and the effect of the presence or involvement of parents

I estimate time input production functions using the approach developed by Todd and Wolpin (2003, 2007) [125] [126], and also applied by Fiorini and Keane (2014) [61], Del Bono et al. (2016) [55], and Del Boca et al. (2017) [54]. The aim of this analysis is to look at the importance of time spent with parents, and to assess the possible heterogeneity among parental time investments, seeing if the child's development depends on who is involved or present during the activity. One of our main interests is to look at time spent with both parents together.

Simple correlations between time inputs and child outcomes are difficult to disentangle from causal relations. According to Fiorini and Keane (2014) [61], endogeneity can come from three sources: a) omitted variables such as unobserved child ability; b) reverse causality, spending more time reading may foster a child's reading test score, but higher abilities in reading may also lead to a greater interest in reading; and c) measurement errors in outcomes and amount of time spent in the activity. The latter could come from recall errors, or self-report bias, children may lie about the amount of time spent on homework or overestimate activities that they consider as more socially valuable. In addition, we only have time diaries for two days in a week, picked randomly in a year, and these measures are subject to transitory shocks. If the family planned to go to Disneyland that day, it is unlikely to be representative of the child's daily time-use.

I deal with omitted variable bias by controlling for past test score. Reverse causality would be a problem if an increase in reading test score triggered an increase in time spent in reading, which cannot be excluded ⁷. Using time diaries avoids measurement error; indeed we may assume that children are less willing to overestimate the amount of time they spend on more socially valuable activities. Still, they may lie about the time

⁷I handle this issue in Section 6.3 using a GMM model.

they spend studying if they fear that their parents will check their answers. Moreover, we are aware that two days picked randomly may lead to measurement error, similar to the measurement errors described in income literature when current earnings are used instead of permanent earnings, but unfortunately, there are only two panel data sets in the world that provide time diaries filled in by children, and no one provides more detailed information. Obviously, asking for more frequent surveys would decrease the number of respondents willing to be surveyed, which leads to greater attrition.

I start by presenting the cumulative value-added model. Let Y_{it} be the outcome of individual i in wave t . I consider three particular outcomes: Broad Reading test score, Math test score, Non Cognitive Skills (Total Behavior Problem Index). As mentioned before, TI_{it}^k and PTI_{it}^{kP} are the vectors of total time inputs (whoever was present) and parental time inputs respectively. Let PTI_{it-1}^{kP} be the vector of parental time inputs in previous wave $t-1$. Putting aside the role of other conditioning variables for the sake of simplicity, the time input production function can be written as

$$Y_{it} = \beta_0 + \sum_1^K \gamma_1^k TI_{it}^k + \sum_1^K \gamma_2^{kP} PTI_{it}^{kP} + \sum_1^K \gamma_3^k TI_{it-1}^k + \sum_1^K \gamma_4^{kP} PTI_{it-1}^{kP} + \lambda Y_{it-1} + \epsilon_{it} \quad (2)$$

Y_{it-1} is the individual's outcome in the previous wave. It captures learning persistence, and is also a proxy for unobserved ability. γ_1^k measures the impact of spending 1 standard deviation more on activity k . γ_2^{kP} captures the effect of the presence or the involvement of a parent during the activity. γ_3^k and γ_4^{kP} measure the effect of child's and parents' time investments in the previous wave. In the main body of the chapter, we assume $\gamma_3^k = \gamma_4^{kP} = 0$, this model is known as the value-added model.

I also estimate a fixed-effect model:

$$Y_{it} = \sum_1^K \gamma_1^k TI_{it}^k + \sum_1^K \gamma_2^{kP} PTI_{it}^{kP} + \alpha_i + \epsilon_{it} \quad (3)$$

These models rely on different assumptions. In the value-added model, we assume **i)** the measurement errors in the child's skills are uncorrelated with inputs and unobserved ability; **ii)** any omitted input is uncorrelated with included input; **iii)** the production function is non-age-varying ($\gamma_3 = \gamma_4 = 0$); **iv)** the effect of inputs (observed or not) declines with age at a constant rate λ ; **v)** such as the effect of unobserved abilities. In the Fixed-effect model, we assume **i); ii), iii);** assumptions **iv)** and **v)** are replaced by **iv)** the effect of inputs (observed or not) is constant by age; **v)** such as the effect of unobserved abilities. In the Cumulative Value-Added model, assumptions **iii)** and **iv)** are relaxed. Table A2.3 summarizes each model assumptions. For a better understanding of these assumptions, see Todd and Wolpin (2007) [126]. All models have the advantage of controlling for the subjectivity of the Primary Care Giver providing the non-cognitive

skills assessment; captured by Y_{it-1} in the Value Added Model and cancelled out in the Fixed Effect Model.

Several specifications are estimated. In the most precise specification, three types of parental time are distinguished: time with at least one parent, paternal time, and time with both parents are included, maternal time is omitted and is the reference category.

$$Y_{it} = \beta_0 + \sum_1^K \gamma_1^k TI_{it}^k + \sum_1^K \gamma_2^{k,OP} PTI_{it}^{k,OP} + \sum_1^K \gamma_2^{k,F} PTI_{it}^{k,F} + \sum_1^K \gamma_2^{k,BP} PTI_{it}^{k,BP} + \lambda Y_{it-1} + \epsilon_{it} \quad (4)$$

This specification is intended to estimate whether who is involved or present during the activity matters for children. $\gamma_2^{k,OP}$ measures the effect of an increase in time spent with at least one parent, and $\gamma_2^{k,F}$ and $\gamma_2^{k,BP}$ measure the effects of spending more time with the father only or with both parents on the activity k respectively, rather than with the mother only.

In all these models, controls Z_{it} are included such as individual's sex, ethnicity, age, Primary Care Giver (PCG)'s employment status, education and earnings, family structure, and the number of siblings. Time with step-parent and grand-parents are also controlled for in Models 2, 3 and 4. Family structure, denoted FS_{it} , is a set of dummies indicating if the child lives only with their mother; only with their mother who has a partner, living or not with the child; only with their father, or others (meaning that the child does not live with either of their parents). The reference category is the two-parents family. Dummies are included indicating if the child had a father at birth or a deceased parent.

5. Effect of family structure on children's and parents' time investments

5.1. Average effect of family structure on children's and parents' time investments

In Table 3, we examine whether a change in family structure affects child and parental time investments. Standard errors are clustered at the individual level. Models include individual fixed effects, and controls such as age, number of siblings, primary care giver's education, employment status and earnings. Dummies indicating if the child had a father at birth or a deceased parent are included. Amounts of time are standardized to a mean of 0 and a standard deviation of 1. Panel A of Table 3 shows the estimation results for total child time investments, Panels B and C show the estimation results for parental time investments measured as time spent with at least one parent considering accessible time (Panel B), when parent is present during the activity; and engaged time (Panel C), when

the parent is involved during the activity.

Estimations of Panel A of Table 3 show that a child's total time investments (whoever is present or involved) are not affected by family structure, children spend the same amount of time on the activities considered. They slightly substitute active leisure to educational activities. We did not expect children to change their habits after a parental separation, although parents may be more time-constrained. So, is time with at least one parent affected by a change in family structure?

Panels B and C show a decrease in time spent with at least one parent present in all activities, except active leisure time, especially in single mother families. Being in a single mother family leads to a decrease of nearly 30% of a standard deviation in the time spent with at least one parent present. By comparison, having a PCG who is a housewife leads to an increase of 40%. However, this decrease in accessible time does not reflect a decrease in engaged time (9% decrease for single mothers but this is not statistically significant). Estimation results on engaged time (Panel C) reveal a small impact of a change in family structure. Estimated coefficients are negative, but not significant even at a 10% level, except time spent on (house)work with at least one parent involved.

To clarify these findings, I report the breakdown of this impact into time spent with the mother only, the father only and both parents together. Figures 4 and 5 show the breakdown of accessible and engaged parental time, respectively. One pattern emerges from these results. The custodial parent increases the time spent alone with the child, but does not manage to compensate for the double decrease in time the child spent with their parents together, and time spent only with the non-custodial parent. Looking at accessible time, time spent with the custodial parent actually decreases since she does not perfectly compensate for the decrease in time with parents together. It means that the custodial parent spends less time at home. A possible explanation is the budget constraint of single families that triggers custodial parents to increase their number of working hours to cope with the cost of separation. Another explanation is the existence of a complementarity effect. One parent increases (decreases) the time spent with the child if the other parent increases (decreases) theirs. For example, instead of going to the supermarket as a family, the custodial parent may prefer to go on her own and leave the child at home or with another adult.

The breakdown of time with at least one parent engaged in the activity reveals that custodial parents aim to compensate at least for the time that was spent with both parents, especially on activities considered as determinants for child development such as personal needs and care, educational activities and active leisure. Single father families do not show exactly the same pattern; however, there are not enough observations in this

group to draw any strong conclusions⁸.

⁸In [A3.1](#), we discuss the equivalence between the transition from having their parents getting separated and having their parents getting back together.

Table 3 – Effect of Family Structure on Child and Parental Time Investments

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	0.01 (0.11)	0.07 (0.11)	-0.16 (0.10)	0.16 (0.10)	-0.08 (0.10)
Single Mother (step-parent)	-0.02 (0.16)	-0.07 (0.16)	0.13 (0.13)	0.08 (0.16)	-0.19 (0.14)
Single Father	-0.01 (0.18)	0.13 (0.17)	-0.00 (0.20)	-0.02 (0.21)	-0.12 (0.17)
Other	-0.10 (0.22)	0.35+ (0.19)	-0.30 (0.21)	0.18 (0.24)	-0.14 (0.20)
Deceased Father	0.01 (0.38)	0.11 (0.47)	0.05 (0.23)	-0.20 (0.39)	-0.24 (0.39)
Deceased Mother	-1.44 (1.49)	0.19 (0.46)	0.72 (0.88)	-0.44 (0.41)	0.23 (0.23)
Age	-0.01** (0.01)	-0.01+ (0.01)	0.00 (0.01)	0.01* (0.01)	0.00 (0.01)
PCG working status - looking for a job	-0.21 (0.18)	0.09 (0.16)	0.13 (0.14)	-0.16 (0.12)	0.18 (0.17)
PCG working status - housewife	0.17 (0.13)	0.11 (0.12)	-0.30** (0.11)	0.09 (0.10)	0.08 (0.11)
PCG working status - student	-0.54* (0.23)	-0.11 (0.30)	-0.14 (0.25)	0.19 (0.24)	0.45 (0.32)
PCG working status - other	-0.31	0.02	-0.22	-0.11	0.34

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Table 3 – *Continued from previous page*

	(0.58)	(0.30)	(0.52)	(0.33)	(0.32)
Number of siblings	0.00	0.00	0.04	-0.01	-0.03
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Earnings	0.04	0.01	0.02	-0.05	-0.00
	(0.04)	(0.04)	(0.04)	(0.03)	(0.04)
Constant	-0.62	-0.32	0.59	0.50	-0.39
	(0.54)	(0.63)	(0.63)	(0.56)	(0.56)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00

Panel B : Time with at least One Parent : Accessible Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.25*	-0.13	-0.22*	0.01	-0.24*	-0.27**
	(0.12)	(0.08)	(0.11)	(0.10)	(0.10)	(0.10)
Single Mother (step-parent)	-0.26	-0.18	-0.30*	-0.21	-0.48***	-0.55***
	(0.17)	(0.16)	(0.15)	(0.13)	(0.14)	(0.14)
Single Father	-0.15	-0.58***	-0.11	0.11	-0.15	-0.28
	(0.21)	(0.17)	(0.18)	(0.21)	(0.16)	(0.18)
Other	-0.28	-0.40+	-0.48***	-0.09	-0.43*	-0.58***
	(0.18)	(0.21)	(0.13)	(0.17)	(0.18)	(0.17)
Deceased Father	0.39+	-0.07	-0.01	-0.08	-0.18	-0.06
	(0.21)	(0.30)	(0.20)	(0.23)	(0.32)	(0.27)
Deceased Mother	0.93	1.61**	-0.19	-0.15	0.09	0.59

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Table 3 – *Continued from previous page*

	(0.96)	(0.52)	(0.27)	(0.24)	(0.49)	(0.68)
Age	-0.01+	-0.01*	0.01	0.01+	0.01	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PCG working status - looking for a job	-0.12	0.25	-0.02	-0.07	-0.02	-0.03
	(0.20)	(0.17)	(0.14)	(0.14)	(0.18)	(0.16)
PCG working status - housewife	0.29*	0.22*	-0.10	0.34**	0.17	0.40***
	(0.13)	(0.10)	(0.20)	(0.12)	(0.11)	(0.11)
PCG working status - student	-0.55*	-0.09	-0.37	-0.13	0.18	-0.23
	(0.25)	(0.32)	(0.24)	(0.23)	(0.30)	(0.32)
PCG working status - other	-0.44	0.55+	-0.22	0.10	0.59	0.31
	(0.46)	(0.31)	(0.22)	(0.46)	(0.57)	(0.52)
Number of siblings	0.01	-0.01	-0.05	0.01	-0.00	-0.01
	(0.02)	(0.02)	(0.04)	(0.03)	(0.02)	(0.02)
Earnings	-0.03	-0.04	0.03	-0.10**	-0.02	-0.08*
	(0.04)	(0.04)	(0.04)	(0.04)	(0.03)	(0.03)
Constant	-0.17	1.64*	0.01	1.36*	-0.22	0.92
	(0.55)	(0.80)	(0.55)	(0.57)	(0.60)	(0.63)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

Panel C : Time with at least One Parent : Engaged Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.20	-0.02	0.02	0.04	-0.05	-0.09

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Table 3 – *Continued from previous page*

	(0.12)	(0.09)	(0.08)	(0.09)	(0.09)	(0.10)
Single Mother (step-parent)	-0.21	-0.07	-0.04	0.02	-0.12	-0.17
	(0.15)	(0.13)	(0.12)	(0.14)	(0.13)	(0.14)
Single Father	-0.20	-0.61**	-0.11	0.01	-0.15	-0.39+
	(0.23)	(0.19)	(0.13)	(0.23)	(0.18)	(0.23)
Other	-0.38*	-0.22	-0.12	-0.10	-0.30**	-0.47**
	(0.17)	(0.18)	(0.17)	(0.21)	(0.11)	(0.16)
Deceased Father	0.22	-0.21	0.34	-0.02	-0.63*	-0.26
	(0.19)	(0.28)	(0.32)	(0.12)	(0.25)	(0.22)
Deceased Mother	0.85	1.61**	0.06	0.18	-0.75	0.55
	(0.98)	(0.61)	(0.25)	(0.25)	(0.71)	(0.81)
Age	-0.00	-0.01	0.00	0.00	0.01*	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PCG working status - looking for a job	-0.10	0.16	-0.03	-0.17	0.22	0.05
	(0.20)	(0.20)	(0.17)	(0.14)	(0.18)	(0.18)
PCG working status - housewife	0.30*	0.14	-0.18	0.12	0.16	0.28*
	(0.14)	(0.11)	(0.21)	(0.12)	(0.12)	(0.11)
PCG working status - student	-0.40*	0.22	0.03	-0.03	0.33	0.08
	(0.20)	(0.30)	(0.14)	(0.13)	(0.27)	(0.24)
PCG working status - other	-0.49	0.49	-0.11	-0.72	0.69+	0.01
	(0.51)	(0.35)	(0.26)	(0.56)	(0.41)	(0.48)
Number of siblings	-0.02	-0.02	-0.03	-0.00	-0.01	-0.03
	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)

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Table 3 – *Continued from previous page*

Earnings	-0.01 (0.04)	-0.03 (0.04)	0.03 (0.04)	-0.09* (0.04)	-0.01 (0.04)	-0.05 (0.04)
Constant	-0.17 (0.58)	1.12 (0.78)	-0.50 (0.51)	1.66** (0.61)	-0.14 (0.53)	0.75 (0.64)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

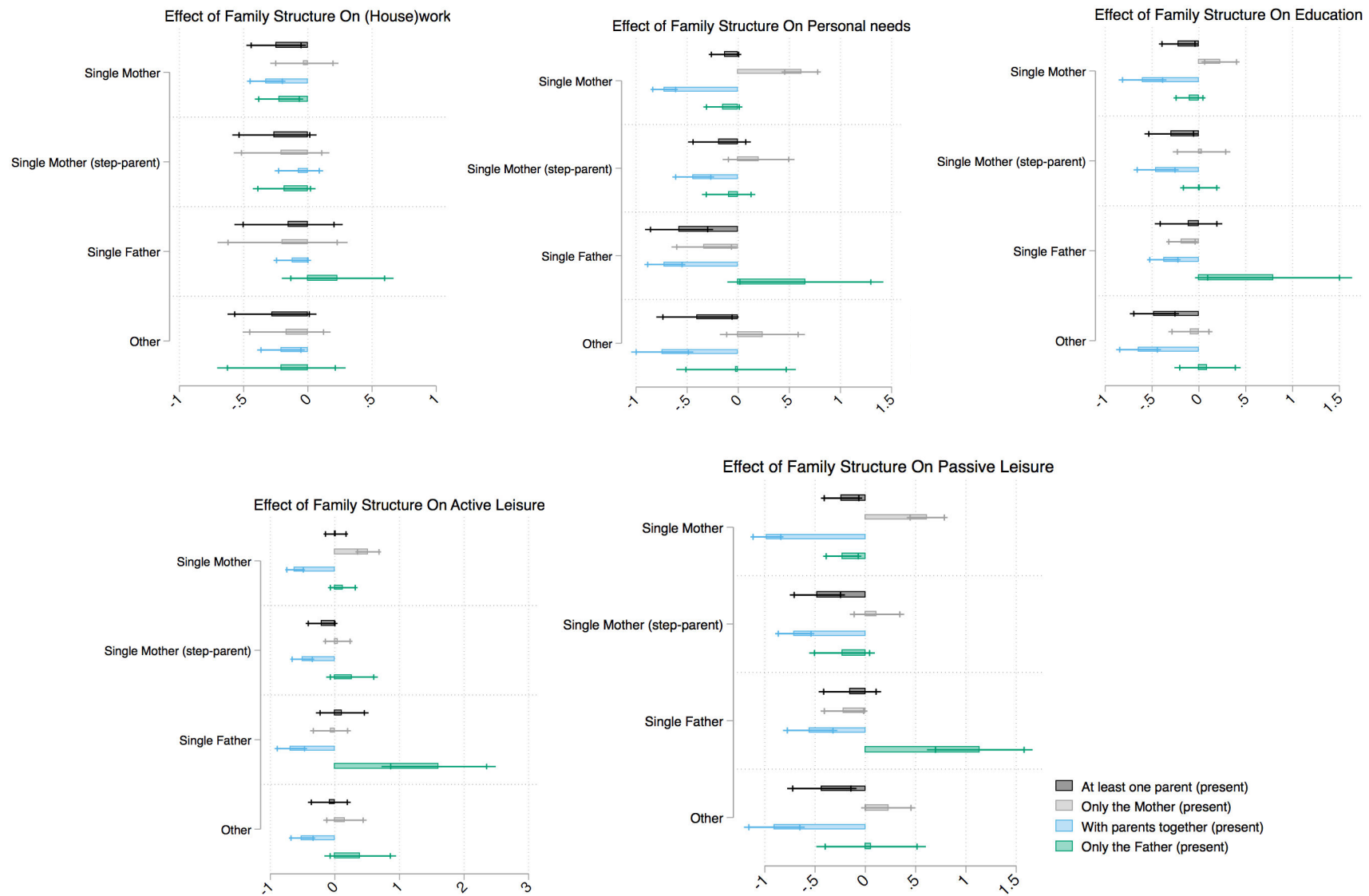


Figure 4 – Breakdown of time with at least one parent (Accessible Time)

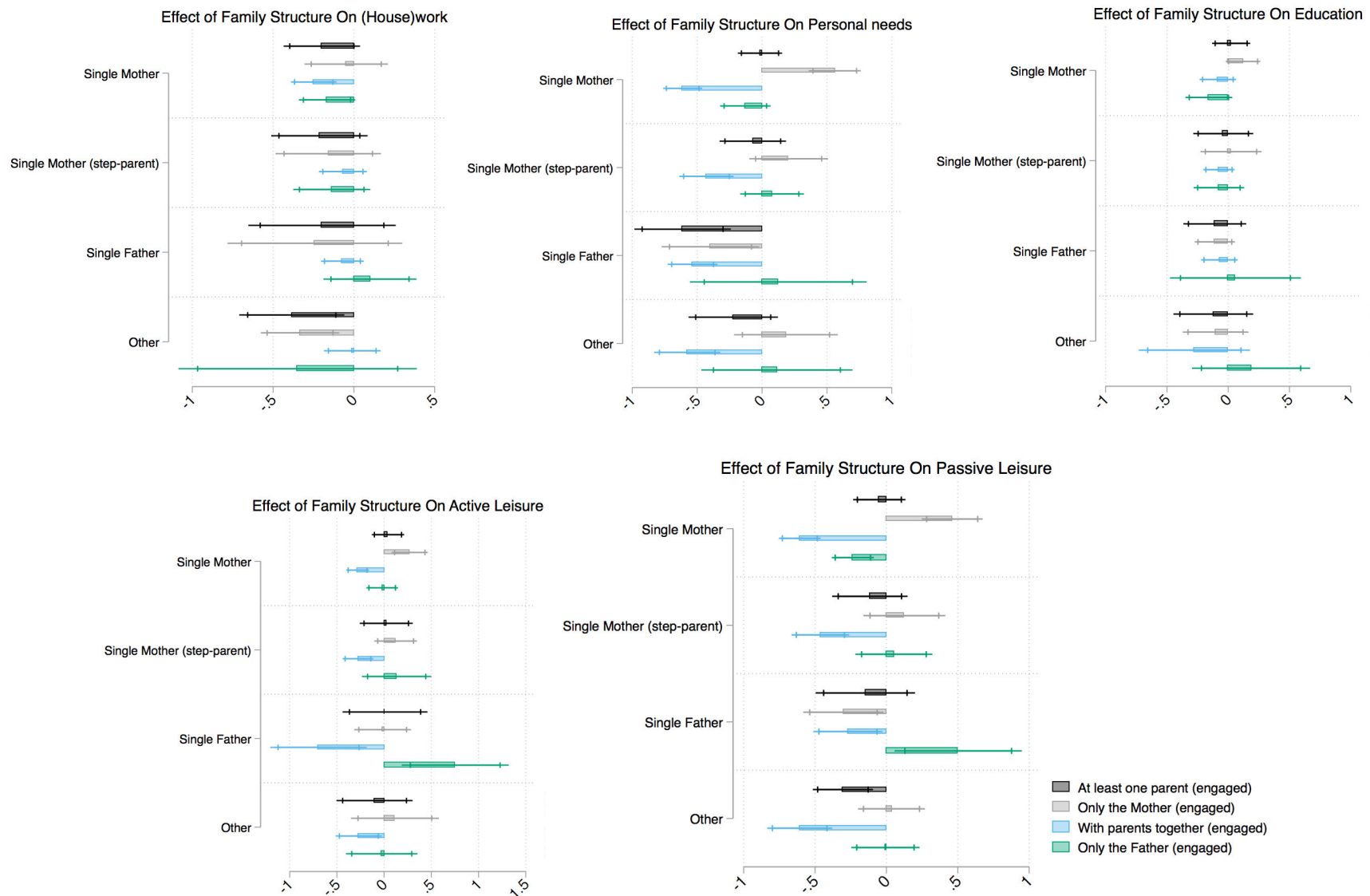


Figure 5 – Breakdown of time with at least one parent (Engaged Time)

Estimation results do not show any impact of family structure on total child time investments, nor any clear effect on time spent with at least one parent involved; but they do show a decrease in time with at least one parent present. In addition, the breakdown of accessible and engaged parental time is greatly affected; time spent on main activities with both parents together and alone with the non-custodial parent decrease. One natural question is whether this average effect of a change in family structure on children’s and parental time investments is the same for all families and for all children. We look in particular whether this effect is the same according to three variables of interest: child’s age at separation, their number of siblings and their primary care giver’s education.

5.2. Heterogeneity analysis

5.2.1 Heterogeneity according to age at separation

Several studies show that parental time input matter especially in early childhood (See Del Bono et al. 2016 [55], Del Boca et al. 2017 [54]). Therefore, it is of particular interest to look whether parents react differently to the change in family structure if the child is young at the moment of the separation. The child’s age at separation is not available for all children, therefore we have a smaller sample for this study. Table 4 reports the number of observations by family structure and age group in our sample⁹. Since we do not have many observations in each cell, I will focus on single mothers families, for whom there are more observations. These results mostly give some insight about an heterogeneous effect of family structure according to child’s age at separation.

Table 4 – Number of observations by family structure and age group

	Younger than six at separation	Six or older at separation	Total
Single Mother	184	176	360
Single mother with SP	111	47	158
Single Father	42	32	74
Other	40	20	60
Total	377	275	652

Source : PSID - CDS, waves 1997, 2002 and 2007

⁹As mentonned earlier, families who do not experience a transition are not included in the sample

Table 5 – Effect of Family Structure on Child and Parental Time Investments: heterogeneity according to the age at parental separation

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.04 (0.15)	0.25+ (0.14)	-0.31* (0.13)	0.27* (0.13)	-0.13 (0.13)
Single Mother=1 × < 6 at separation	-0.02 (0.29)	-0.20 (0.24)	-0.01 (0.21)	-0.01 (0.21)	0.14 (0.22)
Single Mother (SP)	0.04 (0.30)	-0.15 (0.32)	0.34 (0.21)	-0.17 (0.24)	-0.10 (0.27)
Single Mother (SP)=1 × < 6 at separation	-0.18 (0.42)	0.13 (0.39)	-0.37 (0.29)	0.41 (0.33)	-0.17 (0.34)
Single Father	0.03 (0.27)	0.24 (0.33)	-0.45 (0.37)	0.29 (0.31)	-0.03 (0.22)
Single Father=1 × < 6 at separation	-0.06 (0.41)	-0.10 (0.37)	0.24 (0.44)	-0.15 (0.39)	-0.01 (0.30)
Other	-0.09 (0.80)	0.63 (0.42)	-0.90 (0.71)	1.31** (0.48)	-0.76** (0.29)
Other=1 × < 6 at separation	-0.72 (0.96)	-0.48 (0.49)	0.85 (0.79)	-1.33+ (0.69)	1.10* (0.49)
Observations	2742	2742	2742	2742	2742
Nb of Clusters	1379.00	1379.00	1379.00	1379.00	1379.00

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Table 5 – *Continued from previous page*

<i>Panel B : Time with at least One Parent : Accessible Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.28*	-0.09	-0.47**	0.07	-0.30*	-0.32*
	(0.12)	(0.12)	(0.17)	(0.14)	(0.14)	(0.13)
Single Mother=1 × < 6 at separation	0.06	-0.09	0.51*	-0.07	0.04	0.09
	(0.30)	(0.19)	(0.21)	(0.21)	(0.21)	(0.20)
Single Mother (SP)	-0.38	-0.38	-0.59+	-0.38*	-0.59*	-0.84**
	(0.25)	(0.24)	(0.31)	(0.18)	(0.27)	(0.26)
Single Mother (SP)=1 × < 6 at separation	0.08	0.25	0.52	0.14	-0.03	0.25
	(0.42)	(0.34)	(0.37)	(0.27)	(0.34)	(0.34)
Single Father	-0.54	-0.55	-0.36+	0.31	-0.23	-0.40
	(0.33)	(0.34)	(0.21)	(0.42)	(0.22)	(0.34)
Single Father=1 × < 6 at separation	0.77	-0.13	0.15	-0.19	0.17	0.24
	(0.50)	(0.40)	(0.24)	(0.48)	(0.31)	(0.42)
Other	0.07	-0.01	-0.72**	0.28	-0.98+	-0.56
	(0.89)	(0.41)	(0.22)	(0.37)	(0.52)	(0.41)
Other=1 × < 6 at separation	-0.56	-0.94	0.38	-0.35	0.63	-0.14
	(0.96)	(0.68)	(0.33)	(0.56)	(0.61)	(0.54)
Observations	2742	2742	2742	2742	2742	2742
Nb of Clusters	1379.00	1379.00	1379.00	1379.00	1379.00	1379.00

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Table 5 – *Continued from previous page*

<i>Panel C : Time with at least One Parent : Engaged Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.28*	-0.06	-0.12	0.23+	-0.29*	-0.17
	(0.13)	(0.12)	(0.12)	(0.13)	(0.12)	(0.13)
Single Mother=1 × < 6 at separation	0.18	0.07	0.35+	-0.25	0.39*	0.23
	(0.29)	(0.20)	(0.19)	(0.18)	(0.18)	(0.20)
Single Mother (SP)	-0.37	-0.31	-0.51*	-0.06	0.01	-0.40+
	(0.27)	(0.25)	(0.23)	(0.18)	(0.21)	(0.24)
Single Mother (SP)=1 × < 6 at separation	0.26	0.31	0.87**	0.07	-0.25	0.34
	(0.39)	(0.31)	(0.32)	(0.28)	(0.29)	(0.31)
Single Father	-0.59+	-0.81*	0.01	-0.42	-0.28	-0.84+
	(0.33)	(0.38)	(0.19)	(0.50)	(0.28)	(0.44)
Single Father=1 × < 6 at separation	0.76	0.21	-0.20	0.77	0.32	0.84
	(0.52)	(0.45)	(0.28)	(0.53)	(0.35)	(0.52)
Other	-0.39	-0.02	-0.07	0.19	-0.21	-0.19
	(0.41)	(0.22)	(0.17)	(0.28)	(0.17)	(0.29)
Other=1 × < 6 at separation	-0.25	-0.62	0.16	0.11	-0.02	-0.28
	(0.61)	(0.50)	(0.50)	(0.62)	(0.24)	(0.45)
Observations	2742	2742	2742	2742	2742	2742
Nb of Clusters	1379.00	1379.00	1379.00	1379.00	1379.00	1379.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table 5 reports the effect of a change in family structure according to the child's age at parental separation. Looking at total time, whoever was present, children who experience the parental separation when they are younger than 6 are less affected by a change in family structure, whereas, those who experience it after the age of 6 seem to substitute personal needs and active leisure to educational activities and slightly to passive leisure in single mother families. Looking at time spent with at least one parent present during the activity, children who are less than 6 years old at separation are less affected in educational activities. Overall, they are also less affected when we look at total time, whatever the activity, but the effect is still negative. This is also true for Engaged Time, except for active leisure in single-mother families, and passive leisure when there is a step-parent. Over all the activities, the effect is close to zero for children under the age of 6.

5.2.2 Heterogeneity according to the number of siblings

Children have to share their parents' resources with their siblings. Nevertheless, parental time investments is a public good, it can be shared by all the siblings at the same time. In this section, I look whether children with more siblings are differently affected by a change in family structure. Table 6 reports the effect of a change in family structure, along with the interacted effect of a change in family structure with the number of siblings (as a continuous variable). First, let's look at total time, whoever was present (Panel A). In single mother families, only children substitute some time in education activities with time in personal needs and care. The increase in time spent in personal needs and care is lower when there are some siblings. In single mother families with a step parent, only children substitute active leisure and educational activities to passive leisure, whereas this is less true for children with siblings.

Looking at time spent with at least one parent present during the activity, results do not suggest a differential effect among single mother families. When there is a step-parent, children with siblings seem to spend more time in work and housework and passive leisure with at least one parent present than only children. In single father families, children with siblings seem to spend more time with at least one parent when they are doing educational activities, this seems to substitute to active leisure. Again, I must stress that there are not many observations in this category to draw any strong conclusion.

Looking at engaged time, children with siblings in single mother families whether there is step-parent or not, are less affected by a change in family structure. This comes from active leisure for the first one, and from work or housework and passive leisure for the latter one.

Table 6 – Effect of Family Structure on Child and Parental Time Investments; heterogeneity according to the number of siblings

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1	0.03 (0.14)	0.21+ (0.13)	-0.25* (0.12)	0.09 (0.12)	-0.05 (0.12)
Single Mother=1 × Number of siblings	-0.02 (0.06)	-0.11* (0.05)	0.07 (0.05)	0.06 (0.06)	-0.03 (0.05)
Single Mother (step-parent)=1	-0.16 (0.19)	0.02 (0.19)	0.17 (0.16)	0.21 (0.16)	-0.33* (0.15)
Single Mother (step-parent)=1 × Number of siblings	0.11 (0.07)	-0.05 (0.09)	-0.04 (0.07)	-0.08 (0.07)	0.09 (0.06)
Single Father=1	0.19 (0.34)	0.15 (0.22)	-0.30 (0.32)	0.26 (0.28)	-0.26 (0.24)
Single Father=1 × Number of siblings	-0.19 (0.23)	0.00 (0.14)	0.28 (0.20)	-0.28+ (0.17)	0.14 (0.15)
Other=1	-0.39 (0.35)	0.02 (0.23)	-0.08 (0.31)	0.14 (0.30)	0.11 (0.29)
Other=1 × Number of siblings	0.41 (0.27)	0.46* (0.21)	-0.36 (0.25)	0.08 (0.25)	-0.33 (0.24)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00

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Table 6 – *Continued from previous page*

<i>Panel B : Time with at least One Parent : Accessible Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother=1	-0.30*	-0.13	-0.26+	-0.04	-0.26*	-0.34**
	(0.14)	(0.10)	(0.15)	(0.12)	(0.13)	(0.12)
Single Mother=1 × Number of siblings	0.04	-0.00	0.03	0.05	0.02	0.05
	(0.06)	(0.04)	(0.07)	(0.06)	(0.06)	(0.05)
Single Mother (step-parent)=1	-0.48*	-0.14	-0.28	-0.03	-0.60***	-0.57**
	(0.20)	(0.20)	(0.21)	(0.17)	(0.18)	(0.19)
Single Mother (step-parent)=1 × Number of siblings	0.16+	-0.02	-0.02	-0.11	0.09	0.02
	(0.08)	(0.06)	(0.08)	(0.09)	(0.06)	(0.08)
Single Father=1	0.03	-0.37	-0.48***	0.40	-0.13	-0.12
	(0.36)	(0.23)	(0.14)	(0.27)	(0.23)	(0.26)
Single Father=1 × Number of siblings	-0.19	-0.20	0.36*	-0.28+	-0.03	-0.16
	(0.20)	(0.13)	(0.17)	(0.15)	(0.17)	(0.17)
Other=1	-0.28	-0.45+	-0.51**	-0.17	-0.51*	-0.69***
	(0.29)	(0.23)	(0.17)	(0.21)	(0.24)	(0.17)
Other=1 × Number of siblings	0.02	0.09	-0.02	0.14	0.10	0.16
	(0.20)	(0.23)	(0.15)	(0.20)	(0.17)	(0.20)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

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Table 6 – *Continued from previous page*

<i>Panel C : Time with at least One Parent : Engaged Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother=1	-0.23 (0.14)	-0.01 (0.11)	-0.03 (0.11)	-0.09 (0.09)	-0.11 (0.13)	-0.20+ (0.11)
Single Mother=1 × Number of siblings	0.03 (0.07)	-0.00 (0.05)	0.04 (0.05)	0.10* (0.04)	0.04 (0.07)	0.09+ (0.05)
Single Mother (step-parent)=1	-0.45* (0.20)	-0.07 (0.18)	0.08 (0.21)	0.04 (0.15)	-0.30 (0.18)	-0.31+ (0.17)
Single Mother (step-parent)=1 × Number of siblings	0.17* (0.07)	0.01 (0.06)	-0.08 (0.10)	-0.01 (0.06)	0.13+ (0.07)	0.10 (0.06)
Single Father=1	0.00 (0.39)	-0.42+ (0.22)	-0.19 (0.20)	0.04 (0.28)	-0.10 (0.21)	-0.26 (0.29)
Single Father=1 × Number of siblings	-0.20 (0.20)	-0.18 (0.13)	0.07 (0.11)	-0.04 (0.15)	-0.06 (0.16)	-0.13 (0.16)
Other=1	-0.43+ (0.26)	-0.28 (0.20)	-0.13 (0.20)	-0.33 (0.28)	-0.36** (0.13)	-0.62*** (0.19)
Other=1 × Number of siblings	0.09 (0.17)	0.11 (0.20)	-0.01 (0.18)	0.27 (0.29)	0.07 (0.10)	0.21 (0.20)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

There is no big difference in the effect of a change in family structure according to the number of siblings. If any, children with siblings are less affected, especially looking at engaged time.

5.2.3 Heterogeneity according to Primary care giver's education

Parent may react differently to a change in family structure depending on their education. In this section, I look whether children whose primary care giver is more highly educated are differently affected by a change in family structure. Average PCG's education is around 13 years, the median is also 13, from 0 to 17 (Top 10%). Parents are considered as more highly educated when their education level is greater than 13 years; 45% of children in the sample have a more highly educated PCG. Median log earnings are around 10, log of earnings ranges from 2 to 12.6.

Table 7 reports the number of observations by family structure and Primary Care Giver's Education in our sample¹⁰.

Table 7 – Number of observations by Family Structure and Primary Care Giver's Education

	Less Highly Educated	More Highly Educated	Total
Single Mother	382	191	573
Single mother with SP	182	107	289
Single Father	72	23	95
Other	101	46	147
Total	737	367	1104

Notes: Average PCG's education is around 13 years, the median is also 13, from 0 to 17 (Top 10%). Parents are considered as more highly educated when their education level is greater than 13 years; 45% of children in the sample have a more highly educated PCG.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table 8 reports the effect of a change in family structure according to the Primary Care Giver's Education. Looking at total time, whoever was present, children whose primary care giver is more highly educated spend less time in educational activities and more time in work and housework when they live in a single parent families. This is also true when

¹⁰As mentonned earlier, families who do not experience a transition are not included in the sample

there is a step-parent. These effects are not statistically significant, but since we do not have many observations, these results might however give some insight.

Table 8 – Effect of Family Structure on Child and Parental Time Investments; heterogeneity according to the Primary Care Giver's Education

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.06 (0.14)	0.05 (0.13)	-0.08 (0.12)	0.15 (0.13)	-0.11 (0.12)
Single Mother=1 × More Highly Educated	0.19 (0.18)	0.06 (0.18)	-0.23 (0.18)	0.03 (0.17)	0.06 (0.17)
Single Mother (SP)	-0.20 (0.21)	-0.18 (0.19)	0.23 (0.16)	-0.00 (0.21)	-0.04 (0.18)
Single Mother (SP)=1 × More Highly Educated	0.41 (0.26)	0.26 (0.25)	-0.21 (0.20)	0.21 (0.24)	-0.37 (0.24)
Single Father	-0.05 (0.19)	0.06 (0.19)	0.10 (0.22)	-0.03 (0.24)	-0.12 (0.18)
Single Father=1 × More Highly Educated	0.09 (0.48)	0.21 (0.35)	-0.25 (0.49)	-0.02 (0.44)	0.03 (0.40)
Other	-0.05 (0.21)	0.49* (0.23)	-0.53* (0.26)	0.31 (0.30)	-0.22 (0.25)
Other=1 × More Highly Educated	-0.16 (0.48)	-0.35 (0.34)	0.61 (0.42)	-0.34 (0.46)	0.22 (0.39)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00

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Table 8 – *Continued from previous page*

<i>Panel B : Time with at least One Parent : Accessible Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.33*	-0.19+	-0.22*	-0.00	-0.19	-0.31**
	(0.15)	(0.10)	(0.11)	(0.12)	(0.13)	(0.12)
Single Mother=1 × More Highly Educated	0.19	0.21	0.01	0.06	-0.10	0.12
	(0.17)	(0.17)	(0.18)	(0.15)	(0.18)	(0.16)
Single Mother (SP)	-0.33	-0.13	-0.14	-0.20	-0.28+	-0.42*
	(0.24)	(0.22)	(0.16)	(0.16)	(0.16)	(0.17)
Single Mother (SP)=1 × More Highly Educated	0.15	-0.15	-0.39	-0.01	-0.46+	-0.34
	(0.26)	(0.27)	(0.25)	(0.19)	(0.24)	(0.24)
Single Father	-0.31	-0.68**	-0.09	0.21	-0.18	-0.31
	(0.21)	(0.21)	(0.21)	(0.22)	(0.19)	(0.23)
Single Father=1 × More Highly Educated	0.64	0.25	-0.02	-0.38	0.07	0.09
	(0.57)	(0.35)	(0.33)	(0.46)	(0.31)	(0.38)
Other	-0.53**	-0.12	-0.60***	-0.02	-0.28	-0.51*
	(0.17)	(0.22)	(0.16)	(0.18)	(0.20)	(0.22)
Other=1 × More Highly Educated	0.70+	-0.75+	0.33	-0.23	-0.39	-0.20
	(0.39)	(0.43)	(0.23)	(0.34)	(0.36)	(0.34)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

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Table 8 – *Continued from previous page*

<i>Panel C : Time with at least One Parent : Engaged Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.28+	-0.14	-0.04	-0.00	-0.02	-0.18
	(0.16)	(0.10)	(0.09)	(0.10)	(0.11)	(0.12)
Single Mother=1 × More Highly Educated	0.20	0.37*	0.17	0.15	-0.07	0.27
	(0.18)	(0.15)	(0.13)	(0.14)	(0.16)	(0.16)
Single Mother (SP)	-0.28	-0.00	0.03	0.07	-0.02	-0.09
	(0.20)	(0.15)	(0.14)	(0.19)	(0.16)	(0.17)
Single Mother (SP)=1 × More Highly Educated	0.15	-0.19	-0.19	-0.12	-0.22	-0.21
	(0.24)	(0.22)	(0.22)	(0.21)	(0.23)	(0.22)
Single Father	-0.42*	-0.68**	-0.06	0.02	-0.14	-0.49+
	(0.20)	(0.24)	(0.13)	(0.28)	(0.21)	(0.28)
Single Father=1 × More Highly Educated	0.81	0.15	-0.15	-0.10	0.00	0.32
	(0.62)	(0.38)	(0.31)	(0.45)	(0.35)	(0.46)
Other	-0.46**	-0.11	-0.31+	0.03	-0.28*	-0.43*
	(0.16)	(0.20)	(0.19)	(0.24)	(0.14)	(0.20)
Other=1 × More Highly Educated	0.25	-0.35	0.45	-0.38	-0.07	-0.10
	(0.37)	(0.36)	(0.33)	(0.41)	(0.18)	(0.31)
Observations	2966	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00	1478.00

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Table 8 – *Continued from previous page*

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Average PCG's education is around 13 years, the median is also 13, from 0 to 17 (Top 10%). Parents are considered as more highly educated when their education level is greater than 13 years; 45% of children in the sample have a more highly educated PCG. Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Looking at time spent with at least one parent present during the activity, children whose Primary care giver is more highly educated seem to be less affected by a parental separation in single mother families, especially for work and housework and personal needs and care. Nevertheless, it is not true when there is a step-parent.

Looking at engaged time, this pattern is even more salient. Children whose primary care giver is more highly educated seem to spend more time with at least one parent involved in all activities, except passive leisure. This effect is reversed when there is a step parent. Results suggest that children whose primary care giver is more highly educated are less affected by a change in family structure if they are in single-mother families. This is not true if there is a step-parent, but let's remind that the definition of parental time excludes time spent with a parent if a step parent is present.

To sum up, a change in family structure leads to a decrease in time with at least one parent present. In addition, the breakdown of accessible and engaged parental time is greatly affected; time spent on main activities with both parents together and alone with the non-custodial parent decrease. Younger children and children whose primary care giver is more highly educated are less affected by the decrease in time spent with at least one parent. There are no big differences in the effect of a change in family structure according to the number of siblings.

But are these changes reflected in poorer child development? To address this question, I consider time input production functions, and examine whether parental time investments matter in the production of a child's cognitive and non-cognitive skills. I also see if who is present or involved matters for the child.

6. Time Input Production Functions and Parental Time Productivity

6.1. Time Input Production Functions: Main Results

Using a Value Added model, Tables 9 - 11 present the estimations of time input production functions for cognitive and non-cognitive skills¹¹. Because the five time inputs measured as time spent on activities are collinear, I take time spent in personal needs and care as the omitted category. The effect of the other time inputs should be interpreted as relative to that of personal needs and care. I also consider a fixed-effects model in Tables A3.8 and A3.9 in the Appendix.

¹¹Results on Externalizing and Internalizing BPI are available upon request, they go in the same sense as the results on Total BPI, that is why I chose to not report them here.

Standard errors are clustered at the individual level. As mentioned earlier, models include controls such as sex, ethnicity, age, number of siblings, primary care giver's education, employment status and earnings and family structure, along with dummies indicating if the child had a father at birth or a deceased parent. Where time with parents is considered, we also control for the total amount of time spent with grand parents alone, a step-parent alone or other parental time¹² (see Figure 3 to see the breakdown of adult time). Amounts of time are standardized to a mean of 0 and a standard deviation of 1. I first discuss the effect of the total amount of time spent on each activity (Table 9). Next, I consider the effect of the presence of at least one parent (Table 10). In Table 11, I address the question of the heterogeneity of parental time investments, allowing for heterogeneity of productivity in the different parental time investments.

6.1.1 Time Input Production Functions, whoever is present

Table 9 shows the estimated coefficients for the time input production functions considering total time (whoever was present). Active leisure and education activities are ranked highest for both cognitive and non-cognitive skills. For example, an increase of 1 standard deviation in the amount of time spent on educational activities rather than personal needs and care increase the reading test score by 13% of a standard deviation, this is twice larger than the effect of one year of PCG's education (6%). (House)Work is also found to be preferable to personal needs and care. Results suggest that personal needs and care is at the bottom of the ranking.

I performed a Wald test on the four coefficients of child's time investments: the null hypothesis is rejected at a 2% level. Results suggest that the way the child allocates their time is important in the child's development, but is time spent on education more productive when one parent is involved or present? This question is particularly interesting for this study, since we saw earlier that accessible parental time is affected by family structure.

Table 9 – Time Input Production Functions : Total Time (whoever was present)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.09* (0.04)	0.04+ (0.03)	0.05+ (0.03)
Education	0.13* (0.06)	0.09*** (0.03)	0.06* (0.03)
Active Leisure	0.12*	0.08**	0.08**

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¹²Time with one of the parent with another adult

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Table 9 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.05)	(0.03)	(0.03)
Passive Leisure	0.04	0.04	0.01
	(0.04)	(0.03)	(0.03)
Single Mother	-0.07	-0.01	-0.14*
	(0.06)	(0.05)	(0.06)
Single Mother (step-parent)	-0.12+	-0.00	-0.21*
	(0.07)	(0.07)	(0.09)
Single Father	-0.30***	-0.14	-0.25+
	(0.07)	(0.09)	(0.15)
Other	-0.21*	-0.03	-0.03
	(0.09)	(0.11)	(0.12)
No father	0.00	-0.29	0.01
	(0.14)	(0.21)	(0.17)
Deceased Father	-0.01	0.21	-0.02
	(0.14)	(0.16)	(0.13)
Deceased Mother	0.35	0.04	-0.14
	(0.22)	(0.14)	(0.30)
Age	0.02	-0.00	0.03***
	(0.01)	(0.01)	(0.01)
PCG Education	0.06***	0.05***	0.01
	(0.01)	(0.01)	(0.01)
African American	-0.31***	-0.48***	0.13**
	(0.06)	(0.05)	(0.05)
Hispanic	-0.27**	-0.22*	0.16+
	(0.10)	(0.09)	(0.09)
Asian Pacific	0.35*	0.57*	-0.04
	(0.16)	(0.22)	(0.23)
American Indian	-0.78***	-0.96***	0.20***
	(0.06)	(0.07)	(0.05)
Other	-0.13	-0.17	-0.14
	(0.14)	(0.13)	(0.13)
Female	0.12**	-0.05	0.02
	(0.04)	(0.04)	(0.04)
PCG working status - looking for a job	0.03	-0.07	-0.05

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Table 9 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.09)	(0.09)	(0.12)
PCG working status - housewife	0.02	0.03	0.12
	(0.08)	(0.09)	(0.09)
PCG working status - student	-0.20	0.10	0.59+
	(0.22)	(0.24)	(0.34)
PCG working status - other	-0.08	-0.23	0.15
	(0.13)	(0.29)	(0.31)
Number of siblings	-0.00	0.03*	0.02
	(0.01)	(0.01)	(0.01)
Earnings	-0.00	0.01	0.04+
	(0.02)	(0.02)	(0.02)
Reading Score (t-1)	0.46***		
	(0.06)		
Math Score (t-1)		0.42***	
		(0.03)	
Non Cognitive Skills (t-1)			0.45***
			(0.02)
Constant	-0.91***	-0.55**	-0.90***
	(0.26)	(0.21)	(0.25)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test	0.02	0.01	0.01

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time with other adults are included. A Wald Test is performed for the four time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

6.1.2 Does the involvement or presence of at least one parent matter?

Table 10 shows the estimated coefficients for the time input productions considering total time (whoever was present) and time spent with parents. Estimated coefficients on the presence of parents capture the effect of an increase of one standard-deviation in time spent while the parent was present during the activity. In Table 10, we can see that passive leisure is better for child non-cognitive skills if a parent is present. This is likely to reflect the type of passive leisure the child is engaged in. The presence of a parent does not affect the productivity of education activities.¹³ The effect of the presence of at least one parent while the child's is doing passive leisure leads to an increase in 7% in non-cognitive skills, this is twice the effect of an increase in 1% of the Primary Care Giver's annual earnings.

On a Wald test, the effect of the presence of parents is significant for the child's non-cognitive skills (at a 9% level). Results for the effect of the involvement of parents are similar (See Table A3.2 in Appendix).

The small effects of the involvement and presence of parents may be surprising, but since we use a value-added model, the models are estimated only for the second and third waves; the average age of this sample is about 14 years¹⁴. Parental investments matter but especially in early childhood, so these results are not so surprising. Nevertheless, since the breakdown of parental time is highly affected by family structure, we investigate the heterogeneity of parental time. Does one hour with the mother have the same impact as one hour with the father? And is time with both parents more productive for child development?

Table 10 – Time Input Production Functions : Effect of the presence of at least one parent

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.07+ (0.04)	0.05 (0.03)	0.06+ (0.03)
Education	0.13+ (0.07)	0.08** (0.03)	0.06* (0.03)
Active Leisure	0.11* (0.05)	0.09** (0.03)	0.09** (0.03)
Passive Leisure	0.05	0.06+	-0.03

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¹³Although, these estimations do not take into account that the presence of parents could affect time allocation itself. Children could be more likely to do their housework rather than watching TV if their parents are at home.

¹⁴Children must have performed a test in the first wave, they were at least 3 years old for math and non-cognitive skills and 6 years old for reading, thus they are at least 8 and 11 years old in the second wave respectively.

Table 10 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.06)	(0.03)	(0.03)
(House)Work (with at least one parent)	0.03	-0.00	-0.01
	(0.02)	(0.03)	(0.03)
Education (with at least one parent)	0.03	0.03	-0.02
	(0.03)	(0.03)	(0.02)
Active Leisure (with at least one parent)	0.02	-0.01	-0.01
	(0.03)	(0.02)	(0.03)
Passive Leisure (with at least one parent)	-0.02	-0.02	0.07**
	(0.03)	(0.03)	(0.03)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
wald_test_one_parent	0.37	0.69	0.09

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. A Wald Test is performed for the four parental time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

6.1.3 Does who is involved or present matter?

Table 11 shows the estimated coefficients for the time input production functions considering total time (whoever was present), time spent with at least one parent, time with father only and time with both parents. Time with at least one parent is the sum of time spent with the mother only, the father only and both parents together. Here, time with mother only is omitted and taken as the reference category. Thus, the estimated coefficients for time with father only and with both parents capture the difference in the impact of time spent with the father or both parents during the activity, and the impact

of time spent with the mother only. Results for engaged time are reported in Appendix (Table A3.3).

No strong heterogeneity in parental time emerges. On a Wald test, the presence of both parents has a significantly different impact than only mother's for reading skills (at a 6% level); and the presence of father has a significantly different impact than only mother's for math and non-cognitive skills (at a 11% level and a 9% level, respectively).¹⁵

Looking more precisely at time with parents together, results suggest that it is better to be with the mother when the child is doing work or housework rather than with both parents, but better to be with both parents when the child is doing active leisure for reading skills.¹⁶

Results also suggest that it is better to be with the mother when the child is doing (house)work and (slightly better) to do (house)work with her rather than with the father for non-cognitive skills and math skills.

Table 11 – Time Input Production Functions : Does who is present matter? (Accessible Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.08+ (0.04)	0.05+ (0.03)	0.06+ (0.03)
Education	0.13+ (0.07)	0.08** (0.03)	0.06* (0.03)
Active Leisure	0.11* (0.06)	0.09*** (0.03)	0.09** (0.03)
Passive Leisure	0.06 (0.06)	0.06+ (0.03)	-0.03 (0.03)
(House)Work (with at least one parent)	0.05+ (0.03)	0.02 (0.03)	0.00 (0.03)
Education (with at least one parent)	-0.00 (0.05)	0.04 (0.04)	-0.02 (0.03)
Active Leisure (with at least one parent)	-0.02 (0.03)	-0.03 (0.03)	0.01 (0.03)
Passive Leisure (with at least one parent)	0.01 (0.04)	-0.02 (0.03)	0.08* (0.03)

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¹⁵I recover similar results for engaged time. On a Wald test, the involvement of both parents has a significantly different impact than only mother's for reading skills (at a 3% level); and the involvement of father has a significantly different impact than only mother's for math and non-cognitive skills (at a 6% level and a 13% level, respectively).

¹⁶This is also true for engaged time. See Table A3.3

Table 11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
(House)Work (with parents together)	-0.04+ (0.02)	-0.01 (0.02)	-0.01 (0.02)
Education (with parents together)	0.04 (0.03)	-0.02 (0.03)	-0.02 (0.03)
Active Leisure (with parents together)	0.06* (0.03)	0.02 (0.03)	0.00 (0.03)
Passive Leisure (with parents together)	-0.04 (0.03)	-0.01 (0.03)	-0.00 (0.03)
(House)Work (with father only)	0.00 (0.03)	-0.05* (0.02)	-0.03 (0.02)
Education (with father only)	0.02 (0.02)	0.02 (0.02)	0.03 (0.02)
Active Leisure (with father only)	-0.01 (0.02)	0.03 (0.02)	-0.04 (0.02)
Passive Leisure (with father only)	-0.02 (0.02)	-0.00 (0.02)	-0.02 (0.02)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_father	0.86	0.11	0.09
Wald_Test_both_parents	0.06	0.92	0.94

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Wald_Test_father indicates the p-value for the Wald test on the father time inputs. Wald_Test_both_parents indicates the p-value for the Wald test on the both parents time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Results suggest that time spent with both parents, or father have slightly different impact than time spent with the mother. Nevertheless, since the estimated effect of at least one parent present or involved is small, it is unsurprising to find little evidence of heterogeneity. Again, this only applies to adolescents.

Until now, we have considered a common time input production function for all children. In the next section, we allow differences in the time input production function across gender, PCG's education and age, and we also consider the presence of feedback effects.

6.2. Further Evidence

In Tables 12 and 13, I allow time input production functions to differ across genders and family background, respectively. Using a CVA (Cumulative Value Added) model in Section 6.2.2, I consider age-varying time input production functions (Table 14). I account for the presence of feedback effects using an approach based on the GMM framework in Section 6.2.3.

6.2.1 Heterogeneity of Time Input Production Functions

In Tables 12 and 13, I allow the effect of time input investments to vary across gender and PCG's education, respectively¹⁷. As in the previous section, time input production functions include total time (whoever was involved), time spent with at least one parent, time with father only and time with both parents. In the following tables, the focus is on time when the parents are involved in the activity. The estimated coefficients for interaction terms are reported; they capture the possible differences in the effect of time input for girls, and more highly educated parents. As mentioned before, the estimated coefficients for time with father only and with both parents capture the effect of time spent with the father or both parents during the activity, rather than with the mother only.

Child's gender

Estimation results in Table 12 suggest that engaging in active leisure rather than personal needs and care affects girls' non-cognitive skills less than boys', but affects more their reading skills. This could reflect differences in the type of active leisure across genders, or differences in the peer effects in this activity. For example, collective sports might have a different effect than individuals sports, and boys might do more collective sports than girls. The effect of the involvement of both parents rather than mother only

¹⁷In this section, results on Engaged Time are more relevant, therefore I only report those. Results for Accessible Time are in Tables A3.4 and A3.5 in the Appendix

seem to benefit boys' reading skills more than girls' when they are doing educational activities, and their math skills when they are engaging in passive leisure, and girls' when they are doing (house)work. The effect of the involvement of father rather than mother seems to benefit girls' reading skills more when they are doing (house)work and educational activities.

There is no evidence of differences in the effect of time with at least one parent present, and not much evidence of differences in the effect of presence of fathers or both parents. (Table A3.4)

I perform a Wald Test to test the hypothesis that the vector of estimated effects of time input production functions of girls is the same as boys' (testing that the vector of interaction terms is jointly equal to 0). We reject the null hypothesis for non-cognitive skills for the total allocation of time (whoever is present). This suggests that girls' non-cognitive skills may respond differently than boys to the total amount of time spent on each activity. The results suggest also differences across genders in the effect of the involvement of both parents for math skills (at a 8% level) and of paternal time investments for reading skills (at a 9% level).

Table 12 – Time Input Production Functions : Does gender matter? (Engaged Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.02 (0.05)	0.02 (0.04)	-0.00 (0.05)
Female=1 × (House)Work	0.09 (0.08)	0.04 (0.06)	0.06 (0.06)
Education	0.11** (0.04)	0.11** (0.04)	0.09* (0.04)
Female=1 × Education	0.05 (0.12)	-0.05 (0.06)	-0.07 (0.05)
Active Leisure	0.05 (0.03)	0.08* (0.03)	0.16*** (0.04)
Female=1 × Active Leisure	0.15+ (0.09)	0.02 (0.05)	-0.14** (0.05)
Passive Leisure	0.02 (0.05)	0.02 (0.04)	0.03 (0.04)
Female=1 × Passive Leisure	0.06 (0.09)	0.04 (0.05)	-0.07 (0.06)
(House)Work (with at least one parent)	0.11* (0.04)	0.03 (0.04)	0.03 (0.06)
Female=1 × (House)Work (with at least one parent)	-0.08 (0.05)	-0.05 (0.05)	-0.00 (0.06)
Education (with at least one parent)	-0.04 (0.04)	-0.01 (0.04)	-0.03 (0.04)

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Table 12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Female=1 $\times$ Education (with at least one parent)	0.04 (0.05)	-0.07 (0.05)	0.02 (0.05)
Active Leisure (with at least one parent)	0.01 (0.04)	-0.05 (0.05)	-0.08+ (0.04)
Female=1 $\times$ Active Leisure (with at least one parent)	-0.03 (0.05)	0.03 (0.06)	0.07 (0.06)
Passive Leisure (with at least one parent)	-0.04 (0.04)	-0.02 (0.03)	0.05 (0.04)
Female=1 $\times$ Passive Leisure (with at least one parent)	0.02 (0.06)	0.04 (0.05)	0.04 (0.06)
(House)Work (with parents together)	-0.06* (0.02)	-0.03 (0.02)	-0.00 (0.04)
Female=1 $\times$ (House)Work (with parents together)	-0.00 (0.04)	0.07+ (0.04)	0.00 (0.05)
Education (with parents together)	0.09+ (0.05)	0.08 (0.05)	-0.02 (0.03)
Female=1 $\times$ Education (with parents together)	-0.12* (0.05)	-0.05 (0.06)	0.03 (0.04)
Active Leisure (with parents together)	0.02 (0.03)	0.02 (0.04)	0.05 (0.04)
Female=1 $\times$ Active Leisure (with parents together)	0.03 (0.05)	-0.02 (0.05)	-0.05 (0.06)
Passive Leisure (with parents together)	-0.03 (0.07)	0.03 (0.03)	-0.03 (0.03)
Female=1 $\times$ Passive Leisure (with parents together)	0.00 (0.08)	-0.08+ (0.04)	0.01 (0.05)
(House)Work (with father only)	-0.05* (0.02)	-0.05* (0.02)	-0.02 (0.03)
Female=1 $\times$ (House)Work (with father only)	0.15+ (0.08)	0.01 (0.05)	-0.01 (0.04)
Education (with father only)	-0.01 (0.03)	0.02 (0.02)	0.06* (0.03)
Female=1 $\times$ Education (with father only)	0.06+ (0.03)	0.01 (0.04)	-0.06 (0.04)
Active Leisure (with father only)	-0.06 (0.04)	0.02 (0.03)	0.00 (0.03)
Female=1 $\times$ Active Leisure (with father only)	0.06 (0.06)	0.04 (0.05)	0.00 (0.05)
Passive Leisure (with father only)	0.02 (0.02)	0.03 (0.02)	-0.02 (0.03)
Female=1 $\times$ Passive Leisure (with father only)	-0.01 (0.05)	-0.06 (0.04)	-0.05 (0.06)

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Table 12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_whoever	0.25	0.50	0.01
Wald_Test_one_parent	0.55	0.44	0.67
Wald_Test_both_father	0.07	0.26	0.63
Wald_Test_both	0.23	0.08	0.86
Wald_Test_father	0.09	0.71	0.46

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Wald_Test_whoever indicates the p-value for the Wald test on the four time inputs, whoever is present. Wald_Test_one_parent indicates the p-value for the Wald test on the four coefficients of "at least one parent is present". Wald_Test_father indicates the p-value for the Wald test on the father time inputs. Wald_Test_both_parents indicates the p-value for the Wald test on the both parents time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Child's Family Background

In this section we examine whether time input production functions are different across family backgrounds. I considered PCG's education to capture family background. Average PCG's education is around 13 years, the median is also 13, from 0 to 17 (Top 10%). Parents are considered as more highly educated when their education level is greater than 13 years; 45% of children in the sample have a more highly educated PCG. Again, I only report the results for parents' involvement.¹⁸

Results suggest that the non-cognitive skills of children whose PCG is more highly educated respond more to active leisure and education; their reading skills respond more to (house)work. This may reflect different kinds of active leisure or educational activities; or peer effects. More highly educated parents may increase their children's investments in active leisure that plays a greater role in a child's non-cognitive development; also, their children may not read the same books as children whose PCG is less highly educated. Their reading skills respond less positively to (house)work and education activities when

¹⁸See Table A3.5 in Appendix for results on the presence of parents

at least one parent is involved.

Math skills respond more to the involvement of fathers in education activities rather than mothers when the PCG is more highly educated. This may reflect differences in parent's skills. The main finding is that children's cognitive skills respond more positively to the involvement of both parents in education rather than mother only; results suggest the opposite effect on non-cognitive skills. This last finding suggests a trade-off between cognitive and non-cognitive skills when both parents are involved in educational activities. Performing a Wald Test to test if children with a more highly educated PCG respond differently to parental time inputs, in particular time with both parents. Indeed, the involvement of both parents has a significant different effect if parents are more highly educated for the three outcomes (below the 5% level for reading and non-cognitive skills, and at a 10% level for math skills). The presence of parents does not have a different effect if the parents are more highly educated (See Table [A3.5](#) in Appendix).

These results suggest that even adolescents benefit more from time spent with parents who are more highly educated. This may reflect differences in the type of activities. For example, listening to music or going to the theatre may not have the same effect as other type of active leisure. Parenting style and parents' skills are also very likely to explain these differences.

Table 13 – Time Input Production Functions : Does Primary Care Giver's Education matter? (Engaged Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.01 (0.03)	0.05 (0.04)	0.02 (0.04)
More Highly Educated $\times$ (House)Work	0.17* (0.08)	-0.00 (0.06)	0.07 (0.06)
Education	0.07* (0.03)	0.08* (0.04)	-0.01 (0.04)
More Highly Educated $\times$ Education	0.16 (0.12)	0.01 (0.06)	0.14* (0.06)
Active Leisure	0.06+ (0.03)	0.08* (0.03)	0.03 (0.04)
More Highly Educated $\times$ Active Leisure	0.13 (0.10)	0.01 (0.05)	0.13* (0.06)
Passive Leisure	0.01 (0.04)	0.05 (0.04)	-0.03 (0.04)
More Highly Educated $\times$ Passive Leisure	0.09 (0.10)	-0.01 (0.06)	0.07 (0.06)
(House)Work (with at least one parent)	0.08* (0.04)	0.01 (0.03)	0.02 (0.03)
More Highly Educated $\times$ (House)Work (with at least one parent)	-0.10+ (0.05)	-0.02 (0.05)	0.02 (0.06)
Education (with at least one parent)	0.01 (0.03)	-0.01 (0.03)	-0.02 (0.04)
More Highly Educated $\times$ Education (with at least one parent)	-0.09+ (0.05)	-0.06 (0.05)	-0.00 (0.05)
Active Leisure (with at least one parent)	-0.01 (0.04)	-0.05 (0.05)	-0.01 (0.04)
More Highly Educated $\times$ Active Leisure (with at least one parent)	0.01 (0.05)	0.02 (0.06)	-0.08 (0.06)
Passive Leisure (with at least one parent)	0.01 (0.03)	-0.00 (0.03)	0.04 (0.04)
More Highly Educated $\times$ Passive Leisure (with at least one parent)	-0.07 (0.07)	-0.01 (0.06)	0.09 (0.06)
(House)Work (with parents together)	-0.05+ (0.02)	-0.01 (0.02)	0.02 (0.03)
More Highly Educated $\times$ (House)Work (with parents together)	-0.01 (0.04)	0.03 (0.04)	-0.07+ (0.04)
Education (with parents together)	-0.05*** (0.01)	-0.02 (0.02)	0.06** (0.02)
More Highly Educated $\times$ Education (with parents together)	0.08** (0.03)	0.11* (0.05)	-0.08* (0.03)
Active Leisure (with parents together)	0.06+ (0.03)	0.02 (0.04)	-0.01 (0.04)
More Highly Educated $\times$ Active Leisure (with parents together)	-0.02 (0.05)	-0.01 (0.05)	0.08 (0.06)
Passive Leisure (with parents together)	-0.09+ (0.05)	-0.02 (0.03)	-0.02 (0.03)
More Highly Educated $\times$ Passive Leisure (with parents together)	0.15* (0.06)	0.03 (0.05)	-0.01 (0.05)
(House)Work (with father only)	-0.05+ (0.03)	-0.05* (0.02)	-0.01 (0.02)
More Highly Educated $\times$ (House)Work (with father only)	0.11+ (0.06)	0.02 (0.04)	-0.02 (0.04)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL SEPARATION ON CHILD DEVELOPMENT

Table 13 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Education (with father only)	0.02 (0.03)	-0.03 (0.03)	-0.02 (0.04)
More Highly Educated $\times$ Education (with father only)	0.02 (0.04)	0.08* (0.04)	0.07 (0.05)
Active Leisure (with father only)	-0.05 (0.05)	0.05 (0.03)	-0.01 (0.03)
More Highly Educated $\times$ Active Leisure (with father only)	-0.00 (0.06)	-0.04 (0.05)	0.03 (0.05)
Passive Leisure (with father only)	0.02 (0.04)	0.01 (0.03)	-0.01 (0.04)
More Highly Educated $\times$ Passive Leisure (with father only)	-0.01 (0.05)	-0.00 (0.04)	-0.07 (0.05)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_whoever	0.22	0.99	0.08
Wald_Test_one_parent	0.04	0.77	0.45
Wald_Test_both_father	0.02	0.22	0.03
Wald_Test_both	0.00	0.10	0.03
Wald_Test_father	0.50	0.33	0.39

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Wald_Test_whoever indicates the p-value for the Wald test on the four time inputs, whoever is present. Wald_Test_one_parent indicates the p-value for the Wald test on the four coefficients of "at least one parent is present". Wald_Test_father indicates the p-value for the Wald test on the father time inputs. Wald_Test_both_parents indicates the p-value for the Wald test on the both parents time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Time input production functions vary across gender and family background. Results suggest that girls' non-cognitive skills seem to be more sensitive to time allocation in total. Girls' reading skills respond more to time with fathers. There is no evidence of an own-gender effect where time with fathers benefits boys more and time with mothers benefits girls more. Time input production functions vary also according to PCG's education. Active leisure and education activities are more productive if the PCG is more highly educated. Involvement of both parents benefits children more when the PCG is more highly educated for cognitive skills, but less for non-cognitive skills. The first effect may reflect differences in parents' verbal skills. The second may simply reflect the negative effect of intensive parenting or overparenting (see Garst and Gagnon (2015) [69]). Results suggest that girls and children with more highly educated parents are more likely to be affected by a separation, since they benefit more from paternal time and time with both parents. We also address the differences of time input production functions across age. According to Del Boca et al. (2017) [54], parental time investments matter in

childhood but own investments matter in adolescence. We use a CVA model to address this question.

6.2.2 Cumulative Value Added Model Time Input Production Functions

As mentioned in Section 4., the CVA model relies on the following assumptions: **i)** the measurement errors in child's skills are uncorrelated with inputs and unobserved ability; **ii)** any omitted input is uncorrelated with included input; **v)** the effect of unobserved ability declines with age at a constant rate λ . As mentioned earlier, it relaxes assumptions **iii)** and **iv)** in the Value Added Model. It allows for age-varying time input production functions; the effect of time with parents or own time investments are allowed to vary by age and the effect may decline at a non-constant rate.¹⁹

For the sake of brevity, time input production functions include total time (whoever was present) and time spent with at least one parent at time t and $t-1$. Estimated coefficients on the contemporaneous presence or involvement of parents capture the same effect as explained before. Estimated coefficients on the lagged inputs measure the effect of an increase of about 1 standard deviation in the activity five years ago on the current input. In this sample, the child was on average 9 years old five years ago.

Table 14 shows the results for accessible time. Coefficients for current time inputs are not much affected. Results suggest that passive leisure in a previous period is slightly worse for child development if a parent is present. Active leisure with one parent present benefits the child's non-cognitive skills, even 5 years later.

Table 14 – Cumulative Value Added Time Input Production Functions (Accessible Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.07+	0.05+	0.05
	(0.04)	(0.03)	(0.03)
Education	0.12+	0.09***	0.06*
	(0.06)	(0.03)	(0.03)
Active Leisure	0.11*	0.10***	0.09**
	(0.06)	(0.03)	(0.03)
Passive Leisure	0.06	0.08*	-0.03
	(0.06)	(0.03)	(0.03)
L.(House)Work	0.01	0.04	-0.04
	(0.04)	(0.04)	(0.05)
L.Education	-0.04	0.01	-0.01
	(0.05)	(0.03)	(0.03)

Continued on next page

¹⁹See Table A2.3 for a summary of the assumptions of all the models.

TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table 14 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
L.Active Leisure	-0.07 (0.04)	0.01 (0.03)	-0.03 (0.03)
L.Passive Leisure	-0.02 (0.04)	0.01 (0.03)	0.04 (0.03)
(House)Work (with at least one parent)	0.03 (0.02)	-0.01 (0.03)	-0.01 (0.03)
Education (with at least one parent)	0.03 (0.03)	0.03 (0.03)	-0.03 (0.02)
Active Leisure (with at least one parent)	0.01 (0.03)	-0.01 (0.02)	-0.01 (0.03)
Passive Leisure (with at least one parent)	-0.03 (0.03)	-0.03 (0.03)	0.07* (0.03)
L.(House)Work (with at least one parent)	-0.02 (0.04)	-0.05 (0.04)	0.02 (0.05)
L.Education (with at least one parent)	0.00 (0.02)	0.02 (0.02)	0.03 (0.02)
L.Active Leisure (with at least one parent)	0.06 (0.04)	0.03 (0.03)	0.05+ (0.03)
L.Passive Leisure (with at least one parent)	-0.01 (0.03)	-0.04 (0.03)	-0.06* (0.03)
Observations	1326	1604	1682
Nb of Clusters	1213.00	1287.00	1347.00
Wald_Test_all	0.03	0.01	0.05
Wald_Test_whoever	0.22	0.01	0.01
Wald_Test_one_parent	0.46	0.50	0.06
Wald_Test_one_parent_past	0.64	0.23	0.08

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Table 14 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
<i>Notes:</i> Cumulative Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time with other adults are included. "L." denotes the one-period lag of the variable. Wald_Test_all indicates the p-value for the Wald Test for the 16 time input coefficients. Wald_Test_whoever indicates the p-value for the Wald test on the four time inputs, whoever is present. Wald_Test_one_parent indicates the p-value for the Wald test on the four coefficients of "at least one parent is present". Wald_Test_one_parent_past indicates the p-value for the Wald test on the four coefficients of the lagged time inputs "at least one parent is present". Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. <i>Source : PSID - CDS, waves 1997, 2002 and 2007</i>			

Table A3.6 shows the results for engaged time. Coefficients on contemporaneous time inputs are not affected by the introduction of lagged time inputs. Previous own child time inputs do not seem to affect a child's current test score. However, results suggest that past educational activities with one parent involved benefit the child's non-cognitive skills.

Estimation results suggest that early parental time inputs are more productive ($\gamma_3 > \gamma_2$) for children's behaviour. On a Wald Test to test the null hypothesis that coefficients of allocation of time are jointly equal to zero, results suggest that a child's time allocation matters for all outcomes. Child's own time investments matter for math and non cognitive skills. The presence and the involvement of parents matter for non-cognitive skills (at a 6% level). The presence and the involvement of parents in the past matter for non-cognitive skills (at a 8% level).

Del Boca et al. (2017) [54] test this model's assumptions. To test assumption i), they use an analytic correction formula and do not find evidence of any bias caused by measurement errors. To test assumption ii), they add school inputs, early childhood inputs and children's health shocks, but results are not affected.

6.2.3 Feedback Effects

In the previous section, we documented the effect of current and past parental time investments on the child's development. The Value-Added Model and the Cumulative Valued-Added Model differences out the child's unobserved ability that might be correlated with the time input

(the more I am good at reading, the more I spend time on reading), but it does not difference out the heterogeneity in the learning speed. Parents and children may adapt their time investments to the child's learning speed. This is what Del Bono et al. (2016) [55] refer to as feedback effects. Besides, the measurement error in the child's outcome may bias the results.²⁰

To account for the existence of feedback effects, we follow the method used by Del Bono et al. (2016) [55] based on 'levels and differences' generalised method of moments (GMM) framework. This method has been introduced by Arellano and Bover (1995) [8], and extended by Blundell and Bond (1998) [31]. Andrabi et al. (2011) [5] applied it to study the effect on child's achievement of being in a private school. Del Bono et al. (2016) [55] use it in the estimation of the impact of maternal time on child development. This GMM framework estimates a system of two simultaneous equations:

$$Y_{it} = \beta_0 + \sum_1^K \gamma_1^K T I_{it}^k + \sum_1^K \gamma_2^{k,OP} P T I_{it}^{k,OP} + \sum_1^K \gamma_2^{k,F} P T I_{it}^{k,F} + \sum_1^K \gamma_2^{k,BP} P T I_{it}^{k,BP} + \lambda Y_{it-1} + \epsilon_{it} \quad (1)$$

$$\Delta Y_{it} = \sum_1^K \gamma_1^K \Delta T I_{it}^k + \sum_1^K \gamma_2^{k,OP} \Delta P T I_{it}^{k,OP} + \sum_1^K \gamma_2^{k,F} \Delta P T I_{it}^{k,F} + \sum_1^K \gamma_2^{k,BP} \Delta P T I_{it}^{k,BP} + \lambda \Delta Y_{it-1} + \Delta v_{it} \quad (2)$$

where $\epsilon_{it} = \alpha_i + v_{it}$, ΔX_{it} denotes the first difference in X_{it} . γ_j measures the input effect constant over time. Following Del Bono et al. (2016) [55], my instruments are past inputs for (1) and Y_{t-2} along with past inputs for (2).

Table 15 shows the results on the balanced panel for each of the three outcomes. Columns 1, 3 and 5 report the Value-Added Model estimates presented earlier. Columns 2, 4 and 6 report the results with the GMM model. Consider the differences between the Value Added Model and the GMM, results suggest the presence of strong feedback effects. The persistence coefficient (λ) goes down from 0.45 to 0.25 for reading skills. Time investments coefficients are larger in absolute values. Math skills do not seem very affected by child's allocation of time; but reading skills and non-cognitive skills are affected by the child's own time investments and by parental investments.

The effect of time spent in educational activities or active leisure on reading skills (21% and 32% of one SD, respectively) is three times larger than the effect of one year of PCG education (7% of one SD). Looking at NCS, the effect is equivalent to an increase in 1% of earnings.

The presence of at least one parent when they are doing housework, educational activities or active leisure, is fruitful for child's reading skills; the effect in active leisure is equivalent to the effect of one year more in PCG's education. Results suggest that it is better to do educational activities alone than with at least one parent for the child's non-cognitive skills, this could reflect the negative effect of intensive parenting or overparenting (see Garst and Gagnon (2015) [69]). It must be stressed that the sample is more a sample of adolescents, therefore we could expect much larger effect on young children.

²⁰See Andrabi et al. (2011) [5] for more details.

Table 15 – Time Input Production Functions and Feedback Effects: Does the presence of at least one parent matter? (Accessible Time)

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
(House)Work	0.07+	0.08	0.05	0.00	0.06+	-0.04
	(0.04)	(0.12)	(0.03)	(0.10)	(0.03)	(0.13)
Education	0.13+	0.21	0.08**	-0.06	0.06*	0.05
	(0.07)	(0.20)	(0.03)	(0.07)	(0.03)	(0.06)
Active Leisure	0.11*	0.32	0.09**	0.02	0.09**	0.08
	(0.05)	(0.21)	(0.03)	(0.07)	(0.03)	(0.06)
Passive Leisure	0.05	0.14	0.06+	-0.05	-0.03	-0.10
	(0.06)	(0.19)	(0.03)	(0.10)	(0.03)	(0.08)
(House)Work (with at least one parent)	0.03	0.13	-0.00	0.03	-0.01	0.05
	(0.02)	(0.10)	(0.03)	(0.10)	(0.03)	(0.11)
Education (with at least one parent)	0.03	0.03	0.03	-0.02	-0.02	-0.12+
	(0.03)	(0.07)	(0.03)	(0.06)	(0.02)	(0.06)
Active Leisure (with at least one parent)	0.02	0.09	-0.01	-0.01	-0.01	-0.00
	(0.03)	(0.09)	(0.02)	(0.06)	(0.03)	(0.06)
Passive Leisure (with at least one parent)	-0.02	-0.18	-0.02	-0.06	0.07**	0.06
	(0.03)	(0.14)	(0.03)	(0.08)	(0.03)	(0.07)
Other parental time	0.01	0.05	0.00	-0.12+	-0.00	0.04
	(0.02)	(0.09)	(0.02)	(0.07)	(0.02)	(0.07)
Time spent with a grand parent (alone)	0.03	0.03	-0.01	0.05	0.02	-0.09
	(0.02)	(0.07)	(0.02)	(0.06)	(0.03)	(0.06)
Time spent with a step-mother (alone)	-0.01+	0.11	-0.00	-0.03	-0.02	-0.04
	(0.01)	(0.12)	(0.01)	(0.05)	(0.01)	(0.06)
Time spent with a step father (alone)	0.02	0.03	0.02*	0.00	0.01	0.00
	(0.03)	(0.05)	(0.01)	(0.03)	(0.01)	(0.02)
Other Adult Time	-0.01	0.04	-0.01	0.02	-0.00	-0.04
	(0.01)	(0.10)	(0.01)	(0.04)	(0.02)	(0.05)
Single Mother	-0.07	-0.14+	-0.01	-0.02	-0.12*	-0.14*
	(0.06)	(0.08)	(0.05)	(0.06)	(0.06)	(0.06)
Single Mother (step-parent)	-0.12+	-0.24*	-0.01	-0.02	-0.19*	-0.23*
	(0.07)	(0.12)	(0.07)	(0.09)	(0.09)	(0.11)
Single Father	-0.28***	-0.43**	-0.13	-0.15	-0.23	-0.42*
	(0.07)	(0.15)	(0.09)	(0.10)	(0.15)	(0.17)
Other	-0.26**	-0.46*	-0.06	-0.21	-0.01	-0.08
	(0.10)	(0.23)	(0.12)	(0.15)	(0.13)	(0.16)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table 15 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Deceased Father	-0.00 (0.13)	0.03 (0.18)	0.22 (0.16)	0.18 (0.15)	-0.02 (0.13)	-0.06 (0.14)
Deceased Mother	0.29 (0.22)	0.38 (0.25)	0.05 (0.14)	0.01 (0.29)	-0.18 (0.31)	0.16 (0.33)
Age	0.02 (0.01)	0.03* (0.01)	-0.00 (0.01)	-0.00 (0.01)	0.03*** (0.01)	0.02* (0.01)
Number of siblings	-0.00 (0.01)	-0.02 (0.02)	0.03* (0.01)	0.02+ (0.01)	0.02 (0.01)	0.01 (0.01)
PCG working status - looking for a job	0.03 (0.09)	0.03 (0.12)	-0.06 (0.09)	-0.15 (0.10)	-0.05 (0.12)	-0.08 (0.13)
PCG working status - housewife	0.01 (0.08)	-0.09 (0.11)	0.02 (0.09)	-0.01 (0.10)	0.12 (0.09)	0.16 (0.10)
PCG working status - student	-0.20 (0.23)	-0.24 (0.39)	0.08 (0.24)	-0.00 (0.26)	0.59+ (0.33)	0.50* (0.23)
PCG working status - other	-0.08 (0.13)	-0.09 (0.16)	-0.22 (0.28)	-0.03 (0.19)	0.13 (0.30)	0.15 (0.27)
Earnings	0.00 (0.02)	-0.01 (0.02)	0.00 (0.02)	-0.01 (0.02)	0.04* (0.02)	0.07** (0.02)
African American	-0.31*** (0.06)	-0.29*** (0.08)	-0.47*** (0.05)	-0.51*** (0.07)	0.13* (0.05)	0.17** (0.06)
Hispanic	-0.27** (0.10)	-0.18 (0.12)	-0.22* (0.09)	-0.22* (0.10)	0.16+ (0.09)	0.17+ (0.10)
Asian, Pacific	0.29+ (0.17)	0.33 (0.22)	0.54* (0.23)	0.66** (0.24)	-0.02 (0.23)	0.01 (0.24)
American Indian	-0.78*** (0.07)	-0.97*** (0.17)	-0.96*** (0.08)	-0.96*** (0.21)	0.24*** (0.07)	0.14 (0.15)
Other	-0.13 (0.14)	-0.18 (0.22)	-0.18 (0.13)	-0.19 (0.17)	-0.15 (0.13)	-0.11 (0.13)
Female	0.11* (0.04)	0.23** (0.08)	-0.05 (0.04)	-0.07 (0.05)	0.02 (0.04)	0.09 (0.06)
PCG Education	0.06*** (0.01)	0.07*** (0.01)	0.05*** (0.01)	0.07*** (0.01)	0.01 (0.01)	0.01 (0.01)
No father	0.00 (0.14)	-0.11 (0.20)	-0.28 (0.21)	-0.32 (0.21)	0.02 (0.18)	-0.04 (0.20)
Reading Score (t-1)	0.46*** (0.06)	0.24+ (0.13)				

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Table 15 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Math Score (t-1)			0.42***	0.38***		
			(0.03)	(0.09)		
Non Cognitive Skills (t-1)					0.45***	0.32***
					(0.02)	(0.08)
Constant	-0.94***	-1.09***	-0.54*	-0.50*	-0.93***	-1.09***
	(0.26)	(0.32)	(0.21)	(0.24)	(0.25)	(0.29)
Observations	1352	1352	1673	1673	1765	1765
Wald_Test_all	0.04	0.17	0.04	0.76	0.01	0.45
Wald_Test_one_parent	0.37	0.51	0.69	0.91	0.09	0.39

Notes: See previous Tables for the description of the variables and the controls. For each outcome, the first column shows the results of the Value-Added Model previously estimated, the second column shows GMM estimates. " $(t - 1)$ " denotes the one-period lag of the variable.

Wald_Test_all indicates the p-value for the Wald Test for the 8 time input coefficients.

Wald_Test_one_parent indicates the p-value for the Wald test on the four coefficients of "at least one parent is present".

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007.

Table 16 shows the results considering the heterogeneity of parental time inputs. Columns 1, 3 and 5 report the Value-Added Model estimates presented earlier. Columns 2, 4 and 6 report the results with the GMM model.

Presence of both parents seem to benefit more than only mother's when the child is doing education activities (20% of a SD for reading skills) or active leisure (around 20% for reading skills and non-cognitive skills).²¹ No strong evidence of feedback effects appears for math skills. On a Wald test, considering all time inputs, they are statistically different from 0 for the three outcomes (at a 11% level for math skills). Considering the heterogeneity in the parental time, the presence of both parents or father has a significantly different impact than only mother's for the three outcomes. In particular, the presence of both parents has a significantly different impact than only mother's for reading skills (at a 1% level), math skills (at a 13% level) and non-cognitive skills (at a 2% level). The presence of father has a significantly different impact than only mother's for reading skills (at a 6% level), for math skills (at a 5% level) and for non cognitive skills (at a 10% level).

²¹A natural question is whether children's trajectories will become parallel. If γ is the input effect, and λ the persistence effect, children's trajectories will become parallel when the achievement gap reaches $\frac{\gamma}{1-\lambda}$. Table A3.19 reports these coefficients for each input.

Table 16 – Time Input Production Functions and Feedback Effects: Does who is present matter? (Accessible Time)

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
(House)Work	0.08+	0.18	0.05+	0.09	0.06+	-0.01
	(0.04)	(0.12)	(0.03)	(0.09)	(0.03)	(0.12)
Education	0.13+	0.21	0.08**	-0.04	0.06*	0.08
	(0.07)	(0.15)	(0.03)	(0.07)	(0.03)	(0.06)
Active Leisure	0.11*	0.28+	0.09***	0.02	0.09**	0.09
	(0.06)	(0.17)	(0.03)	(0.07)	(0.03)	(0.06)
Passive Leisure	0.06	0.14	0.06+	-0.03	-0.03	-0.08
	(0.06)	(0.17)	(0.03)	(0.10)	(0.03)	(0.08)
(House)Work (with at least one parent)	0.05+	0.17	0.02	0.08	0.00	0.14
	(0.03)	(0.11)	(0.03)	(0.09)	(0.03)	(0.12)
Education (with at least one parent)	-0.00	-0.17	0.04	-0.08	-0.02	-0.15+
	(0.05)	(0.11)	(0.04)	(0.07)	(0.03)	(0.08)
Active Leisure (with at least one parent)	-0.02	0.01	-0.03	-0.00	0.01	-0.06
	(0.03)	(0.11)	(0.03)	(0.08)	(0.03)	(0.09)
Passive Leisure (with at least one parent)	0.01	-0.03	-0.02	-0.00	0.08*	0.05
	(0.04)	(0.14)	(0.03)	(0.08)	(0.03)	(0.08)
(House)Work (with parents together)	-0.04+	-0.24**	-0.01	-0.12*	-0.01	-0.15*
	(0.02)	(0.08)	(0.02)	(0.06)	(0.02)	(0.06)
Education (with parents together)	0.04	0.20*	-0.02	0.07	-0.02	0.01
	(0.03)	(0.09)	(0.03)	(0.06)	(0.03)	(0.07)
Active Leisure (with parents together)	0.06*	0.18+	0.02	0.04	0.00	0.19*
	(0.03)	(0.10)	(0.03)	(0.08)	(0.03)	(0.08)
Passive Leisure (with parents together)	-0.04	-0.18+	-0.01	-0.10	-0.00	-0.02
	(0.03)	(0.10)	(0.03)	(0.07)	(0.03)	(0.08)
(House)Work (with father only)	0.00	-0.04	-0.05*	-0.13*	-0.03	-0.11+
	(0.03)	(0.09)	(0.02)	(0.06)	(0.02)	(0.06)
Education (with father only)	0.02	0.18*	0.02	0.14*	0.03	0.08
	(0.02)	(0.07)	(0.02)	(0.06)	(0.02)	(0.06)
Active Leisure (with father only)	-0.01	-0.03	0.03	-0.00	-0.04	-0.08
	(0.02)	(0.09)	(0.02)	(0.05)	(0.02)	(0.06)
Passive Leisure (with father only)	-0.02	-0.09	-0.00	-0.02	-0.02	-0.04
	(0.02)	(0.06)	(0.02)	(0.05)	(0.02)	(0.06)
Reading Score (t-1)	0.45***	0.21+				
	(0.06)	(0.12)				

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Table 16 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Math Score (t-1)			0.42***	0.34***		
			(0.03)	(0.08)		
Non Cognitive Skills (t-1)					0.45***	0.33***
					(0.02)	(0.08)
Constant	-0.95***	-1.06**	-0.57**	-0.46+	-0.93***	-1.06***
	(0.26)	(0.33)	(0.22)	(0.25)	(0.25)	(0.29)
Observations	1352	1352	1673	1673	1765	1765
Wald_Test_all	0.05	0.02	0.01	0.11	0.02	0.00
Wald_Test_one_parent	0.52	0.32	0.65	0.69	0.22	0.25
Wald_Test_both_father	0.18	0.01	0.35	0.06	0.22	0.00
Wald_Test_both_parents	0.06	0.01	0.92	0.13	0.94	0.02
Wald_Test_father	0.86	0.06	0.11	0.03	0.09	0.10

Notes: See previous Tables for the description of the variables and the controls. For each outcome, the first column shows the results of the Value-Added Model previously estimated, the second column shows GMM estimates. " $(t - 1)$ " denotes the one-period lag of the variable.

Wald_Test_all indicates the p-value for the Wald Test for the 16 time input coefficients. Wald_Test_one_parent indicates the p-value for the Wald test on the four coefficients of "at least one parent is present". Wald_Test_both_father indicates the p-value for the Wald test on the father and both parents time inputs. Wald_Test_father indicates the p-value for the Wald test on the father time inputs. Wald_Test_both_parents indicates the p-value for the Wald test on the both parents time inputs.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007.

Estimation results on engaged time are different. Looking at each coefficient, no strong effect of parental time appears, and no strong evidence of heterogeneity either (see Table A3.7). Performing a Wald Test, we recover that the effect of at least one parent involved in the activity matters for the child's non-cognitive skills; the involvement of both parents has a significantly different impact than only mother's for math skills.

These findings confirm the impact of the presence of at least one parent for non-cognitive skills, and the heterogeneity of parental time, especially for time with parents together rather than mother alone for math skills. Therefore, these results suggest that the change in the breakdown of parental time could be a driving channel for the effect of parental separation on child development (for all skills).

Next section discusses the robustness of the results.

7. Robustness checks

7.1. Omitted Variables

We test the model with more controls. Controlling for parenting style variables or neighbourhood safety, results remain similar. Results are reported in Appendix in Tables [A3.10](#) and [A3.11](#), and Tables [A3.12](#) and [A3.13](#), respectively.

7.2. Attrition

Table 17 – Attrition across waves

	wave		
	1997	2002	2007
A_123	903	903	903
A_1	523		
A_12	1029	1029	
A_13	139		139
A_2		32	
A_3			37
A_23		165	165
Total	2594	2129	1244

Notes: This Table shows the number of observations in each wave and when these leave the sample. A_ij indicates that the child was surveyed in wave *i* and *j*; for example, A_123 indicates that the child is surveyed in the three waves.

Source: PSID-CDS, waves 1997, 2002 and 2007

Table [17](#) shows the number of observations in each wave and when these leave the sample. The balanced panel includes 949 observations. No Attrition (A_123) means that the child is observed in the three waves. A_1, A_2 and A_3 means that the child was present only in the first, second and third wave. A_12 means that they leave the sample in the third wave; A_13 that they were observed only in the first and the third waves; A_23 that they were observed only in the second and third waves.

Table [A3.14](#) in Appendix reports the summary statistics; where these are available for more than one different waves, the first wave is considered. Children observed in all waves

are younger, are more likely to be living with both parents, to be White and to have a primary care giver who is a housewife.

Table 18 shows how attrition is explained, using logit regressions. Results are in odds ratio. The probability of leaving the sample is higher when the child is older, especially for attrition on the third wave, and also when the PCG is a housewife. Family structure explains attrition in the second wave.

Attrition is difficult to address in this case, because it is explained by time-varying variables, and we do not know how these variables change in the second wave. For example, children who are living with their mother in the first wave may leave the sample because they live with their single mother or because the mother has met someone and moved in with him. An Inverse Probability Weighting cannot be used here, because attrition is explained mainly by time-varying variables. Also, looking at age, we could explain attrition by year of birth, but here we do not want to over-weight individuals who are older because they are not children any more, and in addition, attrition concerns all individuals that are more than 19 years old. To check if attrition affects the results, the model is run on the balanced sample.

Results are very similar for the balanced panel. Some coefficients are not significant any more, since we lose in precision by having a smaller sample, but the magnitude is quite close. Results are shown in Tables A3.15 to A3.16.

7.3. Outliers

Individuals with a high variation in their cognitive or non-cognitive skills are excluded: we compute the variation in the cognitive and non cognitive skills between 2 consecutive waves, and exclude the 2% who have the lowest variation, and the 2% who have the highest variation for one of the three outcomes. 241 children (618 observations) are concerned. Tables A3.21 and A3.22 show the results when outliers are excluded: they are similar. The effect of doing house(work) is not statistically significant different from personal needs and care, and reading skills seem poorly explained by the allocation of time when outliers are excluded. There are few changes when we look at the effect of the presence of parents: the positive effect of the presence of parents in passive leisure for non-cognitive skills remains, and the effect of the involvement of parents in education becomes statistically significant.

7.4. Using weights

It must be stressed that these estimations do not exactly identify average partial effect. The PSID consists of two separate samples—a nationally representative sample of U.S. families designed by the University of Michigan Survey Research Center (SRC)

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Table 18 – Attrition - Logit regression

	(1) Attrition	(2) A_1	(3) A_12	(4) A_13
main				
Age	1.929*** (0.0893)	1.141*** (0.0315)	1.888*** (0.0761)	0.802*** (0.0232)
Single Mother	2.210* (0.688)	2.805*** (0.642)	1.213 (0.310)	0.435+ (0.193)
Single Mother (step-parent)	4.817*** (2.145)	3.735*** (1.274)	1.579 (0.616)	1.679 (0.936)
Single Father	3.671** (1.726)	1.476 (0.793)	2.235 (1.249)	1.642 (1.428)
Other	20.04*** (17.63)	8.713*** (4.043)	3.946* (2.335)	3.180 (2.362)
African american	0.577 (0.214)	0.686 (0.186)	0.718 (0.189)	1.710 (0.610)
Hispanic	0.702 (0.248)	0.328* (0.149)	1.320 (0.448)	0.721 (0.345)
Asian Pacific	2.168 (2.061)	0.549 (0.599)	0.793 (0.517)	1.308 (1.075)
American Indian	1.490 (1.783)	2.448 (2.344)	1 (.)	1 (.)
Other	0.938 (0.488)	0.721 (0.397)	1.589 (0.918)	0.0600** (0.0628)
PCG - Looking for work	1.343 (0.580)	1.846 (0.715)	2.581 (1.556)	3.458* (1.796)
PCG - Housewife	2.576* (1.137)	1.549 (0.510)	2.188+ (1.032)	0.757 (0.430)
PCG - Student	0.959 (0.604)	0.158** (0.107)	5.410 (5.658)	0.256 (0.281)
PCG - Other	1.264 (1.335)	1.760 (1.612)	1.460 (1.322)	1 (.)
Female	0.791 (0.171)	0.838 (0.144)	1.000 (0.180)	0.881 (0.227)
Earnings	1.123 (0.143)	1.049 (0.102)	1.137 (0.114)	1.011 (0.170)
Observations	1669	1636	1532	1418
Pseudo R^2	0.657	0.104	0.442	0.103

Notes: Logit regressions (Odd ratio). Attrition is a dummy equals to 1 if the child leave the sample at any wave. A_1 means that the child was present only in the first. A_12 means that they leave the sample in the third wave; A_13 that they were observed only in the first and the third waves.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS.

and an over sample of low income, mostly African-American, families from the Survey of Economic Opportunity (SEO). Therefore, using the whole sample of the PSID does not provide a nationally representative sample. Four main variables are used to determine the provided weights : ethnicity, head education level, MSA status – metropolitan statistical area, and census region.

While there is a consensus of that using weights is necessary in descriptive analysis, it is much less clear using regression analysis attempting to estimate a “causal effect”. In particular, using weights might make the estimators much less precise. According to Solon et al. (2015) [122], there are two main reasons that we may prefer using weights in regression analysis:

- Correcting for endogenous sampling. If the sampling probability is exogenous, weighting is unnecessary for consistency and harmful for precision (see Wooldridge 1999). Since I control for ethnicity and head education level, these two sampling variables are not an issue for this analysis. Controlling for MSA status and census region, the results are qualitatively similar (these variables are not available for some families, therefore we lose some significance power). A change of census region concerns only 75 observations, and only 18 observations among those whose family structure has changed. A change of MSA status concerns 306 observations, and only 98 among those whose family structure has changed.
- Identifying average partial effects. If the variables of interest (in our case Family Structure or Time Investments) have heterogeneous effects according to the sampling variables (ethnicity, head education level, MSA status – metropolitan statistical area, and census region), the OLS and the WLS (Weighted Least Squares) that do not account for this heterogeneity may identify different averages of these heterogeneous effects. This weighted average depends on how the within-group variance of the variable of interest differ between the two groups. If there is no heterogeneous effect, there is no point to use weights, OLS and WLS give consistent estimates. If the effect of the variable of interest is heterogeneous, and the within group variance of the variable of interest is similar between the two groups, then the WLS give consistent estimates. If it is not the case, both WLS and OLS fail to identify the population average effect. In this latter case, it is better to provide an heterogeneity analysis rather than a weighed model.

I first check if the summary statistics differ across the sampling variables; and then if the effects are heterogeneous among the different sampling variables. Results are reported in Appendix [A4.2](#).

8. Time Investments as a Driving Channel

Results suggest that a change in family structure leads to a decrease in time spent with at least one parent present. In addition, the breakdown of accessible and engaged parental time is greatly affected; time spent on main activities with both parents together and alone with the non-custodial parent decrease.

Estimating time input production functions, results suggest that child's allocation of time matters for the outcomes, and the presence of at least one parent matters for non-cognitive skills. Considering heterogeneity in parental time inputs, they do not have the same effect on child's development.

From these findings, it appears that both the decrease in time spent with at least one parent and the heterogeneity in parental inputs could be a driving channel for the effect of parental separation on child's development. In this section, we look how much the effect of a change in family structure is affected when time investments are controlled for. Table 19 reports the effect of family structure using a GMM model without controlling for time input investments (columns 1, 4 and 7), controlling for child's time allocation of time and time spent with at least one parent (in columns 2, 5 and 8), and for the heterogeneity of parental time inputs (columns 3, 6 and 9).²²

Results suggest that child and parental time investments poorly explain the effect of parental separation on reading skills. More surprisingly, for single mothers, heterogeneity of parental investments seems to mediate this effect, suggesting that the decrease in time spent with the non custodial parent and both parents together has a positive effect on child's reading skills. Indeed, the decrease in time spent in passive leisure or housework with both parents together or father only, substituted by time spent with the mother only seems to have a positive impact on child's reading skills.

For math skills, the effect of family structure is quite small.

Considering non-cognitive skills, the negative effect of parental separation on child's non cognitive skills is reduced by 30% when time spent with at least one parent is accounted for, suggesting that the decrease in time spent with at least one parent in work and housework or in passive leisure is a driving channel for this outcome. On the other hand, the effect of family structure is poorly affected by controlling for heterogeneity of parental time inputs.

²²Table A3.20 reports the coefficients for each input when children's trajectories will become parallel $(\frac{\gamma}{1-\lambda})$.

Table 19 – Time Investments as a driving channel (Accessible Time)

	Reading Skills			Math Skills			Non-Cognitive Skills		
Single Mother	-0.12 (0.09)	-0.14+ (0.08)	-0.22+ (0.13)	-0.04 (0.06)	-0.02 (0.06)	-0.12 (0.10)	-0.20** (0.07)	-0.14* (0.06)	-0.12 (0.10)
Single Mother (step-parent)	-0.19* (0.09)	-0.24* (0.12)	-0.19 (0.12)	-0.08 (0.08)	-0.02 (0.09)	-0.05 (0.09)	-0.33*** (0.10)	-0.23* (0.11)	-0.21+ (0.11)
Single Father	-0.34*** (0.10)	-0.43** (0.15)	-0.36* (0.17)	-0.24* (0.10)	-0.15 (0.10)	-0.28* (0.13)	-0.53** (0.18)	-0.42* (0.17)	-0.26 (0.19)
Other	-0.36** (0.12)	-0.46* (0.23)	-0.39+ (0.21)	-0.17 (0.11)	-0.21 (0.15)	-0.18 (0.15)	-0.29* (0.14)	-0.08 (0.16)	-0.04 (0.16)
(House)Work		0.08 (0.12)	0.18 (0.12)		0.00 (0.10)	0.09 (0.09)		-0.04 (0.13)	-0.01 (0.12)
Education		0.21 (0.20)	0.21 (0.15)		-0.06 (0.07)	-0.04 (0.07)		0.05 (0.06)	0.08 (0.06)
Active Leisure		0.32 (0.21)	0.28+ (0.17)		0.02 (0.07)	0.02 (0.07)		0.08 (0.06)	0.09 (0.06)
Passive Leisure		0.14 (0.19)	0.14 (0.17)		-0.05 (0.10)	-0.03 (0.10)		-0.10 (0.08)	-0.08 (0.08)
(House)Work (with at least one parent)		0.13 (0.10)	0.17 (0.11)		0.03 (0.10)	0.08 (0.09)		0.05 (0.11)	0.14 (0.12)
Education (with at least one parent)		0.03 (0.07)	-0.17 (0.11)		-0.02 (0.06)	-0.08 (0.07)		-0.12+ (0.06)	-0.15+ (0.08)
Active Leisure (with at least one parent)		0.09	0.01		-0.01	-0.00		-0.00	-0.06

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Table 19 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	(0.09)	(0.11)	(0.06)	(0.08)	(0.06)	(0.09)
Passive Leisure (with at least one parent)	-0.18	-0.03	-0.06	-0.00	0.06	0.05
	(0.14)	(0.14)	(0.08)	(0.08)	(0.07)	(0.08)
(House)Work (with parents together)		-0.24**		-0.12*		-0.15*
		(0.08)		(0.06)		(0.06)
Education (with parents together)		0.20*		0.07		0.01
		(0.09)		(0.06)		(0.07)
Active Leisure (with parents together)		0.18+		0.04		0.19*
		(0.10)		(0.08)		(0.08)
Passive Leisure (with parents together)		-0.18+		-0.10		-0.02
		(0.10)		(0.07)		(0.08)
(House)Work (with father only)		-0.04		-0.13*		-0.11+
		(0.09)		(0.06)		(0.06)
Education (with father only)		0.18*		0.14*		0.08
		(0.07)		(0.06)		(0.06)
Active Leisure (with father only)		-0.03		-0.00		-0.08
		(0.09)		(0.05)		(0.06)
Passive Leisure (with father only)		-0.09		-0.02		-0.04
		(0.06)		(0.05)		(0.06)
Other parental time	0.05	-0.01	-0.12+	-0.08	0.04	0.06
	(0.09)	(0.07)	(0.07)	(0.06)	(0.07)	(0.06)
Time spent with a grand parent (alone)	0.03	-0.01	0.05	0.03	-0.09	-0.10

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Table 19 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills			
	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)		
Time spent with a step-mother (alone)	0.11	0.05	-0.03	0.00	-0.04	-0.04		
	(0.12)	(0.08)	(0.05)	(0.05)	(0.06)	(0.05)		
Time spent with a step father (alone)	0.03	0.01	0.00	-0.02	0.00	-0.01		
	(0.05)	(0.05)	(0.03)	(0.04)	(0.02)	(0.03)		
Other Adult Time	0.04	-0.07	0.02	-0.00	-0.04	-0.06		
	(0.10)	(0.09)	(0.04)	(0.04)	(0.05)	(0.05)		
African American	-0.49***	-0.29***	-0.37***	-0.67***	-0.51***	-0.54***	0.16**	0.17**
	(0.09)	(0.08)	(0.08)	(0.08)	(0.07)	(0.07)	(0.06)	(0.06)
Hispanic	-0.28*	-0.18	-0.16	-0.29**	-0.22*	-0.21*	0.21+	0.17+
	(0.13)	(0.12)	(0.14)	(0.11)	(0.10)	(0.10)	(0.11)	(0.10)
Asian, Pacific	0.41*	0.33	0.48*	0.72*	0.66**	0.73**	-0.15	0.01
	(0.18)	(0.22)	(0.21)	(0.29)	(0.24)	(0.23)	(0.25)	(0.24)
American Indian	-0.93***	-0.97***	-0.87***	-1.54***	-0.96***	-0.87***	0.29***	0.14
	(0.08)	(0.17)	(0.20)	(0.20)	(0.21)	(0.22)	(0.07)	(0.15)
Other	-0.21	-0.18	-0.26	-0.21	-0.19	-0.21	-0.13	-0.11
	(0.24)	(0.22)	(0.23)	(0.19)	(0.17)	(0.17)	(0.14)	(0.13)
Female	0.18**	0.23**	0.19*	-0.10*	-0.07	-0.11*	0.07	0.09
	(0.06)	(0.08)	(0.07)	(0.04)	(0.05)	(0.05)	(0.05)	(0.06)
PCG Education	0.10***	0.07***	0.07***	0.09***	0.07***	0.07***	0.02	0.01
	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
No father	-0.07	-0.11	-0.23	-0.22	-0.32	-0.40+	-0.04	-0.04

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Table 19 – *Continued from previous page*

	Reading Score			Math Score			Non Cognitive Skills		
	(0.20)	(0.20)	(0.21)	(0.21)	(0.21)	(0.23)	(0.22)	(0.20)	(0.21)
Deceased Father	-0.08	0.03	-0.03	0.19	0.18	0.19	-0.05	-0.06	-0.09
	(0.20)	(0.18)	(0.18)	(0.17)	(0.15)	(0.17)	(0.15)	(0.14)	(0.14)
Deceased Mother	0.27	0.38	0.72*	0.07	0.01	0.27	0.28	0.16	0.19
	(0.38)	(0.25)	(0.32)	(0.25)	(0.29)	(0.26)	(0.33)	(0.33)	(0.36)
Age	0.02+	0.03*	0.02+	-0.00	-0.00	-0.00	0.02+	0.02*	0.02*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of siblings	-0.00	-0.02	-0.01	0.03*	0.02+	0.03*	0.02	0.01	0.02
	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PCG working status - looking for a job	-0.11	0.03	0.06	-0.26*	-0.15	-0.12	-0.09	-0.08	-0.03
	(0.12)	(0.12)	(0.13)	(0.12)	(0.10)	(0.11)	(0.13)	(0.13)	(0.13)
PCG working status - housewife	-0.06	-0.09	-0.11	-0.08	-0.01	-0.02	0.13	0.16	0.14
	(0.10)	(0.11)	(0.11)	(0.10)	(0.10)	(0.10)	(0.10)	(0.10)	(0.11)
PCG working status - student	-0.19	-0.24	-0.25	-0.08	-0.00	-0.04	0.53**	0.50*	0.53*
	(0.22)	(0.39)	(0.40)	(0.21)	(0.26)	(0.28)	(0.20)	(0.23)	(0.23)
PCG working status - other	0.03	-0.09	0.15	0.04	-0.03	0.08	0.25	0.15	0.15
	(0.26)	(0.16)	(0.20)	(0.18)	(0.19)	(0.18)	(0.28)	(0.27)	(0.27)
Earnings	-0.03	-0.01	-0.01	-0.02	-0.01	-0.01	0.09***	0.07**	0.07**
	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Reading Score (t-1)	0.04	0.24+	0.21+						
	(0.18)	(0.13)	(0.12)						
Math Score (t-1)				0.10	0.38***	0.34***			

Continued on next page

Table 19 – *Continued from previous page*

	Reading Score			Math Score			Non Cognitive Skills		
				(0.11)	(0.09)	(0.08)			
Non Cognitive Skills (t-1)							0.14	0.32***	0.33***
							(0.10)	(0.08)	(0.08)
Constant	-1.17***	-1.09***	-1.06**	-0.68**	-0.50*	-0.46+	-1.29***	-1.09***	-1.06***
	(0.32)	(0.32)	(0.33)	(0.26)	(0.24)	(0.25)	(0.28)	(0.29)	(0.29)
Observations	1352	1352	1352	1673	1673	1673	1765	1765	1765

Notes: See previous Tables for the description of the variables and the controls. For each outcome, the first column shows the results of the Value-Added Model previously estimated, the second and third columns show the GMM estimates.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007.

9. Concluding Discussion

In this chapter, I examine if parental time investments may be a driving channel for the effect of parental separation on child development. The chapter also extends the literature on parental time to time with father and with both parents together.

First, the chapter examines whether family structure impacts child and parental time investments. Second, it models time input production functions with a value added specification, considering a possible heterogeneity in the effect of parental time investments according to child's gender and PCG's education. It also uses a cumulative value added model, allowing for the effect of time inputs to vary across age; and a GMM framework to account for feedback effects.

Estimating the impact of family structure on child time investments, I draw attention to three findings. First, family structure does not have any impact on total child time investments (whoever is present). However, time with at least one parent present decreases. Estimations do not suggest strong effect on time with at least one parent involved. Younger children and children whose primary care giver is more highly educated seem to be less affected by the decrease in time spent with at least one parent. Second, the breakdown of accessible and engaged parental time is highly affected. Time spent with both parents together and alone with the non-custodial parent decreases in most activities. The custodial parent compensates partially for the decrease in time spent with the non-custodial parent, and seeks to maintain the amount of qualitative time. Third, this shows a small complementarity between father and mother time in these families. But, since substitution is high when we look at involvement of parents, the custodial parent's time constraints may be a better explanation for this partial substitution.

Estimating the effect of time allocation on a child's cognitive and non-cognitive skills, I draw attention to one main finding and other substantial findings. My main finding is that cognitive and non-cognitive skills production functions show that not all parental time investments have the same impact on child development, meaning the time spent with the mother does not have the same impact as time spent with father or both parents. If no clear evidence appears, a Wald test shows that time with both parents is not equivalent to time with mother regarding reading skills, and time with father is not equivalent to time with mother for math and non-cognitive skills. The cumulative value-added model and the GMM model confirm these last findings. GMM estimates suggest that the presence of both parents has a significantly different impact than only mother's for the three outcomes.

The way children allocate their time matters for both cognitive and non-cognitive skills; leisure and educational activities rank highest. The CVA results are consistent with Del

Boca et al. (2017) [54], previous own child time inputs do not seem to affect a child's current test score; however, past education with one parent benefits for the child's non-cognitive skills.

Estimation results suggest that girls' non-cognitive skills may respond differently than boys to the total amount of time spent on each activity, and girls' reading skills seem to respond differently to time with fathers. Finally, children with more highly educated parents respond more to active leisure and education activities. This is consistent with Del Bono et al. (2016) [55]'s results. This may reflect differences in the type of activities. Parenting style and parents' skills are also very likely to explain these differences.

From these results, it appears that child and parental time investments poorly explain the effect of parental separation on cognitive skills. More surprisingly, for single mothers, heterogeneity of parental investments seems to mediate this effect. Nevertheless, considering non-cognitive skills, the negative effect of parental separation on child's non cognitive skills is reduced by 30% when time spent with at least one parent is accounted for, suggesting that the decrease in time spent with at least one parent is a driving channel for this outcome.

Policies should aim to increase the time parents spend with their children. Labour market policies going in the sense of a decrease in working hours or more flexible schedules such as the development of teleworking might participate to decrease the causal effect of parental separation on non-cognitive skills. On the other hand, those policies might have adverse effects, since it may negatively impact the mother's future labour market outcomes. Moreover, since single-mothers families are much more represented than single-father families, this kind of policies might exacerbate gender discriminations on the labour market. That's why, such policies should be accompanied by fostering the alternating custody. Other policies such as developing transports infrastructures to reduce the time parents spend in transports might also increase time parents spend with their children.

This study is one of the first attempts to estimate the heterogeneity of parental time investments; there are desirable extensions that rely on data improvements, especially in collecting information about early childhood both on cognitive and non-cognitive skills and on child and parental time investments. Models of production functions require a lot of data, especially on past inputs: if we wish to study the time input production functions for young children, we need data on their skills when they were even younger. Moreover, since alternating custody is developing quickly in the recent generations, more research should be devoted to study its effect on child's development.

10. Appendix

A1 More descriptive statistics

A1.1 Descriptive Statistics: Child Outcomes

Table A1.1 reports the correlations over the different dimensions of the child's development. The two dimensions of the BPI are more highly correlated than the two dimensions of cognitive skills. Cognitive skills and non cognitive skills are poorly correlated.

Table A1.1 – Correlations between the different dimension of the Behaviour Problem Index

	Reading Score	Math Score	Total BPI	Ext BPI	Int BPI
Reading Score	1.00	0.59	0.16	0.17	0.11
Math Score	0.59	1.00	0.20	0.20	0.17
Non Cognitive Skills (Total BPI)	0.16	0.20	1.00	0.94	0.88
Externalising BPI	0.17	0.20	0.94	1.00	0.66
Internalising BPI	0.11	0.17	0.88	0.66	1.00

Source : PSID - CDS, waves 1997, 2002 and 2007

Figure A1.1 reports the evolution of non-cognitive skills (Total BPI) and its two dimensions over child's age. The evolution of Total BPI is pretty smooth, whereas behavioural skills tend to increase over time, and emotional skills seem to decrease from the age of 7-9.

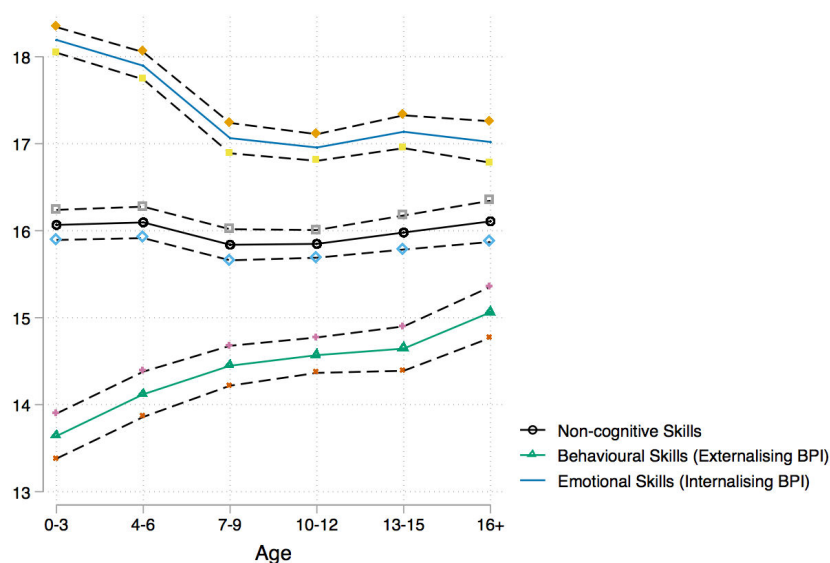


Figure A1.1 – Evolution of Non-Cognitive Skills across age

Notes: The scale has been reversed to ease the interpretation: an increase in the skill reflects and increase in the child's development.

A1.2 Descriptive Statistics: Effect of Family Structure

Table A1.2 shows that children who are not living with both parents have lower scores in Math and Reading and greater behaviour problems. Children who are not living with both parents are less likely to be White, Hispanic or Asian and more likely to be African American or American Indian. Their Primary Care Givers (PCG) is less likely to be a housewife, and more likely to be looking for work or a student.

Panel B of Table A1.2 shows the effect of family structure on child allocation of time. Children who are not living with both parents spend on average less time on personal needs and care and active leisure, and much more time on educational activities and passive leisure. They spend less time on active leisure with nobody else involved in the activity; and more time on passive leisure and (house)work with nobody else involved. They spend slightly more time with nobody around, on personal needs and care, and passive leisure.

They spend on average less time with at least one parent, involved or present, on all activities. When we look at the breakdown of parental time, their mother (alone) spends more time with them involved in personal needs and care and passive leisure; and she is more present (on all activities) On the other hand, fathers, generally the non-custodial parent, are less involved and less present in all activities. Children also spend less time with both parents together involved in the activity or present.

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Table A1.2 – Differences across Family Structure

Panel A : Child Development and Demographic variables		
	Mean	Difference
Reading Score		
Separated Parents	-0.101** (0.0356)	
Two Parents	0.248** (0.0219)	
Difference (T-test)		-0.349** (0.0418)
Math Score		
Separated Parents	-0.0833* (0.0330)	
Two Parents	0.283** (0.0222)	
Difference (T-test)		-0.366** (0.0398)
Non Cognitive Skills		
Separated Parents	-0.290** (0.0359)	
Two Parents	0.121** (0.0202)	
Difference (T-test)		-0.411** (0.0412)
Internalising BPI		
Separated Parents	-0.267** (0.0387)	
Two Parents	0.0639** (0.0202)	
Difference (T-test)		-0.331** (0.0436)
Externalising BPI		
Separated Parents	-0.268** (0.0338)	
Two Parents	0.146** (0.0203)	

Continued on next page

Table A1.2 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		-0.413** (0.0394)
Age		
Separated Parents	11.18** (0.136)	
Two Parents	10.30** (0.0962)	
Difference (T-test)		0.873** (0.167)
Female		
Separated Parents	0.475** (0.0153)	
Two Parents	0.513** (0.00996)	
Difference (T-test)		-0.0380* (0.0182)
White		
Separated Parents	0.508** (0.0153)	
Two Parents	0.722** (0.00933)	
Difference (T-test)		-0.214** (0.0179)
African american		
Separated Parents	0.310** (0.0133)	
Two Parents	0.0609** (0.00384)	
Difference (T-test)		0.250** (0.0139)
Hispanic		
Separated Parents	0.0931** (0.00973)	
Two Parents	0.148**	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
	(0.00794)	
Difference (T-test)		-0.0553** (0.0126)
Asian Pacific		
Separated Parents	0.0185** (0.00452)	
Two Parents	0.0391** (0.00453)	
Difference (T-test)		-0.0206** (0.00640)
American Indian		
Separated Parents	0.0146** (0.00452)	
Two Parents	0.00109 (0.000691)	
Difference (T-test)		0.0135** (0.00457)
Other		
Separated Parents	0.0552** (0.00847)	
Two Parents	0.0286** (0.00348)	
Difference (T-test)		0.0266** (0.00916)
PCG - Worker		
Separated Parents	0.703** (0.0141)	
Two Parents	0.677** (0.00936)	
Difference (T-test)		0.0257 (0.0169)
PCG - Looking for work		
Separated Parents	0.0776** (0.00770)	

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Table A1.2 – *Continued from previous page*

	Mean	Difference
Two Parents	0.0290** (0.00343)	
Difference (T-test)		0.0486** (0.00843)
PCG - Housewife		
Separated Parents	0.177** (0.0119)	
Two Parents	0.263** (0.00883)	
Difference (T-test)		-0.0860** (0.0148)
PCG - Student		
Separated Parents	0.0312** (0.00538)	
Two Parents	0.0171** (0.00244)	
Difference (T-test)		0.0141* (0.00591)
PCG - Other		
Separated Parents	0.0112** (0.00384)	
Two Parents	0.0136** (0.00243)	
Difference (T-test)		-0.00238 (0.00454)
Earnings		
Separated Parents	9.759** (0.0333)	
Two Parents	9.652** (0.0275)	
Difference (T-test)		0.107* (0.0432)
Panel B : Time investment variables		
	Mean	Difference

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Table A1.2 – *Continued from previous page*

	Mean	Difference
(House)Work		
Separated Parents	7.004** (0.263)	
Two Parents	6.615** (0.172)	
Difference (T-test)		0.389 (0.315)
Personal needs		
Separated Parents	85.33** (0.459)	
Two Parents	87.19** (0.305)	
Difference (T-test)		-1.856** (0.551)
Education		
Separated Parents	31.47** (0.529)	
Two Parents	29.72** (0.355)	
Difference (T-test)		1.749** (0.638)
Active Leisure		
Separated Parents	19.53** (0.432)	
Two Parents	21.70** (0.262)	
Difference (T-test)		-2.173** (0.505)
Passive Leisure		
Separated Parents	24.54** (0.384)	
Two Parents	22.73** (0.244)	
Difference (T-test)		1.805**

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Table A1.2 – *Continued from previous page*

	Mean	Difference
		(0.455)
(House)Work (alone)		
Separated Parents	1.395** (0.0986)	
Two Parents	1.067** (0.0539)	
Difference (T-test)		0.328** (0.112)
Personal needs (alone)		
Separated Parents	1.335** (0.0586)	
Two Parents	1.370** (0.0489)	
Difference (T-test)		-0.0350 (0.0763)
Education (alone)		
Separated Parents	2.329** (0.155)	
Two Parents	2.622** (0.100)	
Difference (T-test)		-0.293 (0.185)
Active Leisure (alone)		
Separated Parents	4.262** (0.201)	
Two Parents	4.799** (0.146)	
Difference (T-test)		-0.537* (0.249)
Passive Leisure (alone)		
Separated Parents	6.332** (0.257)	
Two Parents	5.413** (0.153)	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		0.918** (0.299)
(House)Work (alone) (presence)		
Separated Parents	0.368** (0.0498)	
Two Parents	0.279** (0.0236)	
Difference (T-test)		0.0891 (0.0551)
Personal needs (alone) (presence)		
Separated Parents	0.311** (0.0318)	
Two Parents	0.219** (0.0158)	
Difference (T-test)		0.0923** (0.0355)
Education (alone) (presence)		
Separated Parents	0.564** (0.0757)	
Two Parents	0.486** (0.0475)	
Difference (T-test)		0.0788 (0.0894)
Active Leisure (alone) (presence)		
Separated Parents	0.830** (0.0919)	
Two Parents	0.867** (0.0627)	
Difference (T-test)		-0.0371 (0.111)
Passive Leisure (alone) (presence)		
Separated Parents	1.797** (0.162)	
Two Parents	1.246**	

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Table A1.2 – *Continued from previous page*

	Mean	Difference
	(0.0725)	
Difference (T-test)		0.551** (0.177)
(House)Work (with at least one parent)		
Separated Parents	2.389** (0.125)	
Two Parents	3.391** (0.0899)	
Difference (T-test)		-1.002** (0.154)
Personal needs (with at least one parent)		
Separated Parents	4.291** (0.149)	
Two Parents	6.451** (0.113)	
Difference (T-test)		-2.159** (0.187)
Education (with at least one parent)		
Separated Parents	0.906** (0.0728)	
Two Parents	1.110** (0.0545)	
Difference (T-test)		-0.204* (0.0909)
Active Leisure (with at least one parent)		
Separated Parents	2.707** (0.168)	
Two Parents	4.854** (0.131)	
Difference (T-test)		-2.146** (0.213)
Passive Leisure (with at least one parent)		
Separated Parents	5.831** (0.214)	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
Two Parents	7.585** (0.125)	
Difference (T-test)		-1.754** (0.248)
(House)Work (with at least one parent) (presence)		
Separated Parents	3.290** (0.146)	
Two Parents	4.416** (0.110)	
Difference (T-test)		-1.126** (0.183)
Personal needs (with at least one parent) (presence)		
Separated Parents	5.171** (0.155)	
Two Parents	8.003** (0.117)	
Difference (T-test)		-2.832** (0.194)
Education (with at least one parent) (presence)		
Separated Parents	2.135** (0.135)	
Two Parents	3.235** (0.103)	
Difference (T-test)		-1.100** (0.170)
Active Leisure (with at least one parent) (presence)		
Separated Parents	7.580** (0.285)	
Two Parents	12.13** (0.218)	
Difference (T-test)		-4.553** (0.359)
Passive Leisure (with at least one parent) (presence)		
Separated Parents	11.21**	

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Table A1.2 – *Continued from previous page*

	Mean	Difference
	(0.305)	
Two Parents	14.64**	
	(0.205)	
Difference (T-test)		-3.437**
		(0.367)
(House)Work (with mother only)		
Separated Parents	1.995**	
	(0.114)	
Two Parents	1.942**	
	(0.0690)	
Difference (T-test)		0.0524
		(0.133)
Personal needs (with mother only)		
Separated Parents	3.404**	
	(0.141)	
Two Parents	2.831**	
	(0.0845)	
Difference (T-test)		0.573**
		(0.165)
Education (with mother only)		
Separated Parents	0.800**	
	(0.0693)	
Two Parents	0.763**	
	(0.0459)	
Difference (T-test)		0.0366
		(0.0831)
Active Leisure (with mother only)		
Separated Parents	1.748**	
	(0.121)	
Two Parents	1.833**	
	(0.0801)	
Difference (T-test)		-0.0852
		(0.145)
Passive Leisure (with mother only)		

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
Separated Parents	4.615** (0.200)	
Two Parents	3.389** (0.0868)	
Difference (T-test)		1.226** (0.218)
(House)Work (with mother only) (presence)		
Separated Parents	2.596** (0.129)	
Two Parents	2.186** (0.0803)	
Difference (T-test)		0.410** (0.152)
Personal needs (with mother only) (presence)		
Separated Parents	4.068** (0.148)	
Two Parents	2.980** (0.0743)	
Difference (T-test)		1.087** (0.165)
Education (with mother only) (presence)		
Separated Parents	1.730** (0.116)	
Two Parents	1.386** (0.0677)	
Difference (T-test)		0.344* (0.134)
Active Leisure (with mother only) (presence)		
Separated Parents	5.658** (0.251)	
Two Parents	4.609** (0.140)	
Difference (T-test)		1.049** (0.287)

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Table A1.2 – *Continued from previous page*

	Mean	Difference
Passive Leisure (with mother only) (presence)		
Separated Parents	8.887** (0.300)	
Two Parents	5.526** (0.138)	
Difference (T-test)		3.360** (0.331)
(House)Work (with father only)		
Separated Parents	0.225** (0.0368)	
Two Parents	0.550** (0.0333)	
Difference (T-test)		-0.325** (0.0496)
Personal needs (with father only)		
Separated Parents	0.430** (0.0448)	
Two Parents	0.721** (0.0320)	
Difference (T-test)		-0.290** (0.0551)
Education (with father only)		
Separated Parents	0.0880** (0.0217)	
Two Parents	0.222** (0.0223)	
Difference (T-test)		-0.134** (0.0311)
Active Leisure (with father only)		
Separated Parents	0.712** (0.113)	
Two Parents	1.288** (0.0606)	
Difference (T-test)		-0.576**

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
		(0.128)
Passive Leisure (with father only)		
Separated Parents	0.716** (0.0615)	
Two Parents	1.718** (0.0625)	
Difference (T-test)		-1.003** (0.0877)
(House)Work (with father only) (presence)		
Separated Parents	0.316** (0.0590)	
Two Parents	0.571** (0.0339)	
Difference (T-test)		-0.255** (0.0680)
Personal needs (with father only) (presence)		
Separated Parents	0.470** (0.0480)	
Two Parents	0.623** (0.0294)	
Difference (T-test)		-0.154** (0.0563)
Education (with father only) (presence)		
Separated Parents	0.207** (0.0567)	
Two Parents	0.331** (0.0354)	
Difference (T-test)		-0.124+ (0.0668)
Active Leisure (with father only) (presence)		
Separated Parents	1.183** (0.137)	
Two Parents	1.556** (0.0699)	

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Table A1.2 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		-0.373* (0.154)
Passive Leisure (with father only) (presence)		
Separated Parents	1.079** (0.0960)	
Two Parents	1.775** (0.0753)	
Difference (T-test)		-0.696** (0.122)
(House)Work (with parents together)		
Separated Parents	0.169** (0.0443)	
Two Parents	0.899** (0.0474)	
Difference (T-test)		-0.729** (0.0649)
Personal needs (with parents together)		
Separated Parents	0.457** (0.0495)	
Two Parents	2.899** (0.0621)	
Difference (T-test)		-2.442** (0.0794)
Education (with parents together)		
Separated Parents	0.0183** (0.00620)	
Two Parents	0.125** (0.0174)	
Difference (T-test)		-0.107** (0.0185)
Active Leisure (with parents together)		
Separated Parents	0.248** (0.0445)	
Two Parents	1.732**	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A1.2 – *Continued from previous page*

	Mean	Difference
	(0.0677)	
Difference (T-test)		-1.485** (0.0811)
Passive Leisure (with parents together)		
Separated Parents	0.500** (0.0821)	
Two Parents	2.478** (0.0747)	
Difference (T-test)		-1.978** (0.111)
(House)Work (with parents together) (presence)		
Separated Parents	0.378** (0.0605)	
Two Parents	1.660** (0.0618)	
Difference (T-test)		-1.282** (0.0865)
Personal needs (with parents together) (presence)		
Separated Parents	0.634** (0.0595)	
Two Parents	4.399** (0.0792)	
Difference (T-test)		-3.765** (0.0990)
Education (with parents together) (presence)		
Separated Parents	0.197** (0.0508)	
Two Parents	1.518** (0.0694)	
Difference (T-test)		-1.321** (0.0860)
Active Leisure (with parents together) (presence)		
Separated Parents	0.738** (0.0802)	

Continued on next page

Table A1.2 – *Continued from previous page*

	Mean	Difference
Two Parents	5.967** (0.146)	
Difference (T-test)		-5.229** (0.167)
Passive Leisure (with parents together) (presence)		
Separated Parents	1.240** (0.123)	
Two Parents	7.342** (0.156)	
Difference (T-test)		-6.102** (0.198)

Notes: The first column shows the mean for each group, the second columns shows the difference between the means of the two groups, using a t-test.

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

A2 Discussion about the identification strategies

A2.1 Time trend in parental time investments

In this part, we want to check that the trends among the family structures are the same even before the separation. To be able to focus on the different parental times in these two groups, we focus on individuals who live with their two parents during the whole survey, or in a single mother family. Individuals who live once in a single father families or in "other" type of family structure are excluded, since the number of observations is too small in this categories to be able to see an effect. Since the behaviours are not the same than in single mother families, it is not relevant to gather all these categories together.

Figure A2.1 shows the results of a time event study, using an individual fixed effect analysis. These figures show the evolution of parental investments before and after the separation. We can see that before the parental separation, the two trends are parallel. This is less clear for time spent with fathers, but the effect is small and not statistically significant.

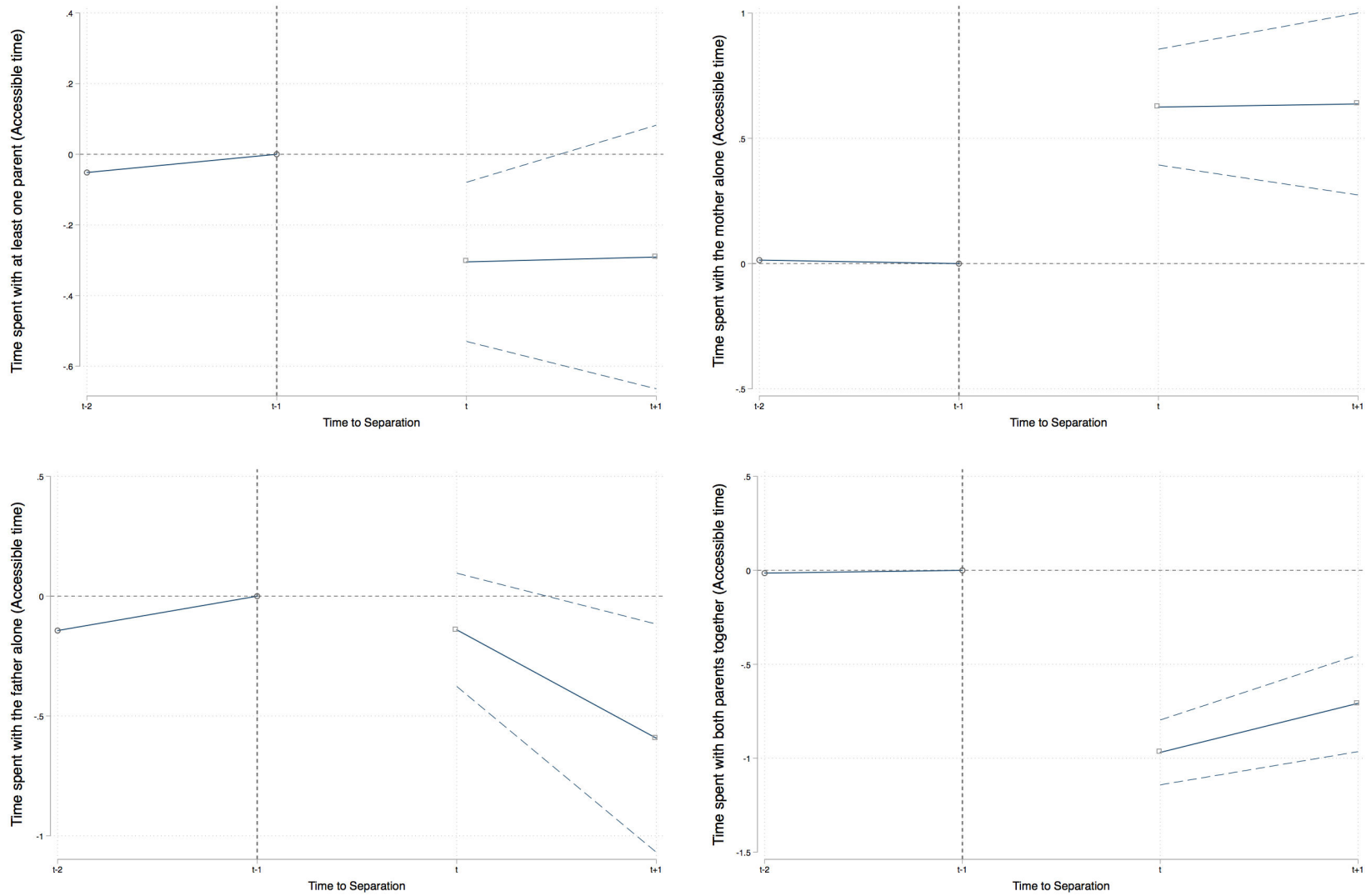


Figure A2.1 – Trends in parental investments

A2.2 Not *yet* separated as a control group

Descriptive statistics

Here we look at the differences between two groups : those in the sample whose parents will never separate (before the age of 19), and those whose parents will separate later, but the separation has not happened yet. It can be used to compare children from separated parents but who have been not affected by the separation yet, since it has not occurred. It gives some idea of the selection.

Table A2.1 shows descriptive statistics for children whose parents are going to separate (but are not separated yet) compared with those whose parents will never separate. The former group has lower cognitive and non-cognitive skills. Their primary care giver is more likely to be a student.

Children whose parents are going to separate spend on average more time on educational activities and passive leisure and less time in active leisure. They spend on average less time with both parents present or involved. They spend less time with at least one parent. These statistics suggest that both parents spend already less time together and are less present at home when a separation is about to occur. This could be the reason why they separate or a reflection of the couple's troubles.

Table A2.1 – Differences between those who will never separate and those who are going to separate.

Panel A : Child Development and Demographic variables		
	Mean	Difference
Reading Score		
Future separation	-0.107 (0.0989)	
Never separated parents	0.274** (0.0222)	
Difference (T-test)		-0.381** (0.101)
Math Score		
Future separation	-0.0157 (0.0731)	
Never separated parents	0.308** (0.0232)	
Difference (T-test)		-0.324**

Continued on next page

TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
		(0.0767)
Non Cognitive Skills		
Future separation	-0.128 (0.0806)	
Never separated parents	0.143** (0.0207)	
Difference (T-test)		-0.271** (0.0832)
Internalising BPI		
Future separation	-0.122 (0.0777)	
Never separated parents	0.0810** (0.0208)	
Difference (T-test)		-0.203* (0.0805)
Externalising BPI		
Future separation	-0.120 (0.0814)	
Never separated parents	0.170** (0.0207)	
Difference (T-test)		-0.290** (0.0840)
PCG - Worker		
Future separation	0.657** (0.0296)	
Never separated parents	0.680** (0.00987)	
Difference (T-test)		-0.0224 (0.0312)
PCG - Looking for work		
Future separation	0.0339** (0.0101)	
Never separated parents	0.0285** (0.00363)	

Continued on next page

Table A2.1 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		0.00534 (0.0107)
PCG - Housewife		
Future separation	0.237** (0.0261)	
Never separated parents	0.266** (0.00936)	
Difference (T-test)		-0.0290 (0.0277)
PCG - Student		
Future separation	0.0723** (0.0172)	
Never separated parents	0.0113** (0.00194)	
Difference (T-test)		0.0610** (0.0173)
PCG - Other		
Future separation	0 (.)	
Never separated parents	0.0150** (0.00269)	
Difference (T-test)		-0.0150** (0.00269)
Earnings		
Future separation	9.663** (0.0712)	
Never separated parents	9.651** (0.0294)	
Difference (T-test)		0.0123 (0.0770)
Panel B : Time investment variables		
	Mean	Difference
(House)Work		
Future separation	0.0178	

Continued on next page

TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
	(0.0649)	
Never separated parents	0.0256	
	(0.0199)	
Difference (T-test)		-0.00777
		(0.0678)
(House) Work		
Future separation	0.0178	
	(0.0649)	
Never separated parents	0.0256	
	(0.0199)	
Difference (T-test)		-0.00777
		(0.0678)
Personal needs		
Future separation	0.0519	
	(0.0605)	
Never separated parents	0.0168	
	(0.0202)	
Difference (T-test)		0.0352
		(0.0638)
Education		
Future separation	-0.0137	
	(0.0659)	
Never separated parents	-0.0267	
	(0.0212)	
Difference (T-test)		0.0130
		(0.0692)
Active Leisure		
Future separation	-0.0553	
	(0.0593)	
Never separated parents	0.131**	
	(0.0214)	
Difference (T-test)		-0.187**
		(0.0631)
Passive Leisure		

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Table A2.1 – *Continued from previous page*

	Mean	Difference
Future separation	-0.0182 (0.0552)	
Never separated parents	-0.119** (0.0196)	
Difference (T-test)		0.101+ (0.0586)
(House)Work (alone)		
Future separation	0.0896 (0.134)	
Never separated parents	-0.0102 (0.0205)	
Difference (T-test)		0.0998 (0.135)
Personal needs (alone)		
Future separation	0.125 (0.0857)	
Never separated parents	-0.0243 (0.0197)	
Difference (T-test)		0.149+ (0.0879)
Education (alone)		
Future separation	-0.109** (0.0418)	
Never separated parents	0.0978** (0.0220)	
Difference (T-test)		-0.206** (0.0472)
Active Leisure (alone)		
Future separation	-0.0367 (0.0617)	
Never separated parents	0.115** (0.0226)	
Difference (T-test)		-0.151* (0.0657)

Continued on next page

TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
Passive Leisure (alone)		
Future separation	0.0900 (0.0645)	
Never separated parents	-0.0772** (0.0198)	
Difference (T-test)		0.167* (0.0675)
(House)Work (alone) (no one else present)		
Future separation	0.0197 (0.0535)	
Never separated parents	-0.0211 (0.0216)	
Difference (T-test)		0.0407 (0.0577)
Personal needs (alone) (no one else present)		
Future separation	0.00854 (0.0454)	
Never separated parents	-0.0363* (0.0180)	
Difference (T-test)		0.0449 (0.0488)
Education (alone) (no one else present)		
Future separation	-0.00864 (0.0385)	
Never separated parents	0.0118 (0.0209)	
Difference (T-test)		-0.0204 (0.0438)
Active Leisure (alone) (no one else present)		
Future separation	0.0178 (0.0680)	
Never separated parents	0.0494* (0.0207)	
Difference (T-test)		-0.0316

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Table A2.1 – *Continued from previous page*

	Mean	Difference
		(0.0711)
Passive Leisure (alone) (no one else present)		
Future separation	-0.00868 (0.0623)	
Never separated parents	-0.0409* (0.0187)	
Difference (T-test)		0.0322 (0.0650)
(House)Work (with at least one parent)		
Future separation	0.0369 (0.0590)	
Never separated parents	0.0932** (0.0201)	
Difference (T-test)		-0.0563 (0.0623)
Personal needs (with at least one parent)		
Future separation	0.0297 (0.0549)	
Never separated parents	0.182** (0.0211)	
Difference (T-test)		-0.152** (0.0588)
Education (with at least one parent)		
Future separation	-0.0331 (0.0474)	
Never separated parents	0.0325 (0.0216)	
Difference (T-test)		-0.0656 (0.0521)
Active Leisure (with at least one parent)		
Future separation	-0.0628 (0.0543)	
Never separated parents	0.135** (0.0204)	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		-0.198** (0.0580)
Passive Leisure (with at least one parent)		
Future separation	-0.0253 (0.0607)	
Never separated parents	0.108** (0.0197)	
Difference (T-test)		-0.133* (0.0638)
(House)Work (with at least one parent)		
Future separation	0.0775 (0.0762)	
Never separated parents	0.104** (0.0208)	
Difference (T-test)		-0.0270 (0.0790)
Personal needs (with at least one parent)		
Future separation	0.0979+ (0.0579)	
Never separated parents	0.213** (0.0205)	
Difference (T-test)		-0.115+ (0.0614)
Education (with at least one parent)		
Future separation	-0.0600 (0.0495)	
Never separated parents	0.163** (0.0243)	
Difference (T-test)		-0.223** (0.0551)
Active Leisure (with at least one parent)		
Future separation	-0.0171 (0.0629)	
Never separated parents	0.230**	

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Table A2.1 – *Continued from previous page*

	Mean	Difference
	(0.0222)	
Difference (T-test)		-0.247** (0.0667)
Passive Leisure (with at least one parent)		
Future separation	0.0624 (0.0566)	
Never separated parents	0.120** (0.0215)	
Difference (T-test)		-0.0581 (0.0605)
(House)Work (with mother only)		
Future separation	-0.00148 (0.0618)	
Never separated parents	-0.00691 (0.0185)	
Difference (T-test)		0.00543 (0.0645)
Personal needs (with mother only)		
Future separation	-0.0777 (0.0519)	
Never separated parents	-0.143** (0.0176)	
Difference (T-test)		0.0652 (0.0548)
Education (with mother only)		
Future separation	-0.0456 (0.0440)	
Never separated parents	-0.0107 (0.0201)	
Difference (T-test)		-0.0349 (0.0484)
Active Leisure (with mother only)		
Future separation	-0.0193 (0.0540)	

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
Never separated parents	-0.0451** (0.0166)	
Difference (T-test)		0.0258 (0.0565)
Passive Leisure (with mother only)		
Future separation	-0.0696 (0.0614)	
Never separated parents	-0.118** (0.0167)	
Difference (T-test)		0.0484 (0.0636)
(House)Work (with mother only)		
Future separation	0.0320 (0.0904)	
Never separated parents	-0.0385* (0.0183)	
Difference (T-test)		0.0705 (0.0923)
Personal needs (with mother only)		
Future separation	-0.115* (0.0573)	
Never separated parents	-0.181** (0.0168)	
Difference (T-test)		0.0661 (0.0597)
Education (with mother only)		
Future separation	-0.0751+ (0.0435)	
Never separated parents	-0.0106 (0.0219)	
Difference (T-test)		-0.0646 (0.0487)
Active Leisure (with mother only)		
Future separation	-0.0773	

Continued on next page

Table A2.1 – *Continued from previous page*

	Mean	Difference
	(0.0554)	
Never separated parents	-0.0703**	
	(0.0192)	
Difference (T-test)		-0.00699
		(0.0586)
Passive Leisure (with mother only)		
Future separation	-0.126**	
	(0.0468)	
Never separated parents	-0.219**	
	(0.0172)	
Difference (T-test)		0.0931+
		(0.0499)
(House)Work (with father only)		
Future separation	0.0507	
	(0.0609)	
Never separated parents	0.0674**	
	(0.0201)	
Difference (T-test)		-0.0167
		(0.0641)
Personal needs (with father only)		
Future separation	0.207**	
	(0.0726)	
Never separated parents	0.0402*	
	(0.0185)	
Difference (T-test)		0.167*
		(0.0749)
Education (with father only)		
Future separation	0.0346	
	(0.0553)	
Never separated parents	0.0598**	
	(0.0225)	
Difference (T-test)		-0.0252
		(0.0597)
Active Leisure (with father only)		

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
Future separation	-0.00707 (0.0603)	
Never separated parents	0.101** (0.0212)	
Difference (T-test)		-0.108+ (0.0639)
Passive Leisure (with father only)		
Future separation	0.0681 (0.0547)	
Never separated parents	0.152** (0.0226)	
Difference (T-test)		-0.0841 (0.0592)
(House)Work (with father only)		
Future separation	0.0578 (0.0602)	
Never separated parents	0.0677** (0.0207)	
Difference (T-test)		-0.00985 (0.0637)
Personal needs (with father only)		
Future separation	0.188** (0.0699)	
Never separated parents	0.0232 (0.0185)	
Difference (T-test)		0.164* (0.0723)
Education (with father only)		
Future separation	0.0752 (0.0867)	
Never separated parents	0.0647** (0.0237)	
Difference (T-test)		0.0105 (0.0899)

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Table A2.1 – *Continued from previous page*

	Mean	Difference
Active Leisure (with father only)		
Future separation	0.0978 (0.0824)	
Never separated parents	0.0662** (0.0198)	
Difference (T-test)		0.0316 (0.0848)
Passive Leisure (with father only)		
Future separation	0.156* (0.0678)	
Never separated parents	0.0837** (0.0213)	
Difference (T-test)		0.0719 (0.0710)
(House)Work (with parents together)		
Future separation	0.0309 (0.0509)	
Never separated parents	0.169** (0.0249)	
Difference (T-test)		-0.139* (0.0566)
Personal needs (with parents together)		
Future separation	0.0629 (0.0481)	
Never separated parents	0.391** (0.0228)	
Difference (T-test)		-0.329** (0.0532)
Education (with parents together)		
Future separation	-0.0187 (0.0430)	
Never separated parents	0.0644* (0.0278)	
Difference (T-test)		-0.0831

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A2.1 – *Continued from previous page*

	Mean	Difference
		(0.0512)
Active Leisure (with parents together)		
Future separation	-0.0629 (0.0455)	
Never separated parents	0.215** (0.0233)	
Difference (T-test)		-0.277** (0.0511)
Passive Leisure (with parents together)		
Future separation	0.00418 (0.0554)	
Never separated parents	0.248** (0.0227)	
Difference (T-test)		-0.244** (0.0599)
(House)Work (with parents together)		
Future separation	0.0625 (0.0548)	
Never separated parents	0.224** (0.0241)	
Difference (T-test)		-0.162** (0.0599)
Personal needs (with parents together)		
Future separation	0.186** (0.0542)	
Never separated parents	0.447** (0.0216)	
Difference (T-test)		-0.261** (0.0584)
Education (with parents together)		
Future separation	-0.0507 (0.0459)	
Never separated parents	0.248** (0.0261)	

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Table A2.1 – *Continued from previous page*

	Mean	Difference
Difference (T-test)		-0.299** (0.0528)
Active Leisure (with parents together)		
Future separation	0.0150 (0.0527)	
Never separated parents	0.392** (0.0242)	
Difference (T-test)		-0.377** (0.0580)
Passive Leisure (with parents together)		
Future separation	0.179** (0.0587)	
Never separated parents	0.395** (0.0236)	
Difference (T-test)		-0.216** (0.0633)

Notes: The first column shows the mean for each group, the second columns shows the difference between the means of the two groups, using a t-test.

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Figures A2.2 and A2.3 show the distribution of time spent with father only, and with both parents together involved and present among the two groups. Children whose parents are going to separate are more likely to declare spending time with their father only than those whose parents will never separate; on the other hand, they are less likely to declare spending time with their two parents. The separation may therefore not affect time with parents together who already avoid each other before the separation.

Results: Effect of Family Structure on Time Investments

Following Adda et al. (2011) [1], we test another method for controlling for family structure endogeneity. We control for the group whose parents are not separated yet, but are going to separate. The "Not yet broken up" indicate the selection of separation, while the other coefficients will capture a causal effect. This method is similar to a difference-and-difference. Results are reported in Table A2.2.

These results confirm the previous results found with the individual fixed-effects model. There is poor evidence of an effect of family structure on the total allocation of time. Children living in single-parent families spend less time with at least one parent present. However, in this model, I find a decrease in time spent with at least one parent involved in the activity.

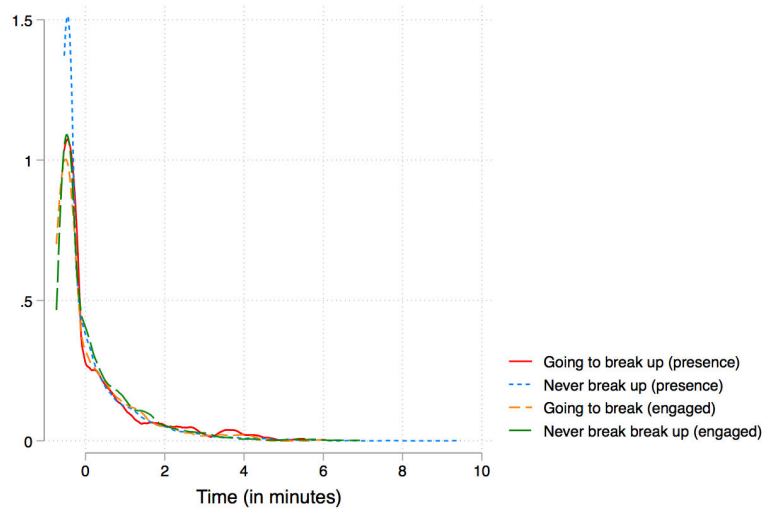


Figure A2.2 – Distribution of time with father (involved or present) among fathers who will separate / never separate

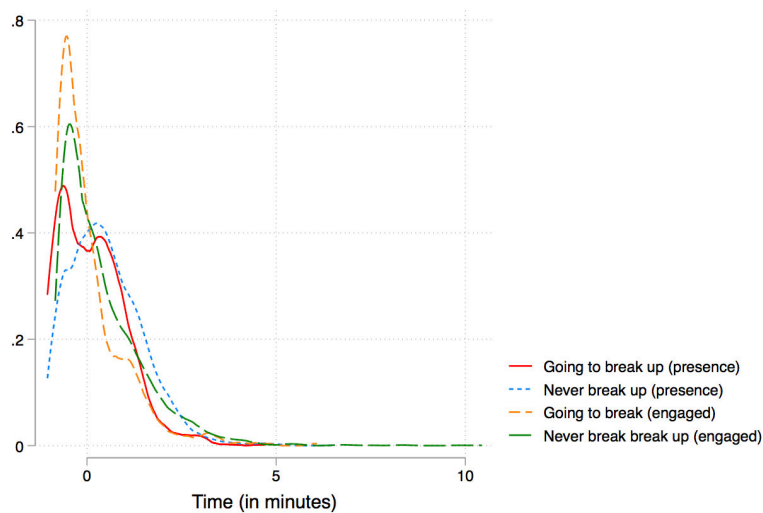


Figure A2.3 – Distribution of time with parents together (involved or present) among parents who will separate / not separate

Table A2.2 – Effect of Family Structure on Total Allocation of Time (controlling for Not yet broken up group)

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.04 (0.06)	-0.10 (0.07)	-0.00 (0.06)	-0.00 (0.06)	0.08 (0.07)
Single Mother (step-parent)	-0.05 (0.07)	-0.08 (0.07)	0.18** (0.06)	-0.16* (0.07)	-0.01 (0.07)
Single Father	-0.07 (0.14)	-0.06 (0.11)	0.09 (0.13)	0.03 (0.12)	-0.07 (0.11)
Other	-0.13 (0.13)	0.14 (0.13)	-0.25* (0.13)	0.23+ (0.12)	-0.06 (0.12)
Not yet broken up	-0.04 (0.06)	-0.09 (0.07)	0.10 (0.07)	-0.05 (0.07)	0.05 (0.06)
Observations	2966	2966	2966	2966	2966
<i>Panel B : Time with at least One Parent : Accessible Time</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.16** (0.06)	-0.36*** (0.05)	-0.19** (0.06)	-0.25*** (0.06)	-0.27*** (0.06)
Single Mother (step-parent)	-0.21** (0.07)	-0.40*** (0.10)	-0.23*** (0.07)	-0.52*** (0.06)	-0.52*** (0.07)
Single Father	-0.32** (0.11)	-0.49*** (0.09)	-0.37*** (0.09)	0.02 (0.14)	-0.39*** (0.11)
Other	-0.43*** (0.09)	-0.74*** (0.11)	-0.53*** (0.07)	-0.48*** (0.09)	-0.84*** (0.11)
Not yet broken up	-0.02 (0.07)	-0.11+ (0.06)	-0.10 (0.06)	-0.14* (0.06)	-0.02 (0.06)
Observations	2966	2966	2966	2966	2966
<i>Panel C : Time with at least One Parent : Engaged Time</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.16* (0.07)	-0.25*** (0.05)	-0.06 (0.05)	-0.29*** (0.06)	-0.22*** (0.06)
Single Mother (step-parent)	-0.21** (0.06)	-0.36*** (0.08)	-0.04 (0.08)	-0.38*** (0.07)	-0.33*** (0.07)
Single Father	-0.34** (0.11)	-0.41*** (0.10)	-0.15+ (0.08)	-0.01 (0.13)	-0.19 (0.12)
Other	-0.44*** (0.08)	-0.58*** (0.10)	-0.24** (0.08)	-0.32** (0.11)	-0.74*** (0.08)
Not yet broken up	-0.02 (0.07)	-0.07 (0.06)	-0.07 (0.05)	-0.19** (0.06)	-0.05 (0.06)

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Table A2.2 – *Continued from previous page*

	(House)Work	Personal Needs	Education	Active Leisure	Passive Leisure
Observations	2966	2966	2966	2966	2966

Notes: Random Effect Results. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included, along with dummies indicating if the child had a father at birth or a deceased parent. I add another control group who has not *yet* broken up.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

A2.3 Estimating Time Input Production Functions: Assumptions of the different estimators.

Table [A2.3](#) summarizes the assumptions of each model used to estimate the Time Input Production Functions

Table A2.3 – Time Input Production Functions: Assumptions of the different estimators.

	Fixed Effect Model	Value Added Model	Cumulative Value Added Model	GMM
Model	$Y_{it} = \Sigma_1^K \gamma_1^k T I_{it}^k + \Sigma_1^K \gamma_2^{kP} P T I_{it}^{kP} + \alpha_i + \epsilon_{it}$ (1)	$Y_{it} = \beta_0 + \Sigma_1^K \gamma_1^k T I_{it}^k + \Sigma_1^K \gamma_2^{kP} P T I_{it}^{kP} + \lambda Y_{it-1} + \epsilon_{it}$ (1)	$Y_{it} = \beta_0 + \Sigma_1^K \gamma_1^k T I_{it}^k + \Sigma_1^K \gamma_2^{kP} P T I_{it}^{kP} + \Sigma_1^K \gamma_3^k T I_{it-1}^k + \Sigma_1^K \gamma_4^{kP} P T I_{it-1}^{kP} + \lambda Y_{it-1} + \epsilon_{it}$ (1)	$Y_{it} = \beta_0 + \Sigma_1^K \gamma_1^K T I_{it}^k + \Sigma_1^K \gamma_2^{k,P} P T I_{it}^{k,P} + \lambda Y_{it-1} + \epsilon_{it}$ (1) $\Delta Y_{it} = \Sigma_1^K \gamma_1^k \Delta T I_{it}^k + \Sigma_1^K \gamma_2^{k,P} \Delta P T I_{it}^{k,P} + \lambda \Delta Y_{it-1} + \Delta v_{it}$ (2)
Assumptions	i) the measurement errors in the child's skills are uncorrelated with inputs and unobserved ability; ii) any omitted input is uncorrelated with included input; iii) the production function is non-age-varying; iv) the effect of inputs (observed or not) is constant by age; v) such as the effect of unobserved abilities; vi) heterogeneity in learning speed is uncorrelated with included input.	i) the measurement errors in the child's skills are uncorrelated with inputs and unobserved ability; ii) any omitted input is uncorrelated with included input; iii) the production function is non-age-varying; iv) the effect of inputs (observed or not) declines with age at a constant rate λ; v) such as the effect of unobserved abilities; vi) heterogeneity in learning speed is uncorrelated with included input.	i) the measurement errors in the child's skills are uncorrelated with inputs and unobserved ability; ii) any omitted input is uncorrelated with included input; iii) relaxed; iv) relaxed; v) such as the effect of unobserved abilities; vi) heterogeneity in learning speed is uncorrelated with included input.	i) the measurement errors in the child's skills are uncorrelated with inputs and unobserved ability; ii) any omitted input is uncorrelated with included input; iii) the production function is non-age-varying; iv) the effect of inputs (observed or not) declines with age at a constant rate λ; v) such as the effect of unobserved abilities; vi) relaxed.
Results	Results are available in Section A3.3 .	Results are available in Section 6.1.	Results are available in Section 6.2.2 .	Results are available in Section 6.2.3 .
Remarks		γ_1^k and γ_2^k are allowed to differ across child's gender and their family background. Results are in Section 6.2.1 .	Del Boca et al. (2017) [54] test this model's assumptions. To test assumption i), they use an analytic correction formula and do not find evidence of any bias caused by measurement errors. To test assumption ii), they add school inputs, early childhood inputs and children's health shocks, but results are not affected.	Our instruments are past inputs for (1) and twice lagged outcomes as well as past inputs for (2). This accounts for potential feedback effects, the adaptation of child's and parental time investments to the variation in child's outcomes.

A3 Additional Tables

A3.1 Effect of Family Structure on Child and Parental Time Investments, excluding those who get back together

There are some children who live in two-parent families, whereas they were in a single-parent families in the previous wave: 46 observations that become two-parent families in the second wave, and 18 in the third wave; this represents only 4% of all two parents families; but it represents one transition over 5 for the single mother / two-parents transitions or single mother with a step parent / two-parents families transitions. These transitions might not be equivalent. If a parental separation is assimilated to a loss, then the loss of having their parents getting separated might not be equivalent to the gain of having the parent getting back together. To check is there is an asymmetry, I replicate the results without those whose parents get back together (transitions from single-parent families to two-parents families). Table [A3.1](#) reports the results; they are qualitatively similar to the main results, even if the coefficients are less precisely estimated. For single-mother families, the decrease in time spent with at least one parent is slightly lower when children whose parents get back together are excluded, suggesting that the gain from having their parents getting back together is larger in absolute values than the loss of having their parents getting separated.

Table A3.1 – Effect of Family Structure on Child and Parental Time Investments (excluding those whose parents get back together)

<i>Panel A : Total Time (whoever was present)</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	
Single Mother	0.07 (0.13)	0.15 (0.11)	-0.33** (0.11)	0.09 (0.11)	0.06 (0.11)	
Single Mother (step-parent)	0.07 (0.17)	0.03 (0.15)	-0.03 (0.14)	-0.04 (0.15)	-0.03 (0.15)	
Single Father	0.07 (0.21)	0.16 (0.19)	-0.10 (0.23)	0.05 (0.22)	-0.16 (0.18)	
Other	-0.01 (0.24)	0.40* (0.18)	-0.44+ (0.23)	0.11 (0.25)	-0.01 (0.21)	
Constant	-0.57 (0.56)	-0.43 (0.66)	0.43 (0.67)	0.34 (0.57)	0.01 (0.57)	
Observations	2839	2839	2839	2839	2839	
Nb of Clusters	1417.00	1417.00	1417.00	1417.00	1417.00	
<i>Panel B : Time with at least One Parent : Accessible Time</i>						
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.12 (0.13)	-0.08 (0.09)	-0.19 (0.12)	-0.00 (0.11)	-0.16 (0.12)	-0.19+ (0.11)
Single Mother (step-parent)	-0.12 (0.16)	-0.16 (0.17)	-0.29+ (0.16)	-0.28* (0.13)	-0.42** (0.15)	-0.52*** (0.15)
Single Father	-0.07	-0.51**	-0.12	0.18	-0.17	-0.23

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Table A3.1 – *Continued from previous page*

	(0.25)	(0.19)	(0.21)	(0.24)	(0.16)	(0.20)
Other	-0.17	-0.39+	-0.46**	-0.10	-0.42*	-0.55**
	(0.19)	(0.22)	(0.15)	(0.19)	(0.19)	(0.18)
Constant	-0.09	1.92*	0.09	1.43*	0.13	1.26+
	(0.58)	(0.84)	(0.58)	(0.60)	(0.64)	(0.66)
Observations	2839	2839	2839	2839	2839	2839
Nb of Clusters	1417.00	1417.00	1417.00	1417.00	1417.00	1417.00

Panel C : Time with at least One Parent : Engaged Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.11	-0.01	-0.00	0.09	-0.08	-0.05
	(0.14)	(0.10)	(0.10)	(0.11)	(0.10)	(0.11)
Single Mother (step-parent)	-0.15	-0.11	-0.04	-0.03	-0.16	-0.21
	(0.17)	(0.14)	(0.14)	(0.13)	(0.15)	(0.14)
Single Father	-0.15	-0.60**	-0.16	0.02	-0.23	-0.42
	(0.27)	(0.21)	(0.15)	(0.26)	(0.20)	(0.26)
Other	-0.32+	-0.24	-0.17	-0.10	-0.35**	-0.48**
	(0.19)	(0.19)	(0.18)	(0.22)	(0.12)	(0.17)
Constant	-0.14	1.33	-0.59	1.87**	-0.08	0.95
	(0.61)	(0.82)	(0.55)	(0.64)	(0.56)	(0.67)
Observations	2839	2839	2839	2839	2839	2839
Nb of Clusters	1417.00	1417.00	1417.00	1417.00	1417.00	1417.00

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Table A3.1 – *Continued from previous page*

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007 excluding those whose parents get back together.

A3.2 Time input production functions: Additional Tables

Table A3.2 – Time Input Production Functions : Effect of the involvement of at least one parent

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.07+	0.05	0.04
	(0.04)	(0.03)	(0.03)
Education	0.14*	0.09***	0.05*
	(0.06)	(0.03)	(0.03)
Active Leisure	0.11*	0.08**	0.09***
	(0.05)	(0.03)	(0.03)
Passive Leisure	0.05	0.04	−0.01
	(0.05)	(0.03)	(0.03)
(House)Work (with at least one parent)	0.03	−0.01	0.02
	(0.02)	(0.02)	(0.02)
Education (with at least one parent)	−0.01	−0.01	−0.01
	(0.02)	(0.02)	(0.02)
Active Leisure (with at least one parent)	0.00	−0.01	−0.03
	(0.02)	(0.02)	(0.02)
Passive Leisure (with at least one parent)	−0.03	−0.00	0.04+
	(0.03)	(0.02)	(0.02)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
wald_test_one_parent	0.53	0.91	0.20

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table A3.3 – Time Input Production Functions : Does who is involved matter? (Engaged Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.07+	0.05+	0.04
	(0.04)	(0.03)	(0.03)
Education	0.14*	0.09**	0.05+
	(0.06)	(0.03)	(0.03)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A3.3 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Active Leisure	0.12* (0.05)	0.09** (0.03)	0.09*** (0.03)
Passive Leisure	0.05 (0.05)	0.04 (0.03)	-0.00 (0.03)
(House)Work (with at least one parent)	0.05* (0.03)	0.00 (0.02)	0.03 (0.03)
Education (with at least one parent)	-0.02 (0.02)	-0.03 (0.03)	-0.03 (0.03)
Active Leisure (with at least one parent)	-0.01 (0.03)	-0.04 (0.03)	-0.05 (0.03)
Passive Leisure (with at least one parent)	-0.02 (0.03)	-0.00 (0.03)	0.07* (0.03)
(House)Work (with parents together)	-0.05** (0.02)	0.00 (0.02)	-0.01 (0.02)
Education (with parents together)	-0.01 (0.02)	0.04 (0.03)	0.00 (0.02)
Active Leisure (with parents together)	0.05+ (0.03)	0.02 (0.03)	0.03 (0.03)
Passive Leisure (with parents together)	-0.03 (0.04)	-0.01 (0.02)	-0.03 (0.02)
(House)Work (with father only)	-0.00 (0.03)	-0.04* (0.02)	-0.02 (0.02)
Education (with father only)	0.02 (0.02)	0.02 (0.02)	0.03 (0.02)
Active Leisure (with father only)	-0.04 (0.03)	0.03 (0.02)	-0.00 (0.02)
Passive Leisure (with father only)	0.01 (0.02)	0.01 (0.02)	-0.04+ (0.02)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_both_parents	0.03	0.73	0.77
Wald_Test_father	0.39	0.06	0.13

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Table A3.3 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
<i>Notes:</i> Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Source : PSID - CDS, waves 1997, 2002 and 2007			

Table A3.4 – Time Input Production Functions : Does gender matter? (Accessible Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.03 (0.05)	0.04 (0.04)	-0.01 (0.05)
Female=1 × (House)Work	0.07 (0.08)	0.00 (0.06)	0.09 (0.07)
Education	0.09* (0.04)	0.10** (0.04)	0.10** (0.04)
Female=1 × Education	0.04 (0.13)	-0.05 (0.06)	-0.07 (0.05)
Active Leisure	0.04 (0.03)	0.09* (0.03)	0.15*** (0.04)
Female=1 × Active Leisure	0.15 (0.10)	0.02 (0.06)	-0.16* (0.06)
Passive Leisure	0.00 (0.06)	0.02 (0.04)	-0.01 (0.05)
Female=1 × Passive Leisure	0.10 (0.10)	0.07 (0.06)	-0.04 (0.07)
(House)Work (with at least one parent)	0.12* (0.05)	0.03 (0.05)	0.04 (0.07)
Female=1 × (House)Work (with at least one parent)	-0.09 (0.06)	-0.01 (0.06)	-0.06 (0.08)
Education (with at least one parent)	-0.03 (0.08)	0.04 (0.07)	-0.06 (0.05)
Female=1 × Education (with at least one parent)	0.06 (0.09)	-0.00 (0.08)	0.09 (0.07)
Active Leisure (with at least one parent)	-0.02 (0.04)	-0.05 (0.04)	-0.03 (0.04)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.4 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Female=1 × Active Leisure (with at least one parent)	-0.02 (0.07)	0.04 (0.07)	0.11 (0.07)
Passive Leisure (with at least one parent)	0.02 (0.04)	0.00 (0.04)	0.05 (0.05)
Female=1 × Passive Leisure (with at least one parent)	-0.03 (0.07)	-0.04 (0.06)	0.03 (0.07)
(House)Work (with parents together)	-0.09** (0.03)	-0.05+ (0.03)	-0.02 (0.04)
Female=1 × (House)Work (with parents together)	0.07 (0.05)	0.07 (0.04)	0.03 (0.05)
Education (with parents together)	0.08 (0.06)	-0.01 (0.04)	-0.00 (0.04)
Female=1 × Education (with parents together)	-0.08 (0.07)	-0.02 (0.06)	-0.05 (0.06)
Active Leisure (with parents together)	0.03 (0.04)	0.04 (0.04)	0.02 (0.04)
Female=1 × Active Leisure (with parents together)	0.05 (0.06)	-0.06 (0.06)	-0.06 (0.06)
Passive Leisure (with parents together)	0.00 (0.04)	0.02 (0.03)	0.01 (0.04)
Female=1 × Passive Leisure (with parents together)	-0.08 (0.06)	-0.05 (0.05)	-0.01 (0.06)
(House)Work (with father only)	-0.05* (0.02)	-0.06+ (0.03)	-0.03 (0.03)
Female=1 × (House)Work (with father only)	0.14+ (0.07)	0.02 (0.05)	0.02 (0.05)
Education (with father only)	-0.00 (0.03)	0.02 (0.02)	0.05* (0.03)
Female=1 × Education (with father only)	0.07 (0.04)	-0.00 (0.05)	-0.07 (0.05)
Active Leisure (with father only)	0.01 (0.03)	0.05+ (0.03)	-0.04 (0.03)
Female=1 × Active Leisure (with father only)	-0.05 (0.04)	-0.04 (0.05)	0.00 (0.05)
Passive Leisure (with father only)	-0.02 (0.02)	0.00 (0.02)	0.01 (0.03)
Female=1 × Passive Leisure (with father only)	0.01 (0.04)	-0.01 (0.04)	-0.07 (0.04)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_whoever	0.53	0.48	0.01
Wald_Test_one_parent	0.53	0.96	0.17

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Table A3.4 – Continued from previous page

	Reading Score	Math Score	Non Cognitive Skills
Wald_Test_both_father	0.01	0.73	0.46
Wald_Test_both	0.24	0.29	0.68
Wald_Test_father	0.13	0.92	0.18

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table A3.5 – Time Input Production Functions : Does Primary Care Giver's Education matter? (Accessible Time)

	Reading Score	Math Score	Non Cognitive Skills
More Highly Educated $\times$ (House)Work	0.18* (0.09)	0.04 (0.06)	0.03 (0.07)
More Highly Educated $\times$ Education	0.14 (0.13)	-0.02 (0.06)	0.13* (0.06)
More Highly Educated $\times$ Active Leisure	0.18+ (0.11)	0.05 (0.05)	0.13* (0.06)
More Highly Educated $\times$ Passive Leisure	0.18 (0.12)	0.00 (0.07)	0.06 (0.07)
More Highly Educated $\times$ (House)Work (with at least one parent)	-0.11+ (0.06)	-0.09 (0.06)	0.10 (0.07)
More Highly Educated $\times$ Education (with at least one parent)	0.02 (0.09)	0.07 (0.08)	0.07 (0.07)
More Highly Educated $\times$ Active Leisure (with at least one parent)	-0.10 (0.07)	-0.02 (0.07)	-0.02 (0.07)
More Highly Educated $\times$ Passive Leisure (with at least one parent)	-0.16+ (0.08)	-0.01 (0.07)	0.07 (0.07)
More Highly Educated $\times$ (House)Work (with parents together)	0.04 (0.05)	0.07 (0.04)	-0.07 (0.05)
More Highly Educated $\times$ Education (with parents together)	0.05 (0.07)	0.05 (0.06)	-0.04 (0.06)
More Highly Educated $\times$ Active Leisure (with parents together)	0.05 (0.06)	-0.02 (0.06)	0.04 (0.06)
More Highly Educated $\times$ Passive Leisure (with parents together)	0.07 (0.06)	0.03 (0.05)	-0.02 (0.06)
More Highly Educated $\times$ (House)Work (with father only)	0.10 (0.06)	-0.01 (0.05)	-0.04 (0.05)
More Highly Educated $\times$ Education (with father only)	-0.02 (0.05)	-0.01 (0.04)	-0.01 (0.05)
More Highly Educated $\times$ Active Leisure (with father only)	-0.04 (0.05)	-0.03 (0.05)	0.06 (0.05)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL SEPARATION ON CHILD DEVELOPMENT

Table A3.5 – Continued from previous page

	Reading Score	Math Score	Non Cognitive Skills
More Highly Educated × Passive Leisure (with father only)	0.03 (0.04)	-0.02 (0.04)	-0.06 (0.05)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00
Wald_Test_whoever	0.30	0.73	0.09
Wald_Test_one_parent	0.04	0.59	0.23
Wald_Test_both_father	0.34	0.38	0.53
Wald_Test_both	0.15	0.29	0.55
Wald_Test_father	0.51	0.80	0.35

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table A3.6 – Cumulative Value Added Time Input Production Functions (Engaged Time)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.07+ (0.04)	0.06+ (0.03)	0.04 (0.03)
Education	0.13* (0.06)	0.10*** (0.03)	0.05+ (0.03)
Active Leisure	0.12* (0.05)	0.10*** (0.03)	0.09*** (0.03)
Passive Leisure	0.05 (0.05)	0.05+ (0.03)	-0.00 (0.03)
L.(House)Work	0.01 (0.04)	0.00 (0.04)	-0.04 (0.04)
L.Education	-0.03 (0.05)	0.01 (0.03)	-0.01 (0.03)
L.Active Leisure	-0.05 (0.04)	0.03 (0.03)	-0.01 (0.03)
L.Passive Leisure	-0.04 (0.03)	-0.01 (0.03)	0.01 (0.03)
(House)Work (with at least one parent)	0.04* (0.02)	-0.01 (0.02)	0.02 (0.03)
Education (with at least one parent)	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)
Active Leisure (with at least one parent)	-0.00 (0.02)	-0.02 (0.02)	-0.04* (0.02)
Passive Leisure (with at least one parent)	-0.04 (0.03)	0.01 (0.02)	0.05* (0.02)

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Table A3.6 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
L.(House)Work (with at least one parent)	-0.02 (0.03)	-0.00 (0.03)	0.02 (0.04)
L.Education (with at least one parent)	-0.03 (0.02)	-0.00 (0.02)	0.04* (0.02)
L.Active Leisure (with at least one parent)	0.03 (0.03)	0.00 (0.02)	0.02 (0.02)
L.Passive Leisure (with at least one parent)	0.02 (0.03)	-0.00 (0.02)	-0.00 (0.02)
Observations	1326	1604	1682
Nb of Clusters	1213.00	1287.00	1347.00
Wald_Test_all	0.03	0.05	0.02
Wald_Test_one_parent	0.26	0.99	0.06

Notes: Cumulative Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time with other adults are included. "L." denotes the one-period lag of the variable.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table A3.7 – Time Input Production Functions and Feedback Effects: Does who is involved matter? (Engaged Time)

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
African American	-0.31*** (0.06)	-0.40*** (0.10)	-0.47*** (0.05)	-0.55*** (0.07)	0.14** (0.05)	0.13+ (0.07)
Hispanic	-0.25* (0.10)	-0.15 (0.14)	-0.18+ (0.09)	-0.21* (0.11)	0.22* (0.09)	0.18+ (0.10)
Asian, Pacific	0.22 (0.17)	0.41* (0.20)	0.44+ (0.24)	0.58* (0.29)	-0.17 (0.27)	-0.24 (0.27)
American Indian	-0.86*** (0.08)	-0.86** (0.28)	-0.89*** (0.09)	-1.14*** (0.24)	0.27*** (0.08)	0.45* (0.20)
Other	-0.14 (0.14)	-0.22 (0.24)	-0.18 (0.13)	-0.21 (0.17)	-0.13 (0.13)	-0.10 (0.13)
Female	0.10* (0.05)	0.17+ (0.09)	-0.06 (0.04)	-0.12* (0.06)	0.01 (0.04)	0.04 (0.06)
PCG Education	0.06***	0.09***	0.05***	0.07***	0.00	-0.00

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.7 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
No father	-0.03	-0.10	-0.19	-0.17	0.10	-0.00
	(0.14)	(0.22)	(0.21)	(0.24)	(0.18)	(0.20)
Age	0.01	0.02	-0.00	-0.00	0.03***	0.02+
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Number of siblings	-0.00	-0.02	0.03**	0.03*	0.02+	0.03+
	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)
PCG working status - looking for a job	0.01	-0.06	-0.05	-0.22+	-0.06	-0.07
	(0.09)	(0.13)	(0.10)	(0.11)	(0.13)	(0.14)
PCG working status - housewife	0.01	-0.06	0.01	-0.02	0.15	0.17
	(0.08)	(0.12)	(0.09)	(0.10)	(0.09)	(0.11)
PCG working status - student	-0.19	-0.29	0.09	-0.02	0.55	0.39
	(0.23)	(0.49)	(0.24)	(0.28)	(0.34)	(0.28)
PCG working status - other	-0.02	0.14	-0.22	0.04	0.14	0.17
	(0.12)	(0.24)	(0.27)	(0.17)	(0.30)	(0.27)
Earnings	-0.01	-0.02	0.00	-0.01	0.05*	0.09***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Single Mother	-0.09	-0.16	-0.00	-0.04	-0.14*	-0.16*
	(0.06)	(0.11)	(0.06)	(0.08)	(0.06)	(0.08)
Single Mother (step-parent)	-0.15*	-0.04	-0.03	-0.03	-0.20*	-0.17
	(0.08)	(0.12)	(0.08)	(0.10)	(0.10)	(0.11)
Single Father	-0.26***	-0.40*	-0.19+	-0.20	-0.16	-0.20
	(0.08)	(0.16)	(0.10)	(0.12)	(0.15)	(0.18)
Other	-0.27**	-0.18	-0.03	-0.02	-0.07	-0.09
	(0.10)	(0.19)	(0.12)	(0.15)	(0.14)	(0.16)
Deceased Father	-0.01	-0.04	0.12	0.14	-0.07	-0.11
	(0.14)	(0.19)	(0.15)	(0.17)	(0.13)	(0.14)
Deceased Mother	0.25	0.55	0.12	0.11	-0.18	0.14
	(0.21)	(0.35)	(0.14)	(0.25)	(0.31)	(0.35)
(House)Work	0.07+	0.22	0.06+	0.16+	0.04	-0.06
	(0.04)	(0.15)	(0.03)	(0.09)	(0.03)	(0.09)
Education	0.13*	0.22	0.10***	0.04	0.05+	0.07
	(0.06)	(0.17)	(0.03)	(0.07)	(0.03)	(0.06)
Active Leisure	0.12*	0.27+	0.10***	0.04	0.10***	0.13*
	(0.05)	(0.16)	(0.03)	(0.06)	(0.03)	(0.06)
Passive Leisure	0.05	0.06	0.05+	-0.03	0.00	0.00
	(0.05)	(0.15)	(0.03)	(0.08)	(0.03)	(0.08)
(House)Work (with at least one parent)	0.07**	-0.02	0.00	-0.06	0.03	0.20*
	(0.02)	(0.10)	(0.03)	(0.08)	(0.03)	(0.08)
Education (with at least one parent)	-0.02	-0.18	-0.04	-0.09	-0.03	-0.09
	(0.02)	(0.13)	(0.03)	(0.06)	(0.03)	(0.06)

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Table A3.7 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Active Leisure (with at least one parent)	-0.00 (0.03)	0.25 (0.16)	-0.05 (0.04)	0.15 (0.10)	-0.06+ (0.03)	0.02 (0.10)
Passive Leisure (with at least one parent)	-0.02 (0.03)	0.14 (0.10)	0.02 (0.03)	0.12+ (0.06)	0.09** (0.03)	0.09 (0.06)
(House)Work (with parents together)	-0.06** (0.02)	-0.08 (0.07)	0.00 (0.02)	-0.01 (0.04)	-0.00 (0.02)	-0.07 (0.05)
Education (with parents together)	-0.01 (0.02)	0.12 (0.08)	0.04 (0.03)	0.15* (0.06)	0.01 (0.02)	-0.05 (0.06)
Active Leisure (with parents together)	0.04+ (0.03)	0.02 (0.12)	0.02 (0.03)	-0.05 (0.08)	0.03 (0.03)	0.03 (0.08)
Passive Leisure (with parents together)	-0.03 (0.04)	-0.18+ (0.10)	-0.02 (0.02)	-0.10 (0.06)	-0.03 (0.02)	-0.03 (0.06)
(House)Work (with father only)	-0.01 (0.03)	0.06 (0.14)	-0.05* (0.02)	-0.01 (0.07)	-0.02 (0.02)	-0.12* (0.06)
Education (with father only)	0.02 (0.02)	0.06 (0.10)	0.02 (0.02)	-0.00 (0.04)	0.04+ (0.02)	0.02 (0.05)
Active Leisure (with father only)	-0.05+ (0.03)	-0.05 (0.11)	0.03 (0.02)	-0.07 (0.06)	-0.00 (0.02)	-0.06 (0.06)
Passive Leisure (with father only)	0.02 (0.02)	-0.09 (0.10)	0.01 (0.02)	0.02 (0.06)	-0.04 (0.02)	-0.05 (0.07)
Other parental time	0.02 (0.02)	0.03 (0.07)	-0.00 (0.02)	-0.07 (0.06)	-0.00 (0.02)	-0.00 (0.06)
Time spent with a grand parent (alone)	0.03 (0.02)	-0.05 (0.09)	-0.01 (0.02)	0.01 (0.05)	0.01 (0.03)	-0.03 (0.06)
Time spent with a step-mother (alone)	-0.01* (0.01)	0.07 (0.10)	-0.00 (0.01)	-0.07 (0.05)	-0.03+ (0.01)	-0.08 (0.06)
Time spent with a step father (alone)	0.02 (0.03)	-0.05 (0.09)	0.02* (0.01)	-0.04 (0.05)	0.00 (0.01)	-0.04 (0.04)
Other Adult Time	-0.01 (0.01)	-0.10 (0.10)	-0.01 (0.01)	0.02 (0.04)	-0.00 (0.02)	-0.03 (0.05)
Reading Score (t-1)	0.48*** (0.06)	0.16 (0.14)				
Math Score (t-1)			0.43*** (0.03)	0.29*** (0.08)		
Non Cognitive Skills (t-1)					0.46*** (0.02)	0.35*** (0.08)
Constant	-0.82** (0.26)	-0.97** (0.35)	-0.54* (0.22)	-0.48+ (0.26)	-0.95*** (0.26)	-1.12*** (0.28)
Observations	1326	1326	1604	1604	1682	1682
Wald_Test_all	0.00	0.08	0.01	0.20	0.05	0.02
Wald_Test_one_parent	0.10	0.24	0.40	0.13	0.02	0.01

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A3.7 – *Continued from previous page*

	Reading Score		Math Score		Non Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Wald_Test_both	0.02	0.13	0.59	0.09	0.64	0.50
Wald_Test_father	0.28	0.76	0.07	0.81	0.10	0.12

Notes: See previous Tables for the description of the variables and the controls. For each outcome, the first column shows the results of the Value-Added Model previously estimated, the second column shows GMM estimates. " $(t - 1)$ " denotes the one-period lag of the variable.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007. *Balanced Panel.*

A3.3 Time Input Production Functions: Fixed-Effect Results

Tables A3.8 and A3.9 report the results for the Individual Fixed-Effect model. As mentioned in Section 4, this model relies on different assumptions. Nevertheless, results are qualitatively the same as the Value-Added one's. The effect of allocation of time on cognitive skills is smaller but remains positive. On the other hand, the effect of allocation of time on non-cognitive skills is stronger. Results on the effect of the presence of parents on the child development are similar.

Table A3.8 – Time Input Production Functions : Total Time (whoever was present)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.04+ (0.02)	0.02 (0.02)	0.06** (0.02)
Education	0.06 (0.04)	0.04+ (0.03)	0.07* (0.03)
Active Leisure	0.04 (0.04)	0.04 (0.03)	0.10*** (0.03)
Passive Leisure	0.01 (0.03)	0.01 (0.03)	0.03 (0.03)
Observations	2316	2566	2657
Nb of Clusters	1377.00	1411.00	1431.00
Wald_Test	0.23	0.51	0.00

Notes: Individual Fixed-Effects Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, PCG's employment status and earnings are included. Controls for total time with other adults are included. Family Structure is also controlled for, including dummies indicating a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007. Balanced Panel.

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Table A3.9 – Time Input Production Functions : Effect of the presence of at least one parent

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.04 (0.03)	0.03 (0.03)	0.06+ (0.03)
Education	0.06 (0.04)	0.04 (0.03)	0.08** (0.03)
Active Leisure	0.04 (0.04)	0.04 (0.03)	0.11*** (0.03)
Passive Leisure	0.01 (0.04)	0.01 (0.03)	−0.03 (0.03)
(House)Work (with at least one parent)	−0.00 (0.02)	−0.01 (0.03)	−0.02 (0.03)
Education (with at least one parent)	0.01 (0.02)	0.01 (0.02)	−0.01 (0.02)
Active Leisure (with at least one parent)	0.02 (0.02)	−0.00 (0.02)	−0.00 (0.03)
Passive Leisure (with at least one parent)	0.01 (0.03)	0.01 (0.02)	0.11*** (0.03)
Observations	2316	2566	2657
Nb of Clusters	1377.00	1411.00	1431.00
wald_test_one_parent	0.88	0.95	0.00

Notes: Individual Fixed-Effects Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, PCG's employment status and earnings are included. Controls for total time with other adults are included. Family Structure is also controlled for, including dummies indicating a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007. Balanced Panel.

A3.4 Omitted variables

Controlling for parenting style. (Tables [A3.10](#) and [A3.11](#))

Parenting style are measured by four indicators that scales from 0 to 5: positive behaviour, warmth and Rosenberg self-esteem scale. Positive behaviour is build from 10 questions about how the child is curious, obedient, or admired for example. Warmth is measured from 7 questions such as how often the parents says that they love their child, talk about the child's interest, told the child they appreciated what they did. The higher the score, the higher parental warmth. Rosenberg self-esteem scale is built from 10 questions.

Results are qualitatively similar when parenting style is accounted for.

Controlling for neighborhood. (Tables [A3.12](#) and [A3.13](#))

Neighborhood is an indicator of the quality of the neighborhood. The Primary Care Giver answers the following question: "How would you rate your neighborhood as a place to raise children?". 1 is for excellent, 5 if for poor. Results are qualitatively the same.

Table A3.10 – Effect of Family Structure on Child and Parental Time Investments (controlling for parenting style)

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	-0.03 (0.13)	0.09 (0.12)	-0.14 (0.11)	0.12 (0.11)	-0.05 (0.11)
Single Mother (step-parent)	-0.03 (0.18)	-0.01 (0.17)	0.04 (0.14)	0.08 (0.17)	-0.14 (0.15)
Single Father	0.04 (0.21)	0.10 (0.18)	0.03 (0.23)	-0.09 (0.22)	-0.10 (0.18)
Other	-0.11 (0.23)	0.30 (0.19)	-0.33 (0.22)	0.22 (0.24)	-0.08 (0.20)
Deceased Father	0.03 (0.40)	0.08 (0.49)	-0.08 (0.27)	-0.08 (0.41)	-0.19 (0.39)
Deceased Mother	-1.51 (1.48)	0.18 (0.47)	0.73 (0.86)	-0.35 (0.43)	0.22 (0.26)
Age	-0.02* (0.01)	-0.01 (0.01)	0.01+ (0.01)	0.01 (0.01)	-0.02* (0.01)
PCG Education	0.02 (0.03)	0.00 (0.04)	-0.02 (0.04)	-0.00 (0.04)	-0.00 (0.04)
PCG working status - looking for a job	-0.18 (0.19)	0.19 (0.17)	0.07 (0.15)	-0.10 (0.13)	0.11 (0.18)
PCG working status - housewife	0.13 (0.14)	0.07 (0.13)	-0.27* (0.12)	0.05 (0.10)	0.15 (0.12)
PCG working status - student	-0.56*	-0.07	-0.04	-0.02	0.49

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Table A3.10 – *Continued from previous page*

	(0.26)	(0.33)	(0.25)	(0.23)	(0.31)
PCG working status - other	-0.27	0.03	-0.18	-0.14	0.29
	(0.59)	(0.31)	(0.52)	(0.34)	(0.34)
Number of siblings	-0.01	0.00	0.04	-0.00	-0.03
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Earnings	0.06	0.00	0.02	-0.04	-0.01
	(0.04)	(0.05)	(0.04)	(0.03)	(0.04)
Positive Behaviour	0.02	-0.04+	-0.00	0.03	0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Parental Warmth	-0.01	-0.07	0.12+	0.06	-0.13*
	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)
Parental Self-Esteem	-0.02	-0.03	-0.00	-0.00	0.05*
	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Constant	-0.54	0.49	-0.53	-0.12	0.64
	(0.67)	(0.73)	(0.73)	(0.67)	(0.67)
Observations	2772	2772	2772	2772	2772
Nb of Clusters	1449.00	1449.00	1449.00	1449.00	1449.00

Panel B : Time with at least One Parent : Accessible Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.28*	-0.07	-0.18	0.00	-0.25*	-0.27**
	(0.13)	(0.09)	(0.12)	(0.10)	(0.11)	(0.10)
Single Mother (step-parent)	-0.26	-0.14	-0.26+	-0.21	-0.45**	-0.53***

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Table A3.10 – *Continued from previous page*

	(0.19)	(0.17)	(0.15)	(0.13)	(0.15)	(0.15)
Single Father	-0.16	-0.52**	-0.11	-0.02	-0.19	-0.34+
	(0.24)	(0.18)	(0.21)	(0.20)	(0.17)	(0.19)
Other	-0.26	-0.35	-0.45**	-0.12	-0.41*	-0.56**
	(0.19)	(0.22)	(0.14)	(0.17)	(0.18)	(0.18)
Deceased Father	0.41+	-0.21	-0.09	-0.03	-0.09	-0.03
	(0.22)	(0.31)	(0.22)	(0.27)	(0.32)	(0.29)
Deceased Mother	0.95	1.64**	-0.22	0.03	0.15	0.71
	(0.97)	(0.55)	(0.30)	(0.22)	(0.49)	(0.69)
Age	-0.01	0.01	0.01	0.02*	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PCG Education	0.04	-0.08	-0.00	-0.02	0.01	-0.01
	(0.03)	(0.05)	(0.04)	(0.03)	(0.04)	(0.04)
PCG working status - looking for a job	0.04	0.38*	0.11	-0.03	-0.03	0.09
	(0.20)	(0.18)	(0.15)	(0.15)	(0.20)	(0.17)
PCG working status - housewife	0.27*	0.21+	-0.07	0.25*	0.18	0.37***
	(0.13)	(0.11)	(0.22)	(0.12)	(0.11)	(0.11)
PCG working status - student	-0.60*	-0.17	-0.33	-0.33	0.22	-0.33
	(0.29)	(0.36)	(0.26)	(0.21)	(0.33)	(0.35)
PCG working status - other	-0.37	0.58+	-0.13	0.03	0.55	0.29
	(0.47)	(0.31)	(0.21)	(0.45)	(0.59)	(0.53)
Number of siblings	0.00	-0.01	-0.06	0.01	-0.00	-0.01
	(0.02)	(0.02)	(0.04)	(0.03)	(0.02)	(0.02)

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Table A3.10 – *Continued from previous page*

Earnings	0.01 (0.04)	-0.04 (0.04)	0.04 (0.04)	-0.08* (0.04)	-0.01 (0.04)	-0.05 (0.04)
Positive Behaviour	0.01 (0.02)	-0.06** (0.02)	0.01 (0.02)	0.02 (0.02)	0.04+ (0.02)	0.01 (0.02)
Parental Warmth	0.07 (0.06)	0.14* (0.06)	-0.00 (0.06)	0.11+ (0.06)	0.04 (0.05)	0.12* (0.05)
Parental Self-Esteem	-0.02 (0.03)	0.02 (0.02)	-0.01 (0.03)	-0.02 (0.02)	0.02 (0.02)	-0.00 (0.02)
Constant	-0.77 (0.65)	1.08 (0.87)	-0.22 (0.71)	0.51 (0.69)	-0.35 (0.69)	0.16 (0.72)
Observations	2772	2772	2772	2772	2772	2772
Nb of Clusters	1449.00	1449.00	1449.00	1449.00	1449.00	1449.00

Panel C : Time with at least One Parent : Engaged Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.24+ (0.13)	0.03 (0.10)	-0.00 (0.09)	-0.02 (0.08)	-0.03 (0.10)	-0.10 (0.10)
Single Mother (step-parent)	-0.21 (0.17)	-0.07 (0.14)	-0.01 (0.14)	-0.05 (0.14)	-0.07 (0.15)	-0.16 (0.15)
Single Father	-0.22 (0.26)	-0.57** (0.20)	-0.14 (0.15)	-0.16 (0.23)	-0.15 (0.17)	-0.45+ (0.24)
Other	-0.38* (0.18)	-0.22 (0.18)	-0.11 (0.17)	-0.16 (0.21)	-0.25* (0.11)	-0.46** (0.17)

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Table A3.10 – *Continued from previous page*

Deceased Father	0.21 (0.20)	-0.42 (0.28)	0.21 (0.33)	-0.05 (0.13)	-0.61** (0.23)	-0.35 (0.22)
Deceased Mother	0.87 (1.00)	1.59* (0.65)	0.10 (0.24)	0.37 (0.26)	-0.75 (0.70)	0.62 (0.84)
Age	-0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)
PCG Education	0.03 (0.04)	-0.05 (0.05)	0.02 (0.04)	-0.05 (0.04)	-0.00 (0.03)	-0.02 (0.04)
PCG working status - looking for a job	0.11 (0.19)	0.23 (0.21)	0.02 (0.19)	-0.10 (0.15)	0.24 (0.19)	0.19 (0.18)
PCG working status - housewife	0.29* (0.14)	0.16 (0.11)	-0.17 (0.23)	0.09 (0.13)	0.27* (0.13)	0.32** (0.12)
PCG working status - student	-0.43+ (0.23)	0.19 (0.33)	-0.02 (0.13)	-0.12 (0.13)	0.30 (0.28)	-0.01 (0.26)
PCG working status - other	-0.40 (0.51)	0.52 (0.36)	-0.10 (0.27)	-0.81 (0.54)	0.69+ (0.42)	0.02 (0.49)
Number of siblings	-0.02 (0.03)	-0.02 (0.02)	-0.03 (0.04)	0.00 (0.02)	-0.01 (0.02)	-0.03 (0.02)
Earnings	0.02 (0.04)	-0.04 (0.04)	0.05 (0.04)	-0.06 (0.04)	0.00 (0.04)	-0.02 (0.04)
Positive Behaviour	0.01 (0.02)	-0.04+ (0.02)	0.00 (0.02)	0.02 (0.02)	0.02 (0.02)	-0.00 (0.02)
Parental Warmth	0.02	0.09	0.11*	0.12*	0.02	0.11+

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Table A3.10 – *Continued from previous page*

	(0.06)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)
Parental Self-Esteem	-0.01	-0.01	0.01	0.00	0.02	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Constant	-0.50	0.83	-1.26*	0.61	-0.25	0.02
	(0.68)	(0.90)	(0.64)	(0.72)	(0.64)	(0.74)
Observations	2772	2772	2772	2772	2772	2772
Nb of Clusters	1449.00	1449.00	1449.00	1449.00	1449.00	1449.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Parenting style is also controlled for.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.11 – Time Input Production Functions : Does who is present matter? (Accessible Time) (controlling for parenting style)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.06 (0.05)	0.04 (0.03)	0.04 (0.03)
Education	0.13+ (0.08)	0.07** (0.03)	0.03 (0.03)
Active Leisure	0.10+ (0.06)	0.07* (0.03)	0.07** (0.03)
Passive Leisure	0.05 (0.06)	0.05 (0.03)	-0.01 (0.03)
(House)Work (with at least one parent)	0.07* (0.03)	0.02 (0.04)	-0.00 (0.03)
Education (with at least one parent)	-0.02 (0.05)	0.04 (0.05)	0.03 (0.03)
Active Leisure (with at least one parent)	-0.01 (0.04)	-0.02 (0.03)	0.04 (0.03)
Passive Leisure (with at least one parent)	0.04 (0.03)	-0.01 (0.03)	0.07* (0.03)
Other parental time	0.01 (0.02)	-0.01 (0.02)	0.01 (0.02)
Time spent with a grand parent (alone)	0.05+ (0.02)	-0.00 (0.02)	0.05* (0.02)
Time spent with a step-mother (alone)	-0.00 (0.01)	-0.01 (0.01)	-0.01 (0.01)
Time spent with a step father (alone)	0.03 (0.03)	0.02* (0.01)	0.00 (0.01)
Other Adult Time	-0.01 (0.01)	-0.01 (0.01)	0.00 (0.02)
(House)Work (with parents together)	-0.04+ (0.03)	-0.00 (0.02)	-0.00 (0.02)
Education (with parents together)	0.05 (0.04)	-0.02 (0.03)	-0.03 (0.02)
Active Leisure (with parents together)	0.07+ (0.03)	0.01 (0.03)	0.00 (0.03)
Passive Leisure (with parents together)	-0.07* (0.03)	-0.01 (0.03)	-0.01 (0.03)

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Table A3.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.03)	(0.03)	(0.03)
(House)Work (with father only)	-0.02	-0.04	-0.01
	(0.02)	(0.03)	(0.02)
Education (with father only)	0.02	0.01	0.01
	(0.03)	(0.02)	(0.02)
Active Leisure (with father only)	-0.01	0.03	-0.03+
	(0.03)	(0.02)	(0.02)
Passive Leisure (with father only)	-0.02	-0.01	0.00
	(0.02)	(0.02)	(0.02)
Single Mother	-0.07	0.01	-0.09+
	(0.07)	(0.07)	(0.05)
Single Mother (step-parent)	-0.11	-0.02	-0.10
	(0.08)	(0.08)	(0.08)
Single Father	-0.21*	-0.08	-0.13
	(0.09)	(0.10)	(0.13)
Other	-0.25*	-0.03	-0.06
	(0.10)	(0.12)	(0.11)
No father	-0.04	-0.28	-0.07
	(0.15)	(0.22)	(0.17)
Deceased Father	-0.04	0.23	-0.02
	(0.14)	(0.16)	(0.12)
Deceased Mother	0.28	0.02	-0.13
	(0.21)	(0.15)	(0.25)
Age	0.02	-0.00	0.02*
	(0.01)	(0.01)	(0.01)
PCG Education	0.06***	0.05***	0.00
	(0.01)	(0.01)	(0.01)
African American	-0.34***	-0.52***	0.04
	(0.06)	(0.06)	(0.05)
Hispanic	-0.23*	-0.22*	0.02
	(0.10)	(0.09)	(0.09)
Asian Pacific	0.17	0.62**	-0.13
	(0.19)	(0.21)	(0.24)
American Indian	-0.83***	-0.89***	0.30***

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.09)	(0.10)	(0.07)
Other	-0.16	-0.20	-0.07
	(0.15)	(0.14)	(0.11)
Female	0.09+	-0.07	-0.06
	(0.05)	(0.04)	(0.04)
PCG working status - looking for a job	0.09	-0.05	-0.02
	(0.10)	(0.10)	(0.10)
PCG working status - housewife	0.02	0.01	0.16+
	(0.09)	(0.09)	(0.09)
PCG working status - student	-0.35	0.10	0.41
	(0.24)	(0.26)	(0.31)
PCG working status - other	-0.08	-0.24	0.04
	(0.17)	(0.31)	(0.23)
Number of siblings	-0.00	0.03**	0.01
	(0.01)	(0.01)	(0.01)
Earnings	0.01	0.01	0.05**
	(0.02)	(0.02)	(0.02)
Positive Behaviour	0.16***	0.15***	0.85***
	(0.04)	(0.03)	(0.06)
Parental Warmth	0.00	-0.05	-0.03
	(0.03)	(0.03)	(0.03)
Parental Self-Esteem	0.04	0.02	0.08+
	(0.05)	(0.05)	(0.05)
Reading Score (t-1)	0.48***		
	(0.06)		
Math Score (t-1)		0.41***	
		(0.03)	
Non Cognitive Skills (t-1)			0.30***
			(0.03)
Constant	-1.81***	-0.98**	-4.38***
	(0.35)	(0.32)	(0.35)
Observations	1191	1506	1589
Nb of Clusters	1101.00	1255.00	1327.00
Wald_Test_father	0.58	0.43	0.44

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Table A3.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Wald_Test_both	0.04	0.98	0.64

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Parenting style is also controlled for.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

Table A3.12 – Effect of Family Structure on Child and Parental Time Investments (controlling for neighborhood safety)

<i>Panel A : Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother	0.03 (0.12)	0.05 (0.12)	-0.15 (0.11)	0.14 (0.11)	-0.04 (0.11)
Single Mother (step-parent)	0.04 (0.16)	-0.03 (0.16)	0.16 (0.14)	0.02 (0.16)	-0.23 (0.16)
Single Father	-0.05 (0.22)	0.29 (0.23)	-0.14 (0.27)	0.23 (0.25)	-0.29 (0.22)
Other	-0.14 (0.19)	0.36+ (0.19)	-0.13 (0.25)	-0.07 (0.27)	-0.13 (0.22)
Deceased Father	-0.04 (0.38)	0.07 (0.46)	0.09 (0.24)	-0.22 (0.39)	-0.21 (0.39)
Deceased Mother	-1.38 (1.49)	0.02 (0.51)	0.79 (0.84)	-0.63 (0.43)	0.46+ (0.26)
Age	-0.01* (0.01)	-0.01 (0.01)	0.00 (0.01)	0.01* (0.01)	-0.00 (0.01)
PCG Education	0.05 (0.04)	0.05 (0.06)	-0.07 (0.06)	0.02 (0.05)	-0.02 (0.06)
PCG working status - looking for a job	-0.27 (0.17)	0.16 (0.18)	0.13 (0.15)	-0.28* (0.13)	0.27 (0.17)
PCG working status - housewife	0.14 (0.14)	-0.00 (0.13)	-0.16 (0.13)	0.03 (0.11)	0.08 (0.13)
PCG working status - student	-0.71**	0.35	-0.01	-0.06	0.16

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL SEPARATION ON CHILD DEVELOPMENT

Table A3.12 – *Continued from previous page*

	(0.27)	(0.28)	(0.23)	(0.23)	(0.30)
PCG working status - other	0.40	0.06	-0.86	0.27	0.34
	(0.41)	(0.33)	(0.54)	(0.30)	(0.40)
Number of siblings	0.00	0.00	0.04	-0.02	-0.02
	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
Earnings	-0.01	0.04	0.04	-0.08*	-0.00
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Neighborhood Safety=2	0.08	0.04	-0.16*	0.08	0.03
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Neighborhood Safety=3	-0.04	0.04	-0.23*	0.22*	0.02
	(0.09)	(0.09)	(0.09)	(0.09)	(0.08)
Neighborhood Safety=4	-0.08	0.00	-0.02	0.11	-0.07
	(0.14)	(0.12)	(0.13)	(0.12)	(0.12)
Neighborhood Safety=5	-0.25	0.39	-0.27	-0.03	0.06
	(0.25)	(0.28)	(0.22)	(0.18)	(0.23)
Constant	-0.48	-1.00	0.66	0.39	0.30
	(0.65)	(0.87)	(0.83)	(0.74)	(0.85)
Observations	2660	2660	2660	2660	2660
Nb of Clusters	1430.00	1430.00	1430.00	1430.00	1430.00

Panel B : Time with at least One Parent : Accessible Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.24+	-0.13	-0.25+	0.02	-0.13	-0.21*

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Table A3.12 – *Continued from previous page*

	(0.12)	(0.09)	(0.13)	(0.10)	(0.12)	(0.11)
Single Mother (step-parent)	-0.27	-0.18	-0.26	-0.24+	-0.35*	-0.49**
	(0.17)	(0.17)	(0.17)	(0.13)	(0.16)	(0.16)
Single Father	-0.15	-0.78***	-0.06	0.24	-0.19	-0.25
	(0.26)	(0.21)	(0.22)	(0.24)	(0.19)	(0.22)
Other	-0.38*	-0.43+	-0.49**	-0.21	-0.32	-0.63**
	(0.17)	(0.26)	(0.16)	(0.20)	(0.21)	(0.21)
Deceased Father	0.37+	-0.02	0.03	-0.10	-0.15	-0.04
	(0.21)	(0.31)	(0.21)	(0.24)	(0.32)	(0.28)
Deceased Mother	0.97	1.83***	-0.22	-0.23	0.24	0.67
	(0.96)	(0.53)	(0.33)	(0.28)	(0.47)	(0.66)
Age	-0.01	-0.01*	0.00	0.01*	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
PCG Education	0.05	-0.09	-0.04	-0.06	-0.04	-0.06
	(0.05)	(0.08)	(0.05)	(0.04)	(0.05)	(0.05)
PCG working status - looking for a job	-0.22	0.30	0.00	-0.24+	0.02	-0.11
	(0.19)	(0.20)	(0.16)	(0.14)	(0.21)	(0.18)
PCG working status - housewife	0.23	0.17	-0.13	0.28*	0.10	0.31*
	(0.14)	(0.12)	(0.24)	(0.14)	(0.12)	(0.12)
PCG working status - student	-0.73*	-0.06	-0.16	-0.21	-0.07	-0.40
	(0.28)	(0.38)	(0.24)	(0.28)	(0.33)	(0.37)
PCG working status - other	-0.02	0.43	-0.45	0.39	0.95	0.66
	(0.36)	(0.40)	(0.35)	(0.46)	(0.74)	(0.60)

*Continued on next page*TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.12 – *Continued from previous page*

Number of siblings	0.01 (0.02)	-0.00 (0.02)	-0.05 (0.04)	-0.00 (0.03)	-0.00 (0.02)	-0.01 (0.02)
Earnings	-0.07+ (0.04)	-0.02 (0.04)	0.08+ (0.05)	-0.14*** (0.04)	-0.00 (0.04)	-0.08* (0.04)
Neighborhood Safety=2	0.06 (0.07)	-0.01 (0.07)	-0.01 (0.09)	0.03 (0.07)	-0.14* (0.07)	-0.03 (0.07)
Neighborhood Safety=3	-0.05 (0.09)	0.06 (0.09)	0.11 (0.11)	0.20* (0.08)	-0.04 (0.08)	0.10 (0.08)
Neighborhood Safety=4	-0.17 (0.15)	0.09 (0.13)	0.02 (0.16)	0.14 (0.11)	-0.13 (0.13)	-0.01 (0.13)
Neighborhood Safety=5	-0.03 (0.26)	-0.05 (0.35)	0.02 (0.25)	-0.02 (0.16)	-0.13 (0.32)	-0.07 (0.20)
Constant	0.21 (0.72)	1.70 (1.22)	-0.04 (0.75)	1.98** (0.69)	0.77 (0.70)	1.77* (0.78)
Observations	2660	2660	2660	2660	2660	2660
Nb of Clusters	1430.00	1430.00	1430.00	1430.00	1430.00	1430.00

Panel C : Time with at least One Parent : Engaged Time

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure	All
Single Mother	-0.23+ (0.13)	-0.02 (0.10)	0.04 (0.09)	0.05 (0.09)	-0.00 (0.10)	-0.07 (0.11)
Single Mother (step-parent)	-0.31+ (0.17)	-0.11 (0.14)	0.00 (0.14)	-0.03 (0.14)	-0.02 (0.14)	-0.19 (0.14)

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Table A3.12 – *Continued from previous page*

Single Father	-0.23 (0.28)	-0.81*** (0.23)	-0.06 (0.13)	-0.11 (0.27)	-0.29 (0.21)	-0.57* (0.28)
Other	-0.40* (0.17)	-0.27 (0.21)	-0.16 (0.18)	-0.10 (0.23)	-0.26* (0.12)	-0.48** (0.18)
Deceased Father	0.22 (0.20)	-0.18 (0.28)	0.30 (0.33)	0.01 (0.13)	-0.54* (0.25)	-0.20 (0.23)
Deceased Mother	0.90 (1.00)	1.81** (0.63)	0.03 (0.32)	0.38 (0.29)	-0.55 (0.69)	0.79 (0.82)
Age	-0.00 (0.01)	-0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.00 (0.01)
PCG Education	0.04 (0.05)	-0.05 (0.08)	-0.01 (0.05)	-0.12* (0.05)	-0.05 (0.04)	-0.07 (0.06)
PCG working status - looking for a job	-0.17 (0.20)	0.26 (0.22)	-0.05 (0.20)	-0.28+ (0.15)	0.31 (0.20)	0.06 (0.20)
PCG working status - housewife	0.23 (0.15)	0.09 (0.12)	-0.25 (0.25)	-0.00 (0.14)	0.03 (0.14)	0.12 (0.12)
PCG working status - student	-0.55* (0.23)	0.26 (0.35)	0.17 (0.15)	-0.12 (0.17)	0.15 (0.28)	-0.06 (0.27)
PCG working status - other	0.04 (0.37)	0.38 (0.45)	-0.31 (0.45)	-0.54 (0.48)	1.17* (0.48)	0.44 (0.43)
Number of siblings	-0.01 (0.03)	0.00 (0.02)	-0.04 (0.04)	-0.01 (0.03)	-0.02 (0.02)	-0.03 (0.02)
Earnings	-0.06	0.00	0.06	-0.12*	0.00	-0.06

*Continued on next page*TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A3.12 – *Continued from previous page*

	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
Neighborhood Safety=2	0.06	0.00	0.16*	-0.02	-0.15*	-0.01
	(0.07)	(0.08)	(0.08)	(0.07)	(0.07)	(0.07)
Neighborhood Safety=3	-0.05	0.05	0.28*	0.02	-0.01	0.05
	(0.09)	(0.09)	(0.11)	(0.08)	(0.08)	(0.08)
Neighborhood Safety=4	-0.11	0.06	0.10	-0.06	0.13	0.03
	(0.15)	(0.13)	(0.13)	(0.12)	(0.10)	(0.12)
Neighborhood Safety=5	0.04	0.33	0.55**	0.17	0.23	0.41*
	(0.28)	(0.26)	(0.17)	(0.16)	(0.29)	(0.20)
Constant	0.22	0.74	-0.62	2.81***	0.63	1.52+
	(0.76)	(1.21)	(0.68)	(0.79)	(0.64)	(0.91)
Observations	2660	2660	2660	2660	2660	2660
Nb of Clusters	1430.00	1430.00	1430.00	1430.00	1430.00	1430.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent. Neighborhood safety is also controlled for.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

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Table A3.13 – Time Input Production Functions : Does who is present matter? (Accessible Time) (controlling for neighborhood safety)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.08+ (0.04)	0.05+ (0.03)	0.06+ (0.03)
Education	0.12+ (0.07)	0.08** (0.03)	0.06* (0.03)
Active Leisure	0.11* (0.05)	0.09** (0.03)	0.09** (0.03)
Passive Leisure	0.06 (0.06)	0.06* (0.03)	-0.03 (0.03)
(House)Work (with at least one parent)	0.05 (0.03)	0.02 (0.03)	0.00 (0.03)
Education (with at least one parent)	0.00 (0.05)	0.04 (0.04)	-0.02 (0.03)
Active Leisure (with at least one parent)	-0.02 (0.03)	-0.04 (0.03)	0.00 (0.03)
Passive Leisure (with at least one parent)	0.01 (0.04)	-0.02 (0.03)	0.08* (0.03)
Other parental time	0.01 (0.02)	-0.00 (0.02)	-0.01 (0.02)
Time spent with a grand parent (alone)	0.03 (0.02)	-0.01 (0.02)	0.03 (0.03)
Time spent with a step-mother (alone)	-0.01* (0.01)	-0.00 (0.01)	-0.03+ (0.02)
Time spent with a step father (alone)	0.02 (0.03)	0.02* (0.01)	0.01 (0.01)
Other Adult Time	-0.01 (0.01)	-0.02 (0.01)	-0.01 (0.02)
(House)Work (with parents together)	-0.04+ (0.02)	-0.01 (0.02)	-0.01 (0.02)
Education (with parents together)	0.04 (0.03)	-0.01 (0.03)	-0.02 (0.03)
Active Leisure (with parents together)	0.06* (0.03)	0.02 (0.03)	-0.00 (0.03)
Passive Leisure (with parents together)	-0.04	-0.01	-0.00

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Table A3.13 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.03)	(0.03)	(0.03)
(House)Work (with father only)	0.01	-0.05*	-0.03
	(0.03)	(0.03)	(0.02)
Education (with father only)	0.02	0.02	0.03
	(0.02)	(0.02)	(0.02)
Active Leisure (with father only)	-0.01	0.04	-0.04
	(0.02)	(0.02)	(0.02)
Passive Leisure (with father only)	-0.02	-0.01	-0.02
	(0.02)	(0.02)	(0.02)
Single Mother	-0.08	-0.01	-0.14*
	(0.07)	(0.07)	(0.07)
Single Mother (step-parent)	-0.12	-0.01	-0.19*
	(0.08)	(0.07)	(0.10)
Single Father	-0.24**	-0.15	-0.16
	(0.08)	(0.10)	(0.16)
Other	-0.25*	-0.06	-0.02
	(0.10)	(0.12)	(0.13)
No father	0.01	-0.28	0.03
	(0.15)	(0.21)	(0.17)
Deceased Father	-0.02	0.23	-0.00
	(0.14)	(0.16)	(0.13)
Deceased Mother	0.33+	0.14	-0.19
	(0.19)	(0.13)	(0.32)
Age	0.02	-0.00	0.03***
	(0.01)	(0.01)	(0.01)
PCG Education	0.06***	0.05***	0.00
	(0.01)	(0.01)	(0.01)
African American	-0.30***	-0.45***	0.16**
	(0.06)	(0.05)	(0.05)
Hispanic	-0.21*	-0.18*	0.20*
	(0.10)	(0.09)	(0.09)
Asian Pacific	0.32*	0.56*	0.01
	(0.16)	(0.23)	(0.23)
American Indian	-0.83***	-0.83***	0.29***

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Table A3.13 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.10)	(0.09)	(0.08)
Other	-0.15	-0.16	-0.10
	(0.14)	(0.13)	(0.12)
Female	0.11*	-0.06	0.01
	(0.05)	(0.04)	(0.04)
PCG working status - looking for a job	0.03	-0.07	-0.07
	(0.09)	(0.09)	(0.12)
PCG working status - housewife	0.00	0.01	0.12
	(0.08)	(0.09)	(0.09)
PCG working status - student	-0.25	0.05	0.55+
	(0.20)	(0.25)	(0.33)
PCG working status - other	-0.04	-0.19	0.16
	(0.15)	(0.27)	(0.30)
Number of siblings	-0.00	0.03*	0.02+
	(0.01)	(0.01)	(0.01)
Earnings	0.00	0.00	0.04*
	(0.02)	(0.02)	(0.02)
Neighborhood Safety=2	0.03	-0.09*	-0.02
	(0.06)	(0.04)	(0.05)
Neighborhood Safety=3	-0.11*	-0.11*	-0.17**
	(0.05)	(0.05)	(0.06)
Neighborhood Safety=4	-0.11	-0.18*	-0.27**
	(0.09)	(0.08)	(0.09)
Neighborhood Safety=5	0.15	-0.20	-0.26+
	(0.12)	(0.13)	(0.15)
Reading Score (t-1)	0.46***		
	(0.06)		
Math Score (t-1)		0.42***	
		(0.03)	
Non Cognitive Skills (t-1)			0.44***
			(0.02)
Constant	-0.90***	-0.43*	-0.78**
	(0.26)	(0.22)	(0.25)
Observations	1350	1671	1763

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Table A3.13 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Nb of Clusters	1236.00	1350.00	1424.00
Wald_Test_father	0.82	0.10	0.06
Wald_Test_both	0.06	0.95	0.96

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included. Neighborhood safety is also controlled for.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source : PSID - CDS, waves 1997, 2002 and 2007

A3.5 Results on the balanced panel (Attrition)

Table A3.14 – Attrition : Descriptive statistics

	No Attrition	All attrition	A_1	A_12	A_13	A_23
	mean	mean	mean	mean	mean	mean
Age	4.02	12.08	7.65	8.81	4.36	10.02
Two Parents	0.81	0.65	0.54	0.73	0.78	0.58
Single Mother	0.16	0.21	0.31	0.18	0.12	0.30
Single Mother (step-parent)	0.01	0.08	0.08	0.04	0.03	0.03
Single Father	0.01	0.03	0.02	0.02	0.02	0.04
Other	0.01	0.03	0.06	0.02	0.04	0.05
White	0.69	0.47	0.61	0.66	0.68	0.01
African american	0.12	0.16	0.21	0.14	0.16	0.22
Hispanic	0.13	0.12	0.08	0.13	0.09	0.17
Asian Pacific	0.02	0.04	0.04	0.03	0.05	0.10
American Indian	0.00	0.01	0.02	0.01	0.00	0.00
Other	0.04	0.04	0.04	0.03	0.01	0.05
Inap	0.00	0.00	0.00	0.00	0.00	0.00
PCG - Worker	0.60	0.67	0.54	0.64	0.69	0.64
PCG - Looking for work	0.03	0.05	0.08	0.06	0.08	0.04
PCG - Retired	0.00	0.00	0.00	0.00	0.00	0.00
PCG - Disabled	0.00	0.00	0.00	0.00	0.00	0.00
PCG - Housewife	0.32	0.24	0.33	0.27	0.21	0.26
PCG - Student	0.04	0.02	0.03	0.02	0.01	0.00
PCG - Other	0.01	0.02	0.02	0.01	0.01	0.06
Female	0.50	0.49	0.46	0.51	0.46	0.56
Earnings	9.47	9.77	9.56	9.45	9.48	9.55
Observations	906	1693	521	1034	138	164

Notes: Attrition is a dummy equals to 1 if the child leave the sample at any wave. A_1 means that the child was present only in the first. A_12 means that they leave the sample in the third wave; A_13 that they were observed only in the first and the third waves.

Source: PSID - CDS.

Table A3.15 – Effect of Family Structure on Time Allocation (Balanced Panel)

<i>Panel A : Total Time (whoever was there)</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother	−0.05 (0.14)	0.07 (0.14)	−0.10 (0.12)	0.16 (0.11)	−0.09 (0.13)
Single Mother (step-parent)	−0.16 (0.21)	−0.08 (0.19)	0.28+ (0.16)	0.11 (0.21)	−0.27 (0.17)
Single Father	−0.07 (0.24)	0.23 (0.19)	0.07 (0.24)	0.05 (0.25)	−0.27 (0.22)
Other	−0.40 (0.30)	0.09 (0.23)	−0.25 (0.26)	0.12 (0.34)	0.23 (0.27)
Observations	1644	1644	1644	1644	1644
Nb of Clusters	683.00	683.00	683.00	683.00	683.00
<i>Panel B : Time with at least One Parent : Accessible Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother	−0.32* (0.15)	−0.16+ (0.09)	−0.19 (0.13)	0.02 (0.11)	−0.26* (0.13)
Single Mother (step-parent)	−0.36 (0.23)	−0.30+ (0.18)	−0.22 (0.18)	−0.22 (0.17)	−0.54** (0.18)
Single Father	−0.15 (0.29)	−0.39* (0.17)	0.03 (0.24)	0.14 (0.29)	−0.13 (0.21)
Other	−0.41+ (0.22)	−0.24 (0.27)	−0.48** (0.17)	−0.20 (0.23)	−0.16 (0.20)
Observations	1644	1644	1644	1644	1644
Nb of Clusters	683.00	683.00	683.00	683.00	683.00
<i>Panel C : Time with at least One Parent : Engaged Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother	−0.31* (0.14)	−0.03 (0.10)	0.01 (0.09)	−0.04 (0.10)	−0.16 (0.10)
Single Mother (step-parent)	−0.31 (0.19)	−0.04 (0.17)	0.02 (0.17)	0.02 (0.21)	−0.20 (0.16)
Single Father	−0.17 (0.31)	−0.38+ (0.20)	−0.05 (0.10)	0.14 (0.25)	−0.11 (0.23)
Other	−0.53* (0.25)	−0.06 (0.20)	−0.34+ (0.19)	0.02 (0.33)	−0.29* (0.13)
Observations	1644	1644	1644	1644	1644
Nb of Clusters	683.00	683.00	683.00	683.00	683.00

Notes: Individual Fixed-Effect Model. Time variables are standardized to a mean of 0 and a standard deviation of 1. Controls for Age, Number of siblings, primary care giver's working status and earnings are included, along with a dummy indicating a deceased parent.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007, Balanced Panel

Table A3.16 – Time Input Production Functions : Total Time
(whoever was there) - Balanced Panel

	(1) Reading Score	(2) Math Score	(3) Non Cognitive Skills
(House)Work	0.07 (0.05)	0.02 (0.03)	0.02 (0.03)
Education	0.12 (0.10)	0.07* (0.04)	0.06 (0.04)
Active Leisure	0.14+ (0.08)	0.09** (0.03)	0.06+ (0.03)
Passive Leisure	0.05 (0.06)	0.05 (0.03)	0.03 (0.04)
Observations	778	1006	1040
Nb of Clusters	665.00	689.00	705.00

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$,
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007, Balanced Panel

Table A3.17 – Time Input Production Functions : Effect of the presence of at least one parent (Balanced Panel)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.06 (0.06)	0.03 (0.04)	0.01 (0.05)
Education	0.11 (0.10)	0.07+ (0.04)	0.07+ (0.04)
Active Leisure	0.15+ (0.08)	0.11** (0.04)	0.07* (0.04)
Passive Leisure	0.06 (0.08)	0.07 (0.04)	−0.02 (0.04)
(House)Work (with at least one parent)	0.02 (0.03)	−0.01 (0.04)	0.01 (0.05)
Education (with at least one parent)	0.03 (0.03)	0.03 (0.03)	−0.05 (0.03)
Active Leisure (with at least one parent)	−0.00 (0.04)	−0.03 (0.03)	−0.02 (0.03)
Passive Leisure (with at least one parent)	−0.02 (0.05)	−0.04 (0.03)	0.07+ (0.04)
Observations	778	1006	1040
Nb of Clusters	665.00	689.00	705.00

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007, Balanced Panel

A3.6 Feedback effects: Steady State

A natural question is whether children's trajectories will become parallel. If γ is the input effect and λ is the persistence effect; children's trajectories would become parallel when the achievement gap reaches $\frac{\gamma}{1-\lambda}$. Tables A3.18, A3.19 and A3.20 report these coefficients for the GMM model estimated in Tables 15, 16 and 19, respectively.

Table A3.18 – Steady State

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Single Mother	-0.13	-0.19	-0.01	-0.03	-0.22	-0.21
Single Mother (step-parent)	-0.23	-0.31	-0.02	-0.04	-0.34	-0.34
Single Father	-0.52	-0.56	-0.23	-0.24	-0.42	-0.62
Other	-0.49	-0.61	-0.10	-0.34	-0.03	-0.11
Deceased Father	-0.01	0.04	0.37	0.29	-0.04	-0.09
Deceased Mother	0.54	0.49	0.09	0.01	-0.32	0.24
Age	0.03	0.03	-0.00	-0.01	0.05	0.03
Number of siblings	-0.01	-0.03	0.04	0.04	0.04	0.02
PCG working status - looking for a job	0.05	0.04	-0.11	-0.24	-0.09	-0.12
PCG working status - housewife	0.01	-0.12	0.03	-0.02	0.21	0.24
PCG working status - student	-0.37	-0.31	0.14	-0.00	1.07	0.74
PCG working status - other	-0.14	-0.11	-0.37	-0.05	0.23	0.23
Earnings	0.00	-0.01	0.01	-0.02	0.07	0.10
African American	-0.57	-0.38	-0.82	-0.82	0.24	0.25
Hispanic	-0.50	-0.24	-0.38	-0.36	0.28	0.25
Asian, Pacific	0.55	0.43	0.93	1.07	-0.03	0.02
American Indian	-1.46	-1.27	-1.66	-1.55	0.44	0.21
Other	-0.25	-0.23	-0.31	-0.31	-0.27	-0.16
Female	0.21	0.31	-0.09	-0.11	0.04	0.13
PCG Education	0.11	0.09	0.09	0.11	0.02	0.01
No father	0.01	-0.15	-0.49	-0.53	0.04	-0.06
(House)Work	0.13	0.10	0.08	0.01	0.10	-0.07
Education	0.24	0.27	0.14	-0.09	0.12	0.07
Active Leisure	0.20	0.42	0.15	0.03	0.16	0.12
Passive Leisure	0.10	0.18	0.11	-0.09	-0.06	-0.15
(House)Work (with at least one parent)	0.05	0.17	-0.00	0.05	-0.01	0.07
Education (with at least one parent)	0.05	0.05	0.06	-0.04	-0.04	-0.17
Active Leisure (with at least one parent)	0.04	0.11	-0.01	-0.02	-0.02	-0.01
Passive Leisure (with at least one parent)	-0.04	-0.24	-0.04	-0.09	0.13	0.09

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Table A3.18 – *Continued from previous page*

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Other parental time	0.03	0.07	0.00	-0.19	-0.01	0.06
Time spent with a grand parent (alone)	0.06	0.03	-0.01	0.08	0.04	-0.13
Time spent with a step-mother (alone)	-0.02	0.15	-0.00	-0.05	-0.04	-0.06
Time spent with a step father (alone)	0.04	0.04	0.04	0.01	0.02	0.00
Other Adult Time	-0.02	0.05	-0.02	0.03	-0.01	-0.06

Notes: Coefficients $\frac{\gamma}{1-\lambda}$ are reported for Table 15.

Source: Sample drawn from the PSID-CDS.

Table A3.19 – Steady State

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Single Mother	-0.14	-0.28	-0.02	-0.18	-0.26	-0.18
Single Mother (step-parent)	-0.23	-0.24	-0.03	-0.08	-0.35	-0.31
Single Father	-0.46	-0.46	-0.29	-0.42	-0.34	-0.39
Other	-0.46	-0.50	-0.09	-0.27	-0.04	-0.05
Deceased Father	-0.01	-0.03	0.37	0.29	-0.04	-0.13
Deceased Mother	0.61	0.92	0.19	0.41	-0.36	0.29
Age	0.03	0.03	0.00	-0.00	0.05	0.03
Number of siblings	-0.00	-0.01	0.05	0.04	0.04	0.03
PCG working status - looking for a job	0.07	0.07	-0.09	-0.18	-0.09	-0.05
PCG working status - housewife	0.01	-0.14	0.03	-0.02	0.21	0.21
PCG working status - student	-0.36	-0.31	0.15	-0.06	1.04	0.78
PCG working status - other	-0.10	0.19	-0.38	0.12	0.24	0.23
Earnings	0.00	-0.01	0.01	-0.02	0.08	0.11
African American	-0.58	-0.47	-0.82	-0.81	0.22	0.21
Hispanic	-0.46	-0.20	-0.37	-0.31	0.26	0.24
Asian, Pacific	0.58	0.61	0.97	1.11	-0.03	0.05
American Indian	-1.48	-1.11	-1.52	-1.31	0.50	0.34
Other	-0.28	-0.33	-0.32	-0.32	-0.26	-0.17
Female	0.20	0.24	-0.09	-0.17	0.03	0.10
PCG Education	0.11	0.09	0.09	0.10	0.01	0.01
No father	-0.05	-0.29	-0.49	-0.60	0.03	-0.12
(House)Work	0.14	0.23	0.08	0.14	0.10	-0.01

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Table A3.19 – *Continued from previous page*

	Reading Skills		Math Skills		Non-Cognitive Skills	
	VA	GMM	VA	GMM	VA	GMM
Education	0.23	0.27	0.14	-0.07	0.11	0.12
Active Leisure	0.20	0.36	0.16	0.04	0.16	0.14
Passive Leisure	0.11	0.18	0.11	-0.04	-0.06	-0.12
(House)Work (with at least one parent)	0.09	0.22	0.04	0.12	0.01	0.20
Education (with at least one parent)	-0.00	-0.22	0.07	-0.12	-0.04	-0.22
Active Leisure (with at least one parent)	-0.03	0.01	-0.06	-0.01	0.01	-0.09
Passive Leisure (with at least one parent)	0.01	-0.04	-0.03	-0.00	0.14	0.07
(House)Work (with parents together)	-0.08	-0.31	-0.02	-0.18	-0.02	-0.23
Education (with parents together)	0.07	0.25	-0.03	0.10	-0.04	0.01
Active Leisure (with parents together)	0.11	0.23	0.04	0.06	0.00	0.28
Passive Leisure (with parents together)	-0.07	-0.23	-0.01	-0.15	-0.01	-0.03
(House)Work (with father only)	0.01	-0.06	-0.09	-0.20	-0.06	-0.16
Education (with father only)	0.03	0.23	0.04	0.21	0.06	0.12
Active Leisure (with father only)	-0.01	-0.04	0.06	-0.00	-0.07	-0.11
Passive Leisure (with father only)	-0.03	-0.11	-0.00	-0.03	-0.03	-0.06
Other parental time	0.03	-0.02	-0.00	-0.13	-0.01	0.09
Time spent with a grand parent (alone)	0.05	-0.01	-0.01	0.04	0.04	-0.15
Time spent with a step-mother (alone)	-0.02	0.06	-0.00	0.00	-0.04	-0.05
Time spent with a step father (alone)	0.03	0.02	0.04	-0.03	0.01	-0.02
Other Adult Time	-0.02	-0.09	-0.03	-0.00	-0.01	-0.09

Notes: Coefficients $\frac{\gamma}{1-\lambda}$ are reported for Table 16.

Source: Sample drawn from the PSID-CDS.

Table A3.20 – Steady State

	Reading Skills			Math Skills			Non-Cognitive Skills		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Single Mother	-0.12	-0.19	-0.28	-0.05	-0.03	-0.18	-0.23	-0.21	-0.18
Single Mother (step-parent)	-0.20	-0.31	-0.24	-0.09	-0.04	-0.08	-0.38	-0.34	-0.31
Single Father	-0.35	-0.56	-0.46	-0.27	-0.24	-0.42	-0.61	-0.62	-0.39
Other	-0.38	-0.61	-0.50	-0.19	-0.34	-0.27	-0.34	-0.11	-0.05
Deceased Father	-0.08	0.04	-0.03	0.21	0.29	0.29	-0.06	-0.09	-0.13
Deceased Mother	0.28	0.49	0.92	0.08	0.01	0.41	0.33	0.24	0.29
Age	0.02	0.03	0.03	-0.00	-0.01	-0.00	0.02	0.03	0.03
Number of siblings	-0.00	-0.03	-0.01	0.03	0.04	0.04	0.02	0.02	0.03
PCG working status - looking for a job	-0.12	0.04	0.07	-0.29	-0.24	-0.18	-0.10	-0.12	-0.05
PCG working status - housewife	-0.07	-0.12	-0.14	-0.09	-0.02	-0.02	0.16	0.24	0.21
PCG working status - student	-0.20	-0.31	-0.31	-0.09	-0.00	-0.06	0.61	0.74	0.78
PCG working status - other	0.04	-0.11	0.19	0.04	-0.05	0.12	0.28	0.23	0.23

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Table A3.20 – *Continued from previous page*

	Reading Skills			Math Skills			Non-Cognitive Skills		
Earnings	-0.03	-0.01	-0.01	-0.02	-0.02	-0.02	0.10	0.10	0.11
African American	-0.51	-0.38	-0.47	-0.75	-0.82	-0.81	0.19	0.25	0.21
Hispanic	-0.29	-0.24	-0.20	-0.32	-0.36	-0.31	0.24	0.25	0.24
Asian, Pacific	0.43	0.43	0.61	0.81	1.07	1.11	-0.17	0.02	0.05
American Indian	-0.96	-1.27	-1.11	-1.71	-1.55	-1.31	0.33	0.21	0.34
Other	-0.22	-0.23	-0.33	-0.24	-0.31	-0.32	-0.15	-0.16	-0.17
Female	0.18	0.31	0.24	-0.11	-0.11	-0.17	0.08	0.13	0.10
PCG Education	0.11	0.09	0.09	0.11	0.11	0.10	0.02	0.01	0.01
No father	0.00	-0.15	-0.29	0.00	-0.53	-0.60	0.00	-0.06	-0.12
(House)Work	0.00	0.10	0.23	0.00	0.01	0.14	0.00	-0.07	-0.01
Education	0.00	0.27	0.27	0.00	-0.09	-0.07	0.00	0.07	0.12
Active Leisure	0.00	0.42	0.36	0.00	0.03	0.04	0.00	0.12	0.14
Passive Leisure	0.00	0.18	0.18	0.00	-0.09	-0.04	0.00	-0.15	-0.12
(House)Work (with at least one parent)	0.00	0.17	0.22	0.00	0.05	0.12	0.00	0.07	0.20
Education (with at least one parent)	0.00	0.05	-0.22	0.00	-0.04	-0.12	0.00	-0.17	-0.22
Active Leisure (with at least one parent)	0.00	0.11	0.01	0.00	-0.02	-0.01	0.00	-0.01	-0.09
Passive Leisure (with at least one parent)	0.00	-0.24	-0.04	0.00	-0.09	-0.00	0.00	0.09	0.07
(House)Work (with parents together)	0.00	0.07	-0.31	0.00	-0.19	-0.18	0.00	0.06	-0.23
Education (with parents together)	0.00	0.03	0.25	0.00	0.08	0.10	0.00	-0.13	0.01
Active Leisure (with parents together)	0.00	0.15	0.23	0.00	-0.05	0.06	0.00	-0.06	0.28
Passive Leisure (with parents together)	0.00	0.04	-0.23	0.00	0.01	-0.15	0.00	0.00	-0.03
(House)Work (with father only)	0.00	0.00	-0.06	0.00	0.00	-0.20	0.00	0.00	-0.16
Education (with father only)	0.00	0.00	0.23	0.00	0.00	0.21	0.00	0.00	0.12
Active Leisure (with father only)	0.00	0.00	-0.04	0.00	0.00	-0.00	0.00	0.00	-0.11
Passive Leisure (with father only)	0.00	0.00	-0.11	0.00	0.00	-0.03	0.00	0.00	-0.06
Other parental time	0.00	0.00	-0.02	0.00	0.00	-0.13	0.00	0.00	0.09
Time spent with a grand parent (alone)	0.00	0.00	-0.01	0.00	0.00	0.04	0.00	0.00	-0.15
Time spent with a step-mother (alone)	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	-0.05
Time spent with a step father (alone)	0.00	0.00	0.02	0.00	0.00	-0.03	0.00	0.00	-0.02
Other Adult Time	-0.07	0.05	-0.09	-0.24	0.03	-0.00	-0.05	-0.06	-0.09

Notes: Coefficients $\frac{\gamma}{1-\lambda}$ are reported for Table 19.

Source: Sample drawn from the PSID-CDS.

A3.7 Results excluding the outliers

Table A3.21 – Time Input Production Functions : Total Time (whoever was there) - Outliers excluded

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.02 (0.02)	0.02 (0.02)	0.02 (0.03)
Education	0.05* (0.02)	0.07** (0.03)	0.04 (0.03)
Active Leisure	0.02 (0.02)	0.07** (0.03)	0.05+ (0.03)
Passive Leisure	-0.01 (0.02)	0.05* (0.02)	0.01 (0.03)
Observations	1160	1391	1466
Nb of Clusters	1068.00	1127.00	1184.00

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007, Outliers excluded

Table A3.22 – Time Input Production Functions : Effect of the presence of at least one parent (Outliers Excluded)

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.01 (0.03)	0.02 (0.03)	0.02 (0.03)
Education	0.04+ (0.02)	0.07** (0.03)	0.05+ (0.03)
Active Leisure	0.01 (0.02)	0.07* (0.03)	0.06* (0.03)
Passive Leisure	−0.01 (0.03)	0.06* (0.03)	−0.03 (0.03)
(House)Work (with at least one parent)	0.02 (0.02)	−0.00 (0.03)	−0.01 (0.03)
Education (with at least one parent)	0.02 (0.02)	0.00 (0.02)	−0.04+ (0.02)
Active Leisure (with at least one parent)	0.03 (0.02)	0.00 (0.02)	−0.03 (0.03)
Passive Leisure (with at least one parent)	−0.00 (0.02)	−0.01 (0.02)	0.05+ (0.02)
Observations	1160	1391	1466
Nb of Clusters	1068.00	1127.00	1184.00

Notes: Value Added Model. Cognitive test scores are standardized to the national average by age groups, with a mean of 0 and a standard deviation of 1. Broad reading and math test scores are taken from age of 6 and from age of 3, respectively. Non-cognitive Skills are provided by the Primary Care Giver from the age of 3. Time variables are also standardized to a mean of 0 and a standard deviation of 1. Controls for Sex, Ethnicity, Age, Number of siblings, PCG's education, employment status and earnings are included. Family Structure is also controlled for, including dummies indicating if the child had a father at birth or a deceased parent. Controls for total time spent with grand parents alone, a step-parent alone or other parental time are included.

Clustered standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: PSID - CDS, waves 1997, 2002 and 2007, Outliers excluded

A4 Analysis on weights

The PSID consists of two separate samples—a nationally representative sample of U.S. families designed by the University of Michigan Survey Research Center (SRC) and an over sample of low income, mostly African-American, families from the Survey of Economic Opportunity (SEO). Therefore, the whole sample of the PSID does not provide a nationally representative sample, and the previous results do not reflect the average partial effect.

Four main variables are used to determine the weights : ethnicity, head education level, MSA status – metropolitan statistical area, and census region. Since the sample is not large enough to test simultaneously the heterogeneity of all these variables, I first provide how the individual’s characteristics differ across these sampling variables. These descriptive statistics are estimated without the weights. Second, I show how the results differ across these sampling variables doing an heterogeneity analysis. Since the following results rely on splitting the sample, a lot of significance power is lost, but the results give some qualitative insights.

A4.1 Summary Statistics

Table A4.1 shows the mean of the different variables for African American and other ethnicities, and a t-test for each variable. We can see that African American are a bit older in general, this should not be an issue for the main analysis, since the variables are standardised by age group. The primary care giver is less highly educated in average, they are more likely to work for a job and less likely to be a housewife. They are less likely to live in central counties in Metropolitan Area (MA) and live also in different census regions.

Table A4.1 – Differences across ethnicity

	Not African American	African American	Diff./se
Age	10.075	10.323	-0.248+ (0.127)
Age at separation	5.291	5.040	0.251 (0.218)
PCG Education	13.157	12.495	0.662** (0.068)
PCG working status - looking for a job	0.032	0.111	-0.079** (0.006)

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Table A4.1 – *Continued from previous page*

	Not African American	African American	Difference
PCG working status - retired	0.000	0.000	0.000 (0.000)
PCG working status - disabled	0.000	0.000	0.000 (0.000)
PCG working status - housewife	0.248	0.143	0.105** (0.011)
PCG working status - student	0.021	0.029	-0.008+ (0.004)
PCG working status - other	0.011	0.009	0.002 (0.003)
Number of siblings	1.405	1.460	-0.056 (0.037)
Earnings	9.677	9.632	0.044 (0.035)
Central counties in MA	0.155	0.408	-0.253** (0.011)
Fringe counties in MA	0.138	0.104	0.034** (0.009)
Counties in MA > 250 000 to 1 M	0.175	0.263	-0.088** (0.011)
Counties in MA < 250 000	0.056	0.019	0.037** (0.005)
Urban, > 20 000, adj. to a MA	0.035	0.005	0.030** (0.004)
Urban, > 20 000, not adj. to a MA	0.021	0.034	-0.012** (0.004)
Urban, < 20 000, adj. to a MA	0.058	0.042	0.016** (0.006)
Urban, < 20 000, not adj. to a MA	0.048	0.089	-0.041** (0.006)
Completely rural	0.030	0.010	0.020** (0.004)
Northeast	0.127	0.050	0.078** (0.008)
Midwest	0.198	0.175	0.024* (0.011)
South	0.177	0.680	-0.503**

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Table A4.1 – *Continued from previous page*

	Not African American	African American	Difference
			(0.011)
West	0.212	0.068	0.144**
			(0.010)
Observations	5978		

Notes: The first column shows the mean for each group, the second column shows the difference between the means of the two groups, using a t-test.

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.2 shows the mean of the different variables for children whose parents are less highly educated or highly educated (below or above 13 years of schooling), and a t-test for each variable. Children whose PCG is less highly educated is on average younger. Again, this is not an issue since the variables are standardised by age group. They experience a parental separation when they are younger in average, this could be an issue to estimate the effect of a change in family structure on time investments, but I already provide the heterogeneity analysis according to this variable. They are more likely to be African American. Their PCG is more likely to look for a job or to be a housewife or a student. The household earnings is lower on average. They are more likely to live in more rural areas, and again, they don't live in the same regions.

Table A4.2 – Differences across PCG's education

	Less Highly Educated	More Highly Educated	Diff./se
Age	9.970	10.444	-0.474**
			(0.124)
Age at separation	4.669	5.939	-1.270**
			(0.220)
African american	0.426	0.281	0.145**
			(0.013)
PCG working status - looking for a job	0.082	0.030	0.052**
			(0.006)
PCG working status - retired	0.000	0.000	0.000
			(0.000)
PCG working status - disabled	0.000	0.000	0.000
			(0.000)
PCG working status - housewife	0.237	0.172	0.065**
			(0.011)
PCG working status - student	0.031	0.015	0.016**
			(0.004)
PCG working status - other	0.010	0.010	0.000

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Table A4.2 – *Continued from previous page*

	PCG Less Highly Educated	PCG More Highly Educated	Difference
			(0.003)
Number of siblings	1.444	1.399	0.045
			(0.037)
Earnings	9.434	9.933	-0.499**
			(0.033)
Central counties in MA	0.255	0.238	0.017
			(0.011)
Fringe counties in MA	0.109	0.148	-0.039**
			(0.009)
Counties in MA > 250 000 to 1 M	0.214	0.198	0.016
			(0.011)
Counties in MA < 250 000	0.040	0.046	-0.006
			(0.005)
Urban, > 20 000, adj. to a MA	0.023	0.025	-0.002
			(0.004)
Urban, > 20 000, not adj. to a MA	0.032	0.018	0.014**
			(0.004)
Urban, < 20 000, adj. to a MA	0.063	0.037	0.026**
			(0.006)
Urban, < 20 000, not adj. to a MA	0.082	0.036	0.046**
			(0.006)
Completely rural	0.032	0.009	0.022**
			(0.004)
Northeast	0.067	0.144	-0.076**
			(0.008)
Midwest	0.207	0.165	0.042**
			(0.010)
South	0.404	0.300	0.104**
			(0.013)
West	0.169	0.146	0.023*
			(0.010)
Observations	5978		

Notes: The first column shows the mean for each group, the second column shows the difference between the means of the two groups, using a t-test.

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Looking at differences between those who live in urban areas and those who live in more rural areas, we recover the same results than before. Children who live in areas with less than 250 000 inhabitants are less likely to be African American, their primary care giver does shorter schooling and earn less in average. Urban areas are more represented

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in Midwest and the South, but less represented in Northeast and West.

Table A4.3 – Differences across urban areas (BEALE code)

	pop < 250 000	pop > 250 000	Diff./se
Age	10.276	10.226	0.050 (0.151)
Age at separation	5.204	5.196	0.008 (0.267)
PCG Education	12.589	12.791	-0.202* (0.084)
African american	0.316	0.488	-0.172** (0.016)
PCG working status - looking for a job	0.047	0.077	-0.030** (0.008)
PCG working status - retired	0.000	0.000	0.000 (0.000)
PCG working status - disabled	0.000	0.000	0.000 (0.000)
PCG working status - housewife	0.224	0.203	0.021 (0.013)
PCG working status - student	0.022	0.027	-0.005 (0.005)
PCG working status - other	0.008	0.012	-0.003 (0.003)
Number of siblings	1.461	1.467	-0.005 (0.045)
Earnings	9.477	9.715	-0.238** (0.041)
Northeast	0.047	0.152	-0.105** (0.010)
Midwest	0.294	0.210	0.084** (0.013)
South	0.491	0.428	0.063** (0.016)
West	0.168	0.208	-0.040**

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Table A4.3 – *Continued from previous page*

	pop < 250 000	pop > 250 000	Difference (0.013)
Observations	4845		

Notes: The first column shows the mean for each group, the second column shows the difference between the means of the two groups, using a t-test. Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Looking at differences across the four census regions, the average PCG's education is much higher in Northeast. African American are much more represented in the South. Children whose PCG is looking for a job are more represented in Northeast, whereas housewives are more represented in the West. Family size seems to be larger in the West. These Tables suggest that the differences between the sampling variables recover differences in the other variables. They are also highly correlated with previous variables of interest such as age at separation. Therefore, in the next section, I will mainly focus on the heterogeneity according to PCG's education and to ethnicity. I also provide the heterogeneity analysis according to urban area and region, but these might only reflect heterogeneity effect according to ethnicity or PCG's education.

Table A4.4 – Summary statistics by region

	Northeast mean	Midwest mean	South mean	West mean
Age	10.30	10.19	10.28	10.19
Age at separation	5.31	5.06	5.22	5.29
PCG Education	14.06	12.84	12.62	12.02
African american	0.18	0.34	0.69	0.16
PCG working status - looking for a job	0.02	0.06	0.08	0.07
PCG working status - retired	0.00	0.00	0.00	0.00
PCG working status - disabled	0.00	0.00	0.00	0.00
PCG working status - housewife	0.20	0.18	0.19	0.29
PCG working status - student	0.02	0.02	0.03	0.03
PCG working status - other	0.01	0.00	0.01	0.01
Number of siblings	1.35	1.53	1.37	1.67
Earnings	9.92	9.57	9.63	9.62

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Table A4.4 – *Continued from previous page*

	Northeast	Midwest	South	West
Central counties in MA	0.26	0.40	0.26	0.34
Fringe counties in MA	0.33	0.13	0.12	0.15
Counties in MA > 250 000 to 1 M	0.30	0.12	0.31	0.26
Counties in MA < 250 000	0.01	0.07	0.03	0.10
Urban, > 20 000, adj. to a MA	0.06	0.03	0.02	0.04
Urban, > 20 000, not adj. to a MA	0.01	0.01	0.05	0.04
Urban, < 20 000, adj. to a MA	0.02	0.12	0.07	0.01
Urban, < 20 000, not adj. to a MA	0.00	0.06	0.12	0.04
Completely rural	0.02	0.07	0.02	0.01
Observations	592	1135	2159	954

Notes: Each column shows the mean for each region.

Source: Sample drawn from the PSID-CDS.

A4.2 Heterogeneity analysis according to weights variables.

Since the following results rely on splitting the sample, a lot of significance power is lost, but the results give some qualitative insights. I do not comment single fathers and other families since there are too few observations in those groups to draw any conclusion. Heterogeneity according to the household head's education level are already provided in Sections 5.2.3 and 6.2.1 for the effect of family structure on time and the time input production functions, respectively.

Heterogeneous effect for African American?

African American are over-represented in the PSID sample. On the effect of family structure on time investments (Table A4.5), it appears that time spent in educational activities decrease more for African American children; substituted by active leisure. This is true for all single-mother families.

Looking at time spent with at least one parent, time spent in personal needs and care and active leisure decrease only for other ethnicities, the decrease in time spent on passive leisure is also less important. On the other hand, time spent in educational activities with at least one parent present decrease mainly in African American families, in particular for single mothers without a step-parent. We recover similar patterns for engaged time.

Looking at Time input production functions (Tables A4.6 - A4.8), whoever is present, we can see that active leisure does not have any effect for African American or at least

a smaller effect. This might reflect the kind of active leisure. There is no difference in the effect of spending one hour with at least one parent. Looking whether who is there matters, we can see that the presence of at least one parent (in this case the mother) has a larger and positive effect for educational activities in African American families, but a negative one for active leisure for the three outcomes. Being with two parents while doing active leisure is much more fruitful for African American children, but there is a negative effect of doing educational activities with both parents together rather than mother only. Results suggest that doing active leisure and education while the father is present rather than the mother only is much productive for the child's development.

Table A4.5 – Effect of Family Structure on Parental Time Investments, heterogeneous effect for African-American?

<i>Panel A: Total Time (whoever was present)</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother=1	-0.06 (0.15)	0.10 (0.14)	-0.03 (0.13)	0.07 (0.15)	-0.10 (0.14)
Single Mother=1 × African American=1	0.13 (0.22)	-0.05 (0.21)	-0.24 (0.19)	0.16 (0.19)	0.02 (0.19)
Single Mother (Step)=1	-0.14 (0.21)	-0.00 (0.19)	0.25 (0.16)	0.05 (0.21)	-0.23 (0.18)
Single Mother (Step)=1 × African American=1	0.27 (0.32)	-0.13 (0.30)	-0.23 (0.25)	0.05 (0.29)	0.07 (0.28)
Single Father=1	0.16 (0.25)	0.23 (0.21)	-0.15 (0.25)	-0.02 (0.25)	-0.05 (0.18)
Single Father=1 × African American=1	-0.57 (0.46)	-0.29 (0.32)	0.56 (0.40)	-0.05 (0.42)	-0.22 (0.37)
Other=1	-0.14 (0.31)	0.54* (0.22)	-0.06 (0.33)	0.12 (0.35)	-0.36 (0.24)
Other=1 × African American=1	0.03 (0.44)	-0.36 (0.35)	-0.42 (0.41)	0.12 (0.46)	0.41 (0.39)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00
<i>Panel B: Time with at least one parent: Accessible Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure

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Table A4.5 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1	-0.13 (0.16)	-0.27* (0.13)	-0.05 (0.12)	-0.09 (0.14)	-0.37** (0.14)
Single Mother=1 × African American=1	-0.20 (0.22)	0.25 (0.16)	-0.33+ (0.19)	0.19 (0.18)	0.26 (0.20)
Single Mother (Step)=1	-0.30 (0.22)	-0.27 (0.23)	-0.13 (0.18)	-0.39* (0.18)	-0.68*** (0.18)
Single Mother (Step)=1 × African American=1	0.14 (0.33)	0.15 (0.26)	-0.35 (0.29)	0.41+ (0.22)	0.43 (0.27)
Single Father=1	-0.12 (0.26)	-0.56** (0.18)	-0.03 (0.25)	0.08 (0.26)	-0.45* (0.17)
Single Father=1 × African American=1	-0.07 (0.41)	-0.14 (0.35)	-0.17 (0.28)	0.02 (0.40)	0.84** (0.28)
Other=1	0.05 (0.30)	-0.84** (0.32)	-0.28 (0.20)	-0.29 (0.25)	-0.77* (0.30)
Other=1 × African American=1	-0.63+ (0.34)	0.83* (0.40)	-0.37 (0.24)	0.38 (0.33)	0.68+ (0.35)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00
<i>Panel C: Time with at least one parent: Engaged Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother=1	-0.06 (0.14)	-0.03 (0.14)	0.10 (0.10)	0.01 (0.13)	-0.17 (0.13)

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Table A4.5 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1 × African American=1	-0.25 (0.23)	0.03 (0.17)	-0.13 (0.15)	0.07 (0.16)	0.22 (0.17)
Single Mother (Step)=1	-0.13 (0.18)	-0.08 (0.19)	-0.01 (0.17)	-0.06 (0.22)	-0.16 (0.17)
Single Mother (Step)=1 × African American=1	-0.15 (0.30)	0.01 (0.24)	-0.04 (0.24)	0.17 (0.25)	0.05 (0.25)
Single Father=1	-0.04 (0.28)	-0.62** (0.19)	-0.16 (0.15)	0.05 (0.26)	-0.41* (0.20)
Single Father=1 × African American=1	-0.44 (0.42)	-0.00 (0.41)	0.18 (0.27)	-0.16 (0.48)	0.79* (0.33)
Other=1	-0.01 (0.21)	-0.38 (0.26)	0.06 (0.29)	-0.40 (0.29)	-0.47** (0.15)
Other=1 × African American=1	-0.73* (0.31)	0.29 (0.35)	-0.34 (0.33)	0.54 (0.39)	0.37+ (0.20)
Observations	2966	2966	2966	2966	2966
Nb of Clusters	1478.00	1478.00	1478.00	1478.00	1478.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.6 – Time Input Production Functions : Total Time (whoever was present); heterogeneous effect for African-American?

	(1) Reading Score	(2) Math Score	(3) Non Cognitive Skills
(House)Work	0.12* (0.06)	0.05 (0.04)	0.05 (0.03)
African american=1 × (House)Work	-0.08 (0.07)	-0.02 (0.05)	-0.00 (0.05)
Education	0.15 (0.10)	0.10* (0.04)	0.05 (0.03)
African american=1 × Education	-0.06 (0.10)	-0.02 (0.05)	0.02 (0.06)
Active Leisure	0.17* (0.08)	0.13*** (0.03)	0.11** (0.03)
African american=1 × Active Leisure	-0.14 (0.09)	-0.12* (0.05)	-0.07 (0.05)
Passive Leisure	0.07 (0.07)	0.05 (0.04)	0.00 (0.04)
African american=1 × Passive Leisure	-0.08 (0.08)	-0.01 (0.05)	0.01 (0.06)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.7 – Time Input Production Functions : Effect of the presence of at least one parent; heterogeneous effect for African-American?

	(1)	(2)	(3)
	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.10 (0.07)	0.06 (0.04)	0.06 (0.04)
African american=1 $\times$ (House)Work	-0.07 (0.08)	-0.04 (0.06)	-0.02 (0.06)
Education	0.15 (0.10)	0.08* (0.04)	0.05 (0.04)
African american=1 $\times$ Education	-0.06 (0.11)	-0.02 (0.06)	0.03 (0.06)
Active Leisure	0.16+ (0.08)	0.13*** (0.04)	0.12** (0.04)
African american=1 $\times$ Active Leisure	-0.13 (0.09)	-0.12* (0.05)	-0.08 (0.06)
Passive Leisure	0.10 (0.09)	0.07 (0.05)	-0.03 (0.04)
African american=1 $\times$ Passive Leisure	-0.11 (0.11)	-0.03 (0.06)	-0.01 (0.07)
(House)Work (with at least one parent)	0.02 (0.03)	-0.02 (0.04)	-0.02 (0.04)
African american=1 $\times$ (House)Work (with at least one parent)	-0.00 (0.05)	0.03 (0.05)	0.02 (0.06)

*Continued on next page*TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A4.7 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Education (with at least one parent)	0.03 (0.03)	0.04 (0.02)	-0.01 (0.02)
African american=1 × Education (with at least one parent)	0.02 (0.08)	0.00 (0.08)	-0.05 (0.06)
Active Leisure (with at least one parent)	0.02 (0.03)	-0.00 (0.03)	-0.01 (0.03)
African american=1 × Active Leisure (with at least one parent)	0.00 (0.05)	-0.03 (0.05)	0.01 (0.05)
Passive Leisure (with at least one parent)	-0.04 (0.05)	-0.04 (0.04)	0.06 (0.04)
African american=1 × Passive Leisure (with at least one parent)	0.06 (0.06)	0.03 (0.05)	0.03 (0.06)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00

Standard errors in parentheses. + p < 0.1, *p < 0.05, ** p < 0.01, *** p < 0.001.

Source: Sample drawn from the PSID-CDS.

Table A4.8 – Time Input Production Functions : Does who is present matter? (Accessible Time); heterogeneous effect for African-American?

	(1)	(2)	(3)
	Reading Score	Math Score	Non Cognitive Skills

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Table A4.8 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.10 (0.07)	0.06 (0.04)	0.06 (0.04)
African american=1 × (House)Work	-0.06 (0.09)	-0.04 (0.06)	-0.02 (0.07)
Education	0.15 (0.10)	0.08* (0.04)	0.05 (0.04)
African american=1 × Education	-0.08 (0.11)	-0.02 (0.06)	0.03 (0.06)
Active Leisure	0.16+ (0.08)	0.13*** (0.04)	0.12** (0.04)
African american=1 × Active Leisure	-0.13 (0.09)	-0.11* (0.05)	-0.08 (0.06)
Passive Leisure	0.10 (0.10)	0.07 (0.05)	-0.03 (0.04)
African american=1 × Passive Leisure	-0.12 (0.11)	-0.03 (0.06)	-0.01 (0.07)
(House)Work (with at least one parent)	0.05 (0.04)	0.02 (0.05)	-0.00 (0.04)
African american=1 × (House)Work (with at least one parent)	-0.04 (0.06)	-0.00 (0.06)	0.00 (0.07)
Education (with at least one parent)	-0.02 (0.04)	0.01 (0.04)	-0.03 (0.04)

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TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
SEPARATION ON CHILD DEVELOPMENT

Table A4.8 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
African american=1 × Education (with at least one parent)	0.07 (0.12)	0.10 (0.11)	0.04 (0.08)
Active Leisure (with at least one parent)	-0.01 (0.04)	0.02 (0.04)	0.03 (0.05)
African american=1 × Active Leisure (with at least one parent)	-0.03 (0.07)	-0.13+ (0.07)	-0.05 (0.07)
Passive Leisure (with at least one parent)	-0.01 (0.08)	-0.02 (0.05)	0.05 (0.05)
African american=1 × Passive Leisure (with at least one parent)	0.06 (0.09)	0.00 (0.07)	0.03 (0.07)
(House)Work (with parents together)	-0.05+ (0.03)	-0.02 (0.03)	-0.02 (0.03)
African american=1 × (House)Work (with parents together)	0.02 (0.05)	0.03 (0.05)	0.04 (0.07)
Education (with parents together)	0.04 (0.03)	0.02 (0.03)	0.00 (0.03)
African american=1 × Education (with parents together)	-0.04 (0.09)	-0.13+ (0.07)	-0.11 (0.07)
Active Leisure (with parents together)	0.04 (0.04)	-0.03 (0.03)	-0.03 (0.04)
African american=1 × Active Leisure (with parents together)	0.08 (0.06)	0.12+ (0.07)	0.06 (0.07)

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Table A4.8 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Passive Leisure (with parents together)	-0.04 (0.05)	-0.02 (0.04)	0.01 (0.04)
African american=1 × Passive Leisure (with parents together)	-0.00 (0.07)	0.05 (0.06)	-0.01 (0.07)
(House)Work (with father only)	0.01 (0.03)	-0.07* (0.03)	-0.04 (0.02)
African american=1 × (House)Work (with father only)	-0.01 (0.05)	0.07 (0.06)	0.03 (0.06)
Education (with father only)	0.03 (0.02)	0.04+ (0.02)	0.05* (0.02)
African american=1 × Education (with father only)	-0.11 (0.08)	-0.06 (0.05)	-0.15** (0.05)
Active Leisure (with father only)	-0.01 (0.03)	-0.00 (0.03)	-0.06+ (0.03)
African american=1 × Active Leisure (with father only)	0.02 (0.07)	0.12* (0.05)	0.05 (0.06)
Passive Leisure (with father only)	-0.01 (0.03)	-0.00 (0.03)	-0.01 (0.03)
African american=1 × Passive Leisure (with father only)	-0.01 (0.04)	-0.00 (0.05)	0.02 (0.05)
Observations	1352	1673	1765
Nb of Clusters	1238.00	1352.00	1426.00

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Table A4.8 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.			
<i>Source:</i> Sample drawn from the PSID-CDS.			

Heterogeneous effect for census region?

Looking if family structure has an effect on time investments (Table [A4.9](#)), results suggest that time spent in education is more affected for children living in North East; consequently, time spent in other activities are less affected. Time spent in educational activities with at least one parent is more affected in North East, while time spent in work and housework is more affected in Midwest (except when there is a step parent) and South. Time spent with at least one parent in personal needs and care and passive leisure are more affected in West and Midwest. Time spent with at least one parent involved in the activity, in particular in leisure, is more affected in North East region.

Looking at Time Input Production Functions (Tables [A4.10](#) - [A4.12](#)), education and active leisure are less productive in Midwest than in the Northeast for math skills, but more for reading skills. Active leisure is less productive in South for math and non-cognitive skills. In the Western states, active leisure is more productive for reading skills. Passive leisure is less productive for reading skills in NorthEast region.

Time spent with at least one parent in educational activities has a negative effect in North-East for non-cognitive skills, and in active leisure for reading skills. In Midwest, doing passive leisure while there is at least one parent present is less productive for cognitive skills.

Being with both parents together rather than only one parent is better in North East regions doing education activities, while it is worse when the child is doing active leisure.

Table A4.9 – Effect of Family Structure on Parental Time Investments, heterogeneous effect for census region?

<i>Panel A: Total Time (whoever was present)</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother=1	0.26 (0.33)	0.24 (0.22)	-0.45 (0.32)	0.33 (0.30)	-0.07 (0.23)
Single Mother=1 × Midwest	-0.58 (0.37)	-0.48 (0.31)	0.72+ (0.39)	-0.15 (0.41)	-0.21 (0.28)
Single Mother=1 × South	-0.10 (0.36)	-0.22 (0.27)	0.25 (0.34)	-0.28 (0.32)	0.08 (0.27)
Single Mother=1 × West	-0.29 (0.40)	-0.18 (0.42)	0.22 (0.41)	0.28 (0.43)	-0.31 (0.41)
Single Mother (Step)=1	0.06 (0.33)	0.20 (0.39)	-0.27 (0.40)	0.06 (0.52)	0.28 (0.29)
Single Mother (Step)=1 × Midwest	0.18 (0.45)	-0.36 (0.45)	0.54 (0.45)	-0.27 (0.62)	-0.62 (0.39)
Single Mother (Step)=1 × South	-0.23 (0.41)	-0.34 (0.45)	0.42 (0.43)	0.09 (0.55)	-0.39 (0.34)
Single Mother (Step)=1 × West	-0.71 (0.52)	0.02 (0.59)	0.74 (0.57)	0.72 (0.62)	-1.42** (0.49)
Single Father=1	-1.49*** (0.21)	-0.61** (0.24)	2.99*** (0.19)	0.18 (0.16)	-2.56*** (0.17)
Single Father=1 × Midwest	1.28** (0.41)	0.65 (0.43)	-3.06*** (0.50)	-0.63+ (0.38)	2.66*** (0.29)
Single Father=1 × South	1.43***	0.77*	-3.29***	0.12	2.48***

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Table A4.9 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
	(0.34)	(0.38)	(0.36)	(0.39)	(0.34)
Single Father=1 × West	1.89***	0.33	-3.12***	0.26	2.38***
	(0.52)	(0.34)	(0.42)	(0.40)	(0.37)
Other=1	-0.94***	0.01	0.55*	2.62***	-3.21***
	(0.23)	(0.26)	(0.23)	(0.20)	(0.20)
Other=1 × Midwest	0.06	0.21	-0.35	-2.54***	3.18***
	(0.54)	(0.40)	(0.47)	(0.51)	(0.45)
Other=1 × South	1.42***	0.44	-1.30***	-2.62***	3.20***
	(0.34)	(0.42)	(0.36)	(0.39)	(0.42)
Other=1 × West	0.34	0.49	-0.15	-2.37***	2.17**
	(0.53)	(0.57)	(0.39)	(0.51)	(0.75)
Observations	2248	2248	2248	2248	2248
Nb of Clusters	1139.00	1139.00	1139.00	1139.00	1139.00
<i>Panel B: Time with at least one parent: Accessible Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother=1	-0.05	0.05	-0.36	-0.01	-0.26
	(0.39)	(0.35)	(0.23)	(0.26)	(0.32)
Single Mother=1 × Midwest	-0.29	-0.09	0.37	-0.09	-0.21
	(0.47)	(0.41)	(0.31)	(0.40)	(0.40)
Single Mother=1 × South	-0.23	-0.08	0.21	0.09	0.29
	(0.42)	(0.36)	(0.28)	(0.27)	(0.34)
Single Mother=1 × West	-0.06	-0.55	0.10	0.29	-0.19

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Table A4.9 – *Continued from previous page*

	(House(Work))	Personal needs	Education	Active Leisure	Passive Leisure
	(0.48)	(0.50)	(0.29)	(0.36)	(0.50)
Single Mother (Step)=1	-0.06	-0.05	-0.80	-0.17	-0.22
	(0.38)	(0.48)	(0.81)	(0.32)	(0.45)
Single Mother (Step)=1 × Midwest	0.26	0.09	0.38	-0.36	-0.25
	(0.50)	(0.53)	(0.84)	(0.44)	(0.53)
Single Mother (Step)=1 × South	-0.41	-0.04	0.85	0.18	0.04
	(0.46)	(0.51)	(0.83)	(0.35)	(0.48)
Single Mother (Step)=1 × West	-0.47	0.40	0.95	0.37	-0.85
	(0.62)	(0.82)	(0.89)	(0.49)	(0.58)
Single Father=1	-1.34***	0.45*	2.05***	-1.03***	-1.37***
	(0.22)	(0.20)	(0.19)	(0.19)	(0.17)
Single Father=1 × Midwest	1.10***	-0.59	-2.69***	0.62+	0.75+
	(0.26)	(0.48)	(0.33)	(0.37)	(0.43)
Single Father=1 × South	1.11**	-1.38***	-2.32***	1.22**	1.82***
	(0.38)	(0.36)	(0.22)	(0.43)	(0.25)
Single Father=1 × West	1.75**	-0.95**	-1.41*	1.52***	1.12***
	(0.68)	(0.31)	(0.61)	(0.41)	(0.33)
Other=1	-1.25***	1.61***	1.75***	-0.49*	-1.52***
	(0.24)	(0.27)	(0.19)	(0.22)	(0.20)
Other=1 × Midwest	0.76*	-2.39***	-2.03***	-0.01	0.47
	(0.34)	(0.47)	(0.29)	(0.38)	(0.38)
Other=1 × South	0.81**	-1.48***	-2.32***	0.68*	1.72***

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Table A4.9 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
	(0.29)	(0.38)	(0.23)	(0.34)	(0.29)
Other=1 × West	1.00	-1.57	-1.58***	1.22+	1.10*
	(0.70)	(1.00)	(0.47)	(0.71)	(0.48)
Observations	2248	2248	2248	2248	2248
Nb of Clusters	1139.00	1139.00	1139.00	1139.00	1139.00
<i>Panel C: Time with at least one parent: Engaged Time</i>					
	(House)Work	Personal needs and care	Education	Active Leisure	Passive Leisure
Single Mother=1	-0.24	-0.04	-0.03	-0.17	-0.64+
	(0.34)	(0.41)	(0.16)	(0.13)	(0.39)
Single Mother=1 × Midwest	0.09	0.11	0.20	0.35	0.90*
	(0.47)	(0.46)	(0.24)	(0.29)	(0.44)
Single Mother=1 × South	0.03	0.09	-0.07	0.21	0.63
	(0.38)	(0.42)	(0.20)	(0.17)	(0.40)
Single Mother=1 × West	0.15	-0.05	0.29	0.22	0.80+
	(0.43)	(0.52)	(0.31)	(0.23)	(0.48)
Single Mother (Step)=1	-0.12	-0.08	-0.29	0.04	-0.14
	(0.35)	(0.53)	(0.29)	(0.20)	(0.56)
Single Mother (Step)=1 × Midwest	0.31	0.33	0.06	-0.10	0.42
	(0.45)	(0.58)	(0.37)	(0.34)	(0.60)
Single Mother (Step)=1 × South	-0.22	0.15	0.30	0.10	-0.00
	(0.42)	(0.55)	(0.33)	(0.27)	(0.58)
Single Mother (Step)=1 × West	-0.51	-0.10	0.87	0.19	-0.33

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Table A4.9 – *Continued from previous page*

	(House(Work))	Personal needs	Education	Active Leisure	Passive Leisure
	(0.65)	(0.62)	(0.63)	(0.59)	(0.70)
Single Father=1	-0.22	-0.72***	0.15	-2.99***	-0.23
	(0.23)	(0.21)	(0.19)	(0.22)	(0.18)
Single Father=1 × Midwest	-0.16	0.33	-0.89	3.30***	-0.12
	(0.33)	(0.46)	(0.66)	(0.43)	(0.40)
Single Father=1 × South	-0.28	-0.36	-0.21	2.91***	0.50+
	(0.38)	(0.41)	(0.27)	(0.54)	(0.30)
Single Father=1 × West	0.74	0.42	0.13	3.18***	-0.24
	(0.78)	(0.35)	(0.27)	(0.35)	(0.47)
Other=1	-0.05	0.47+	0.04	-2.36***	-0.22
	(0.25)	(0.28)	(0.19)	(0.23)	(0.21)
Other=1 × Midwest	-0.66	-1.24**	-0.17	2.48***	-0.22
	(0.48)	(0.45)	(0.44)	(0.40)	(0.27)
Other=1 × South	-0.37	-0.32	-0.36	2.46***	0.18
	(0.30)	(0.37)	(0.25)	(0.41)	(0.26)
Other=1 × West	-0.23	-0.13	1.08+	2.31***	0.38
	(0.69)	(0.76)	(0.62)	(0.58)	(0.36)
Observations	2248	2248	2248	2248	2248
Nb of Clusters	1139.00	1139.00	1139.00	1139.00	1139.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

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Table A4.10 – Time Input Production Functions : Total Time (whoever was present); heterogeneous effect for census region?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.05 (0.08)	0.13 (0.09)	0.01 (0.07)
Midwest $\times$ (House)Work	0.11 (0.15)	-0.19+ (0.11)	0.10 (0.09)
South $\times$ (House)Work	0.02 (0.09)	-0.09 (0.10)	-0.01 (0.09)
West $\times$ (House)Work	0.07 (0.10)	-0.02 (0.12)	0.08 (0.10)
Education	0.09 (0.07)	0.15+ (0.08)	0.04 (0.08)
Midwest $\times$ Education	0.22 (0.22)	-0.18+ (0.10)	0.08 (0.10)
South $\times$ Education	-0.03 (0.08)	-0.06 (0.09)	-0.01 (0.09)
West $\times$ Education	0.05 (0.10)	0.03 (0.12)	-0.03 (0.11)
Active Leisure	-0.04 (0.06)	0.16** (0.06)	0.16* (0.08)
Midwest $\times$ Active Leisure	0.34+ (0.20)	-0.17+ (0.09)	0.02 (0.10)
South $\times$ Active Leisure	0.07 (0.07)	-0.16* (0.08)	-0.16+ (0.09)
West $\times$ Active Leisure	0.17* (0.08)	0.03 (0.09)	-0.07 (0.10)
Passive Leisure	-0.11 (0.07)	0.04 (0.08)	0.06 (0.12)
Midwest $\times$ Passive Leisure	0.23 (0.17)	-0.10 (0.10)	-0.12 (0.14)
South $\times$ Passive Leisure	0.09 (0.08)	0.01 (0.09)	-0.04 (0.13)
West $\times$ Passive Leisure	0.24** (0.09)	0.14 (0.11)	0.02 (0.15)
Observations	1085	1330	1399

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Table A4.10 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Nb of Clusters	989.00	1077.00	1131.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.11 – Time Input Production Functions : Effect of the presence of at least one parent; heterogeneous effect for census region?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.04 (0.08)	0.19 (0.13)	0.02 (0.12)
Midwest $\times$ (House)Work	0.07 (0.14)	-0.27+ (0.15)	0.12 (0.13)
South $\times$ (House)Work	0.02 (0.10)	-0.15 (0.14)	-0.02 (0.13)
West $\times$ (House)Work	0.03 (0.11)	-0.07 (0.16)	0.02 (0.14)
Education	0.08 (0.09)	0.16* (0.08)	0.05 (0.08)
Midwest $\times$ Education	0.21 (0.23)	-0.20* (0.10)	0.07 (0.10)
South $\times$ Education	-0.04 (0.10)	-0.10 (0.09)	-0.01 (0.09)
West $\times$ Education	0.04 (0.11)	0.01 (0.12)	-0.06 (0.11)
Active Leisure	0.05 (0.08)	0.18* (0.09)	0.04 (0.09)
Midwest $\times$ Active Leisure	0.20 (0.20)	-0.21+ (0.11)	0.16 (0.11)
South $\times$ Active Leisure	-0.04	-0.15	-0.04

*Continued on next page*TIME INVESTMENTS AS A DRIVING CHANNEL FOR THE EFFECT OF PARENTAL
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Table A4.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.09)	(0.10)	(0.11)
West $\times$ Active Leisure	0.10	0.02	0.01
	(0.10)	(0.11)	(0.12)
Passive Leisure	-0.09	0.03	-0.03
	(0.09)	(0.12)	(0.15)
Midwest $\times$ Passive Leisure	0.28	-0.06	-0.05
	(0.21)	(0.14)	(0.17)
South $\times$ Passive Leisure	0.07	0.04	-0.02
	(0.10)	(0.13)	(0.16)
West $\times$ Passive Leisure	0.21+	0.11	0.14
	(0.13)	(0.14)	(0.18)
(House)Work (with at least one parent)	0.01	-0.09	-0.03
	(0.07)	(0.10)	(0.09)
Midwest $\times$ (House)Work (with at least one parent)	0.03	0.10	-0.02
	(0.09)	(0.11)	(0.11)
South $\times$ (House)Work (with at least one parent)	-0.01	0.10	0.03
	(0.09)	(0.11)	(0.11)
West $\times$ (House)Work (with at least one parent)	0.07	0.09	0.10
	(0.09)	(0.12)	(0.12)
Education (with at least one parent)	0.07	-0.00	-0.13+
	(0.07)	(0.08)	(0.07)
Midwest $\times$ Education (with at least one parent)	-0.02	0.03	0.12

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Table A4.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.10)	(0.09)	(0.09)
South × Education (with at least one parent)	-0.00	0.11	0.09
	(0.11)	(0.11)	(0.08)
West × Education (with at least one parent)	-0.01	0.02	0.13
	(0.08)	(0.09)	(0.09)
Active Leisure (with at least one parent)	-0.10	-0.00	0.09
	(0.07)	(0.06)	(0.07)
Midwest × Active Leisure (with at least one parent)	0.16+	0.02	-0.16+
	(0.08)	(0.08)	(0.09)
South × Active Leisure (with at least one parent)	0.16+	-0.03	-0.12
	(0.08)	(0.07)	(0.08)
West × Active Leisure (with at least one parent)	0.07	0.02	-0.04
	(0.09)	(0.08)	(0.10)
Passive Leisure (with at least one parent)	0.04	0.02	0.02
	(0.06)	(0.08)	(0.09)
Midwest × Passive Leisure (with at least one parent)	-0.22+	-0.12	0.01
	(0.12)	(0.10)	(0.11)
South × Passive Leisure (with at least one parent)	-0.03	-0.06	0.08
	(0.08)	(0.09)	(0.10)
West × Passive Leisure (with at least one parent)	-0.04	0.03	-0.07
	(0.09)	(0.11)	(0.11)
Observations	1085	1330	1399

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Table A4.11 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Nb of Clusters	989.00	1077.00	1131.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.12 – Time Input Production Functions : Does who is present matter? (Accessible Time); heterogeneous effect for census region?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.05 (0.08)	0.20 (0.13)	0.02 (0.12)
Midwest $\times$ (House)Work	0.02 (0.13)	-0.26+ (0.15)	0.13 (0.14)
South $\times$ (House)Work	0.02 (0.10)	-0.16 (0.14)	-0.02 (0.13)
West $\times$ (House)Work	0.03 (0.11)	-0.07 (0.16)	0.04 (0.15)
Education	0.10 (0.09)	0.16* (0.08)	0.05 (0.08)
Midwest $\times$ Education	0.14 (0.21)	-0.21* (0.10)	0.07 (0.11)
South $\times$ Education	-0.05 (0.10)	-0.10 (0.10)	-0.01 (0.10)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
West × Education	0.03 (0.12)	0.01 (0.12)	-0.02 (0.12)
Active Leisure	0.09 (0.08)	0.16+ (0.09)	0.03 (0.10)
Midwest × Active Leisure	0.08 (0.17)	-0.19+ (0.11)	0.19 (0.12)
South × Active Leisure	-0.07 (0.09)	-0.14 (0.11)	-0.02 (0.11)
West × Active Leisure	0.07 (0.11)	0.03 (0.12)	0.01 (0.12)
Passive Leisure	-0.09 (0.09)	0.03 (0.12)	-0.04 (0.15)
Midwest × Passive Leisure	0.23 (0.19)	-0.07 (0.14)	-0.06 (0.17)
South × Passive Leisure	0.08 (0.10)	0.04 (0.13)	-0.01 (0.16)
West × Passive Leisure	0.24+ (0.13)	0.09 (0.15)	0.15 (0.18)
(House)Work (with at least one parent)	0.10 (0.11)	-0.09 (0.12)	0.03 (0.11)
Midwest × (House)Work (with at least one parent)	-0.07 (0.13)	0.07 (0.14)	-0.11 (0.12)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
South × (House)Work (with at least one parent)	-0.07 (0.12)	0.12 (0.13)	-0.03 (0.12)
West × (House)Work (with at least one parent)	0.03 (0.13)	0.22 (0.15)	0.16 (0.14)
Education (with at least one parent)	-0.01 (0.08)	-0.05 (0.10)	-0.20* (0.10)
Midwest × Education (with at least one parent)	0.04 (0.10)	0.07 (0.13)	0.36** (0.13)
South × Education (with at least one parent)	0.08 (0.14)	0.19 (0.14)	0.20 (0.12)
West × Education (with at least one parent)	0.08 (0.12)	0.13 (0.13)	0.24+ (0.13)
Active Leisure (with at least one parent)	-0.06 (0.11)	0.12 (0.10)	0.01 (0.09)
Midwest × Active Leisure (with at least one parent)	0.07 (0.12)	-0.18 (0.13)	-0.09 (0.12)
South × Active Leisure (with at least one parent)	0.10 (0.12)	-0.20+ (0.12)	-0.03 (0.11)
West × Active Leisure (with at least one parent)	-0.01 (0.13)	-0.12 (0.13)	0.04 (0.13)
Passive Leisure (with at least one parent)	0.11 (0.09)	0.00 (0.13)	0.09 (0.13)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Midwest $\times$ Passive Leisure (with at least one parent)	-0.29*	-0.09	-0.06
	(0.15)	(0.15)	(0.15)
South $\times$ Passive Leisure (with at least one parent)	-0.06	-0.01	0.02
	(0.10)	(0.14)	(0.13)
West $\times$ Passive Leisure (with at least one parent)	-0.06	0.06	-0.02
	(0.14)	(0.17)	(0.17)
(House)Work (with parents together)	-0.07	-0.04	-0.03
	(0.08)	(0.08)	(0.07)
Midwest $\times$ (House)Work (with parents together)	0.04	0.05	0.06
	(0.09)	(0.09)	(0.08)
South $\times$ (House)Work (with parents together)	0.01	0.04	0.09
	(0.09)	(0.09)	(0.08)
West $\times$ (House)Work (with parents together)	-0.05	-0.09	-0.15
	(0.10)	(0.10)	(0.10)
Education (with parents together)	0.09	0.07	0.09
	(0.07)	(0.09)	(0.09)
Midwest $\times$ Education (with parents together)	-0.10	-0.06	-0.26*
	(0.09)	(0.11)	(0.10)
South $\times$ Education (with parents together)	-0.11	-0.14	-0.14
	(0.10)	(0.11)	(0.11)
West $\times$ Education (with parents together)	-0.07	-0.14	-0.15
	(0.10)	(0.11)	(0.12)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Active Leisure (with parents together)	-0.09 (0.09)	-0.14+ (0.08)	0.05 (0.07)
Midwest × Active Leisure (with parents together)	0.19+ (0.10)	0.24* (0.11)	-0.02 (0.09)
South × Active Leisure (with parents together)	0.15 (0.11)	0.16 (0.10)	-0.04 (0.09)
West × Active Leisure (with parents together)	0.15 (0.11)	0.14 (0.11)	0.04 (0.11)
Passive Leisure (with parents together)	-0.04 (0.08)	0.03 (0.09)	-0.08 (0.10)
Midwest × Passive Leisure (with parents together)	0.02 (0.12)	-0.02 (0.11)	0.14 (0.13)
South × Passive Leisure (with parents together)	-0.03 (0.09)	-0.07 (0.10)	0.06 (0.11)
West × Passive Leisure (with parents together)	0.01 (0.11)	-0.00 (0.12)	-0.04 (0.13)
(House)Work (with father only)	-0.11* (0.05)	0.01 (0.06)	-0.09 (0.06)
Midwest × (House)Work (with father only)	0.23* (0.11)	0.05 (0.10)	0.07 (0.08)
South × (House)Work (with father only)	0.08 (0.06)	-0.05 (0.07)	0.03 (0.07)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
West $\times$ (House)Work (with father only)	0.15+ (0.08)	-0.14+ (0.08)	0.07 (0.08)
Education (with father only)	-0.06 (0.04)	0.09 (0.08)	0.00 (0.05)
Midwest $\times$ Education (with father only)	0.10* (0.05)	-0.10 (0.09)	-0.08 (0.07)
South $\times$ Education (with father only)	0.09 (0.07)	-0.05 (0.09)	-0.02 (0.07)
West $\times$ Education (with father only)	0.05 (0.06)	-0.06 (0.09)	0.04 (0.08)
Active Leisure (with father only)	-0.05 (0.07)	-0.07 (0.10)	0.12+ (0.07)
Midwest $\times$ Active Leisure (with father only)	0.06 (0.09)	0.16 (0.12)	-0.21* (0.09)
South $\times$ Active Leisure (with father only)	0.03 (0.08)	0.17+ (0.10)	-0.16+ (0.08)
West $\times$ Active Leisure (with father only)	0.06 (0.09)	0.13 (0.11)	-0.24* (0.10)
Passive Leisure (with father only)	0.03 (0.07)	-0.04 (0.08)	0.00 (0.10)
Midwest $\times$ Passive Leisure (with father only)	0.02 (0.08)	0.05 (0.09)	-0.02 (0.11)

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Table A4.12 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
South $\times$ Passive Leisure (with father only)	-0.04 (0.08)	0.00 (0.09)	0.01 (0.11)
West $\times$ Passive Leisure (with father only)	-0.08 (0.09)	0.00 (0.10)	-0.02 (0.12)
Observations	1085	1330	1399
Nb of Clusters	989.00	1077.00	1131.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Heterogeneous effect for Metropolitan Statistical Area (MSA)

Looking if family structure has an effect on time investments (Table [A4.13](#)), results suggest that there is a decrease in personal needs and care and passive leisure in rural areas, substituted by an increase in education and active leisure after the change in family structure. The effect is reversed for larger cities. Looking at time spent with at least one parent, single mothers spend more time in educational activities in rural areas, while those from urban areas spend less time with their children. The latter might be more affected by time in transports.

Looking at time input production functions (Tables [A4.14](#) [A4.16](#)), the effect of doing work and housework is larger in rural areas, this might reflect differences in the kind of work and housework. Educational activities have a larger effect on child's development in urban and metropolitan areas. Active leisure are also more fruitful for children's reading skills and non-cognitive skills in urban areas. These differences in the effect of each activity might reflect differences in the type of leisure that is done or differences in the access to some leisure.

Time spent with at least one parent has a larger (positive) effect when the child is doing leisure in urban areas. The presence of the father benefits more to children living in rural areas while they are doing passive leisure for their non-cognitive skills, and when they are doing active leisure for their reading skills.

Doing passive leisure with both parents together is more fruitful for child's reading skills in rural areas, contrarily to do educational activities.

Table A4.13 – Effect of Family Structure on Parental Time Investments, heterogeneous effect for Metropolitan Statistical Area (MSA)?

<i>Panel A: Total Time (whoever was present)</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1	-1.96+	-1.10+	1.06	1.05	-0.05
	(1.01)	(0.57)	(0.92)	(0.79)	(0.31)
Single Mother=1 × Central counties in MA	1.70+	1.09+	-1.27	-0.57	-0.13
	(1.03)	(0.59)	(0.94)	(0.81)	(0.36)
Single Mother=1 × Fringe counties in MA	1.80+	1.28*	-1.19	-0.71	-0.19
	(1.05)	(0.62)	(0.96)	(0.83)	(0.40)
Single Mother=1 × Counties in MA > 250 000 to 1 M	2.39*	1.13+	-1.26	-1.26	0.17
	(1.03)	(0.60)	(0.94)	(0.82)	(0.36)
Single Mother=1 × Counties in MA < 250 000	2.24*	1.09	-1.01	-1.02	-0.34
	(1.11)	(0.78)	(1.06)	(0.96)	(0.43)
Single Mother=1 × Urban, > 20 000, adj. to a MA	2.11+	1.99*	-2.15*	-0.38	-0.38
	(1.27)	(0.89)	(1.07)	(1.06)	(0.52)
Single Mother=1 × Urban, > 20 000, not adj. to a MA	2.37+	0.97	-1.49	-1.02	0.17
	(1.21)	(0.61)	(1.02)	(0.90)	(0.73)
Single Mother=1 × Urban, < 20 000, adj. to a MA	1.64	1.16*	-0.27	-1.58+	-0.27
	(1.01)	(0.58)	(1.00)	(0.86)	(0.45)
Single Mother=1 × Urban, < 20 000, not adj. to a MA	2.44*	0.90	-1.09	-0.67	-0.52
	(1.05)	(0.67)	(0.96)	(0.82)	(0.40)
Single Mother (Step)=1	0.53	-1.83+	1.12+	1.34**	-1.48**
	(0.69)	(0.95)	(0.63)	(0.51)	(0.57)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother (Step)=1 × Central counties in MA	-0.78 (0.75)	1.78+ (0.98)	-0.95 (0.67)	-1.15* (0.55)	1.26* (0.61)
Single Mother (Step)=1 × Fringe counties in MA	-0.56 (0.74)	1.81+ (0.98)	-1.17+ (0.68)	-1.15+ (0.62)	1.58* (0.64)
Single Mother (Step)=1 × Counties in MA > 250 000 to 1 M	-0.36 (0.76)	2.16* (1.01)	-1.05 (0.67)	-1.73** (0.59)	1.30* (0.63)
Single Mother (Step)=1 × Counties in MA < 250 000	0.05 (1.05)	2.69* (1.18)	-1.45+ (0.81)	-1.24 (0.84)	0.20 (0.70)
Single Mother (Step)=1 × Urban, > 20 000, adj. to a MA	-1.90 (1.19)	3.33** (1.16)	-3.42* (1.73)	-0.73 (1.11)	3.17* (1.47)
Single Mother (Step)=1 × Urban, > 20 000, not adj. to a MA	0.79 (0.80)	2.13+ (1.12)	-1.33* (0.68)	-1.92*** (0.53)	1.04 (0.64)
Single Mother (Step)=1 × Urban, < 20 000, adj. to a MA	-2.12* (0.94)	1.52 (1.10)	-0.51 (0.77)	-0.56 (1.03)	1.36+ (0.72)
Single Father=1	-4.05*** (0.64)	-3.02*** (0.66)	2.53** (0.77)	3.06*** (0.86)	-1.41* (0.62)
Single Father=1 × Central counties in MA	4.17*** (0.76)	2.88*** (0.69)	-2.63** (0.84)	-2.95** (0.92)	1.38* (0.69)
Single Father=1 × Fringe counties in MA	3.26*** (0.81)	3.54*** (1.04)	-2.10 (2.01)	-2.47** (0.92)	0.29 (1.24)
Single Father=1 × Counties in MA > 250 000 to 1 M	4.42*** (0.71)	3.42*** (0.70)	-2.42** (0.84)	-3.53*** (1.00)	1.12 (0.73)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Father=1 × Counties in MA < 250 000	4.93*** (1.10)	2.66** (0.87)	-3.16** (1.04)	-3.43*** (1.00)	2.19** (0.70)
Single Father=1 × Urban, > 20 000, adj. to a MA	4.08*** (0.63)	1.90*** (0.56)	-2.49*** (0.65)	-1.26+ (0.75)	0.83+ (0.49)
Single Father=1 × Urban, > 20 000, not adj. to a MA	2.50** (0.96)	3.99*** (0.77)	-3.42*** (0.91)	-2.54** (0.96)	1.71+ (0.95)
Single Father=1 × Urban, < 20 000, adj. to a MA	6.66*** (1.58)	2.10** (0.81)	-3.63*** (0.97)	-3.37*** (0.94)	2.61*** (0.77)
Single Father=1 × Urban, < 20 000, not adj. to a MA	4.01*** (1.04)	3.39*** (0.98)	-2.55* (1.30)	-3.89*** (1.00)	1.87** (0.71)
Other=1	-1.78 (1.21)	-0.78 (0.75)	2.34* (0.95)	-0.24 (0.76)	-0.11 (0.49)
Other=1 × Central counties in MA	1.98 (1.32)	0.79 (0.90)	-2.66** (1.01)	0.44 (0.86)	0.40 (0.71)
Other=1 × Fringe counties in MA	0.31 (1.63)	0.81 (0.81)	-2.08+ (1.06)	0.59 (0.99)	-0.10 (0.80)
Other=1 × Counties in MA > 250 000 to 1 M	2.19+ (1.23)	1.66* (0.82)	-2.90** (1.02)	0.07 (0.85)	-0.26 (0.58)
Other=1 × Counties in MA < 250 000	1.09 (1.21)	0.56 (0.75)	-0.31 (0.95)	-0.15 (0.76)	-1.18* (0.49)
Other=1 × Urban, > 20 000, adj. to a MA	0.54 (1.63)	3.90** (1.22)	-5.79** (1.95)	-1.30 (1.32)	3.17+ (1.63)

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Table A4.13 – *Continued from previous page*

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Other=1 × Urban, < 20 000, adj. to a MA	2.53*	2.13*	-3.94***	2.85***	-2.27***
	(1.28)	(0.84)	(1.02)	(0.82)	(0.59)
Other=1 × Urban, < 20 000, not adj. to a MA	2.06+	0.64	-4.25***	1.46	0.14
	(1.24)	(0.90)	(1.07)	(0.93)	(0.85)
Observations	2251	2251	2251	2251	2251
Nb of Clusters	1140.00	1140.00	1140.00	1140.00	1140.00
<i>Panel B: Time with at least one parent: Accessible Time</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1	-2.39*	-1.23*	0.38	0.83	-0.42
	(1.11)	(0.54)	(0.32)	(1.12)	(0.37)
Single Mother=1 × Central counties in MA	2.01+	1.26*	-0.52	-0.71	0.26
	(1.13)	(0.56)	(0.36)	(1.13)	(0.42)
Single Mother=1 × Fringe counties in MA	2.01+	1.09+	-0.60	-0.85	0.15
	(1.14)	(0.60)	(0.42)	(1.14)	(0.46)
Single Mother=1 × Counties in MA > 250 000 to 1 M	2.44*	1.18*	-0.66+	-0.96	0.44
	(1.12)	(0.55)	(0.39)	(1.14)	(0.42)
Single Mother=1 × Counties in MA < 250 000	2.71*	1.15	-0.34	-0.81	-0.07
	(1.17)	(0.92)	(0.59)	(1.22)	(0.49)
Single Mother=1 × Urban, > 20 000, adj. to a MA	1.00	1.65	-2.49*	-0.10	-1.50**
	(1.10)	(1.90)	(1.19)	(1.21)	(0.51)
Single Mother=1 × Urban, > 20 000, not adj. to a MA	1.98	1.16+	-0.82	-0.52	0.52
	(1.21)	(0.60)	(0.51)	(1.29)	(0.65)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1 × Urban, < 20 000, adj. to a MA	1.87+	1.31*	0.81	-1.51	-0.12
	(1.07)	(0.62)	(0.59)	(1.20)	(0.55)
Single Mother=1 × Urban, < 20 000, not adj. to a MA	2.34+	1.20	-0.49	-0.33	-0.77+
	(1.24)	(0.78)	(0.32)	(1.09)	(0.41)
Single Mother (Step)=1	0.42	0.50	-0.34	1.24*	-1.12**
	(0.85)	(0.65)	(0.43)	(0.51)	(0.43)
Single Mother (Step)=1 × Central counties in MA	-0.61	-0.51	0.19	-1.29*	0.84+
	(0.91)	(0.72)	(0.50)	(0.52)	(0.50)
Single Mother (Step)=1 × Fringe counties in MA	-0.64	-0.47	0.22	-1.47**	1.06*
	(0.89)	(0.73)	(0.54)	(0.56)	(0.52)
Single Mother (Step)=1 × Counties in MA > 250 000 to 1 M	-0.68	-0.76	-0.14	-1.58**	0.83+
	(0.88)	(0.68)	(0.54)	(0.56)	(0.50)
Single Mother (Step)=1 × Counties in MA < 250 000	-0.62	1.51	0.43	-1.45*	-0.33
	(0.95)	(1.90)	(1.01)	(0.63)	(0.57)
Single Mother (Step)=1 × Urban, > 20 000, adj. to a MA	-1.95*	-0.35	-2.04	-0.52	-0.03
	(0.92)	(1.93)	(1.29)	(0.74)	(0.79)
Single Mother (Step)=1 × Urban, > 20 000, not adj. to a MA	0.37	-0.77	0.25	-2.56***	0.05
	(0.95)	(0.67)	(0.51)	(0.57)	(0.70)
Single Mother (Step)=1 × Urban, < 20 000, adj. to a MA	-2.38+	-0.96	1.36+	-1.39	0.17
	(1.27)	(0.85)	(0.82)	(0.96)	(0.58)
Single Father=1	-4.97***	-4.33***	1.41	0.52	-2.83***
	(0.75)	(0.82)	(1.72)	(0.93)	(0.57)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Father=1 × Central counties in MA	5.30*** (0.91)	3.90*** (0.85)	-1.44 (1.75)	-0.34 (1.00)	2.94*** (0.63)
Single Father=1 × Fringe counties in MA	4.06*** (0.82)	3.85*** (1.08)	-0.93 (2.08)	-1.31 (0.94)	1.26* (0.60)
Single Father=1 × Counties in MA > 250 000 to 1 M	5.61*** (0.78)	3.57*** (0.88)	-1.69 (1.72)	-0.82 (1.00)	3.35*** (0.66)
Single Father=1 × Counties in MA < 250 000	4.55*** (0.73)	5.89*** (0.87)	-1.94 (1.76)	-0.33 (1.00)	3.67*** (0.81)
Single Father=1 × Urban, > 20 000, adj. to a MA	4.91*** (0.73)	3.33*** (0.69)	-0.03 (1.21)	1.33* (0.65)	2.57*** (0.43)
Single Father=1 × Urban, > 20 000, not adj. to a MA	3.30*** (0.97)	4.14*** (0.91)	-1.76 (1.72)	-0.12 (1.17)	3.20*** (0.80)
Single Father=1 × Urban, < 20 000, adj. to a MA	3.76*** (1.00)	2.73** (0.95)	-2.65 (1.85)	-1.35 (0.98)	2.70*** (0.78)
Single Father=1 × Urban, < 20 000, not adj. to a MA	4.22*** (1.24)	2.65* (1.18)	-1.88 (1.80)	-0.75 (1.13)	2.38*** (0.66)
Other=1	-2.50** (0.95)	-0.57 (0.62)	0.08 (0.48)	0.47 (0.93)	-0.97 (0.68)
Other=1 × Central counties in MA	2.45* (1.02)	0.04 (0.66)	-0.13 (0.55)	-0.49 (0.98)	0.72 (0.71)
Other=1 × Fringe counties in MA	1.24 (0.99)	-0.07 (1.03)	-0.53 (0.52)	-0.75 (1.06)	-0.11 (0.74)

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Table A4.13 – *Continued from previous page*

	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Other=1 × Counties in MA > 250 000 to 1 M	2.56** (0.96)	0.91 (0.71)	-0.66 (0.55)	-0.16 (0.99)	1.25+ (0.72)
Other=1 × Counties in MA < 250 000	1.75+ (0.94)	1.07+ (0.62)	0.25 (0.48)	-0.80 (0.93)	-0.59 (0.68)
Other=1 × Urban, > 20 000, adj. to a MA	0.46 (1.07)	-0.10 (2.00)	-2.30+ (1.36)	-0.79 (1.11)	1.48 (1.12)
Other=1 × Urban, < 20 000, adj. to a MA	2.77** (1.03)	-1.73** (0.67)	-0.90 (0.64)	-0.68 (1.00)	-2.08** (0.78)
Other=1 × Urban, < 20 000, not adj. to a MA	1.98+ (1.10)	1.31 (1.06)	-0.73+ (0.43)	-0.08 (0.89)	0.32 (0.71)
Observations	2251	2251	2251	2251	2251
Nb of Clusters	1140.00	1140.00	1140.00	1140.00	1140.00
<i>Panel C: Time with at least one parent: Engaged Time</i>					
	(House)Work	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1	-1.15* (0.58)	-0.55 (0.46)	-0.03 (0.33)	-0.32 (0.71)	-0.06 (0.58)
Single Mother=1 × Central counties in MA	0.82 (0.64)	0.58 (0.49)	-0.06 (0.36)	0.42 (0.72)	0.05 (0.59)
Single Mother=1 × Fringe counties in MA	0.66 (0.65)	0.21 (0.54)	-0.20 (0.41)	0.23 (0.72)	-0.21 (0.65)
Single Mother=1 × Counties in MA > 250 000 to 1 M	1.31* (0.60)	0.60 (0.48)	0.21 (0.38)	0.24 (0.73)	0.15 (0.60)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother=1 × Counties in MA < 250 000	1.50*	0.51	-0.63	0.30	0.19
	(0.71)	(0.96)	(0.57)	(1.09)	(0.83)
Single Mother=1 × Urban, > 20 000, adj. to a MA	-1.03	-0.73	0.62	-0.54	-0.06
	(0.71)	(0.91)	(1.17)	(1.06)	(0.89)
Single Mother=1 × Urban, > 20 000, not adj. to a MA	0.70	0.89	1.03	1.42	0.29
	(0.80)	(0.58)	(0.67)	(0.97)	(0.73)
Single Mother=1 × Urban, < 20 000, adj. to a MA	0.90	0.95+	1.13+	0.13	0.37
	(0.62)	(0.55)	(0.62)	(0.84)	(0.64)
Single Mother=1 × Urban, < 20 000, not adj. to a MA	1.18	0.95	0.00	1.16	-0.27
	(1.20)	(0.82)	(0.37)	(0.94)	(0.59)
Single Mother (Step)=1	0.26	0.84	-0.08	2.03**	0.26
	(1.06)	(0.67)	(0.49)	(0.74)	(0.49)
Single Mother (Step)=1 × Central counties in MA	-0.58	-0.68	-0.33	-2.14**	-0.14
	(1.08)	(0.75)	(0.54)	(0.75)	(0.54)
Single Mother (Step)=1 × Fringe counties in MA	-0.48	-0.89	0.09	-2.11**	-0.19
	(1.10)	(0.74)	(0.56)	(0.77)	(0.56)
Single Mother (Step)=1 × Counties in MA > 250 000 to 1 M	-0.41	-0.94	-0.05	-2.36**	-0.64
	(1.08)	(0.70)	(0.55)	(0.77)	(0.56)
Single Mother (Step)=1 × Counties in MA < 250 000	-0.26	-1.26	0.28	-2.17*	-1.67+
	(1.18)	(0.95)	(1.07)	(0.99)	(0.86)
Single Mother (Step)=1 × Urban, > 20 000, adj. to a MA	-2.59*	-2.30*	0.68	-2.73*	0.14
	(1.16)	(1.03)	(1.27)	(1.11)	(0.87)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Single Mother (Step)=1 × Urban, > 20 000, not adj. to a MA	1.09 (1.27)	-0.83 (0.85)	3.23** (1.20)	-2.49* (1.25)	-0.92 (0.91)
Single Mother (Step)=1 × Urban, < 20 000, adj. to a MA	-1.54 (1.43)	-0.24 (0.90)	0.59 (0.63)	-1.17 (1.27)	0.24 (0.74)
Single Father=1	-3.79*** (0.72)	-3.86*** (0.85)	-0.27 (1.03)	2.35* (1.12)	-2.25* (0.90)
Single Father=1 × Central counties in MA	4.11*** (0.95)	3.44*** (0.88)	0.20 (1.08)	-1.86 (1.16)	2.53** (0.95)
Single Father=1 × Fringe counties in MA	3.29*** (0.74)	2.60** (0.97)	-0.53 (1.28)	-4.52*** (1.26)	1.29 (1.04)
Single Father=1 × Counties in MA > 250 000 to 1 M	4.06*** (0.72)	3.37*** (0.92)	0.57 (1.10)	-2.92* (1.17)	2.58** (0.97)
Single Father=1 × Counties in MA < 250 000	3.49*** (0.79)	5.15*** (0.89)	0.17 (1.03)	-2.92* (1.20)	3.44*** (0.94)
Single Father=1 × Urban, > 20 000, adj. to a MA	3.72*** (0.70)	3.02*** (0.69)	0.35 (1.02)	-1.06 (0.72)	1.74** (0.57)
Single Father=1 × Urban, > 20 000, not adj. to a MA	2.46** (0.90)	3.10** (1.00)	1.68 (1.10)	-1.12 (1.63)	2.65** (1.03)
Single Father=1 × Urban, < 20 000, adj. to a MA	2.48* (0.96)	2.40* (0.96)	0.17 (1.34)	-3.60** (1.20)	1.01 (1.21)
Single Father=1 × Urban, < 20 000, not adj. to a MA	2.59* (1.25)	2.02 (1.34)	0.21 (1.20)	-3.77** (1.44)	0.93 (0.99)

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Table A4.13 – *Continued from previous page*

	(House(Work)	Personal needs	Education	Active Leisure	Passive Leisure
Other=1	-1.38*	0.61	-0.01	-0.53	0.50
	(0.57)	(0.56)	(0.41)	(0.63)	(0.55)
Other=1 × Central counties in MA	1.27+	-0.88	0.43	0.59	-0.40
	(0.70)	(0.62)	(0.58)	(0.73)	(0.58)
Other=1 × Fringe counties in MA	-0.48	-1.44	-0.64	0.45	-1.33*
	(0.91)	(0.94)	(0.54)	(0.74)	(0.61)
Other=1 × Counties in MA > 250 000 to 1 M	1.38*	-0.13	0.04	0.76	-0.46
	(0.59)	(0.64)	(0.53)	(0.74)	(0.55)
Other=1 × Counties in MA < 250 000	0.99+	-0.46	0.14	0.99	-1.69**
	(0.56)	(0.55)	(0.39)	(0.62)	(0.54)
Other=1 × Urban, > 20 000, adj. to a MA	-1.58+	-3.33**	0.23	-1.16	-1.11
	(0.83)	(1.12)	(1.18)	(1.07)	(1.06)
Other=1 × Urban, < 20 000, adj. to a MA	1.49*	-2.69***	-2.57***	0.74	-1.52*
	(0.73)	(0.61)	(0.58)	(0.70)	(0.72)
Other=1 × Urban, < 20 000, not adj. to a MA	0.92	-0.24	-0.09	1.39	-0.53
	(1.08)	(0.94)	(0.45)	(0.87)	(0.57)
Observations	2251	2251	2251	2251	2251
Nb of Clusters	1140.00	1140.00	1140.00	1140.00	1140.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.14 – Time Input Production Functions : Total Time (whoever was present); heterogeneous effect for Metropolitan Statistical Area (MSA)?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	-0.04 (0.19)	0.24 (0.79)	2.38** (0.75)
Central counties in MA $\times$ (House)Work	0.23 (0.22)	-0.27 (0.79)	-2.29** (0.75)
Fringe counties in MA $\times$ (House)Work	0.19 (0.26)	-0.24 (0.80)	-2.38** (0.75)
Counties in MA $> 250\,000$ to 1 M $\times$ (House)Work	0.08 (0.20)	-0.17 (0.79)	-2.38** (0.75)
Counties in MA $< 250\,000 \times$ (House)Work	0.06 (0.24)	-0.11 (0.80)	-2.24** (0.76)
Urban, $> 20\,000$, adj. to a MA $\times$ (House)Work	0.12 (0.20)	-0.02 (0.80)	-2.21** (0.76)
Urban, $> 20\,000$, not adj. to a MA $\times$ (House)Work	-0.18 (0.24)	-0.17 (0.79)	-2.15** (0.81)
Urban, $< 20\,000$, adj. to a MA $\times$ (House)Work	0.11 (0.22)	-0.20 (0.80)	-2.48** (0.76)
Urban, $< 20\,000$, not adj. to a MA $\times$ (House)Work	0.01 (0.20)	-0.29 (0.79)	-2.24** (0.76)
Education	-0.04 (0.20)	-0.09 (0.45)	-0.31+ (0.18)
Central counties in MA $\times$ Education	0.41 (0.28)	0.14 (0.46)	0.35+ (0.19)
Fringe counties in MA $\times$ Education	0.19 (0.22)	0.26 (0.47)	0.39* (0.20)
Counties in MA $> 250\,000$ to 1 M $\times$ Education	0.14 (0.21)	0.25 (0.46)	0.35+ (0.19)
Counties in MA $< 250\,000 \times$ Education	0.04 (0.25)	0.40 (0.47)	0.46+ (0.24)
Urban, $> 20\,000$, adj. to a MA $\times$ Education	0.10 (0.22)	0.27 (0.46)	0.44+ (0.23)
Urban, $> 20\,000$, not adj. to a MA $\times$ Education	-0.35 (0.24)	0.02 (0.46)	0.42 (0.29)
Urban, $< 20\,000$, adj. to a MA $\times$ Education	0.06 (0.22)	0.07 (0.47)	0.19 (0.23)
Urban, $< 20\,000$, not adj. to a MA $\times$ Education	0.06 (0.22)	0.15 (0.46)	0.38 (0.24)
Active Leisure	-0.03 (0.18)	0.07 (0.38)	-0.18 (0.22)
Central counties in MA $\times$ Active Leisure	0.26 (0.22)	-0.05 (0.38)	0.31 (0.23)
Fringe counties in MA $\times$ Active Leisure	0.20 (0.23)	0.03 (0.39)	0.34 (0.23)
Counties in MA $> 250\,000$ to 1 M $\times$ Active Leisure	0.12 (0.18)	0.02 (0.38)	0.20 (0.23)
Counties in MA $< 250\,000 \times$ Active Leisure	-0.08 (0.23)	0.22 (0.39)	0.32 (0.27)
Urban, $> 20\,000$, adj. to a MA $\times$ Active Leisure	0.19 (0.23)	0.13 (0.39)	0.22 (0.28)
Urban, $> 20\,000$, not adj. to a MA $\times$ Active Leisure	-0.12 (0.27)	0.12 (0.39)	0.32 (0.39)
Urban, $< 20\,000$, adj. to a MA $\times$ Active Leisure	0.10 (0.21)	0.06 (0.40)	0.09 (0.27)

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Table A4.14 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
Urban, < 20 000, not adj. to a MA × Active Leisure	-0.04 (0.20)	-0.11 (0.39)	0.32 (0.25)
Passive Leisure	0.03 (0.14)	0.12 (0.28)	-0.60** (0.19)
Central counties in MA × Passive Leisure	0.11 (0.18)	-0.16 (0.28)	0.65** (0.20)
Fringe counties in MA × Passive Leisure	-0.03 (0.21)	-0.06 (0.30)	0.49* (0.21)
Counties in MA > 250 000 to 1 M × Passive Leisure	0.03 (0.15)	-0.01 (0.28)	0.66** (0.20)
Counties in MA < 250 000 × Passive Leisure	0.04 (0.20)	0.16 (0.31)	0.57* (0.26)
Urban, > 20 000, adj. to a MA × Passive Leisure	-0.12 (0.15)	-0.05 (0.30)	0.61* (0.24)
Urban, > 20 000, not adj. to a MA × Passive Leisure	-0.34 (0.22)	-0.03 (0.29)	0.59+ (0.34)
Urban, < 20 000, adj. to a MA × Passive Leisure	-0.23 (0.18)	-0.17 (0.30)	0.59* (0.23)
Urban, < 20 000, not adj. to a MA × Passive Leisure	-0.22 (0.18)	-0.09 (0.29)	0.71** (0.24)
Completely rural × (House)Work		-0.18 (0.60)	-2.69*** (0.67)
Observations	1086	1332	1401
Nb of Clusters	990.00	1078.00	1132.00

Standard errors in parentheses. + p < 0.1, *p < 0.05, ** p < 0.01, *** p < 0.001.

Source: Sample drawn from the PSID-CDS.

Table A4.15 – Time Input Production Functions : Effect of the presence of at least one parent, heterogeneous effect for Metropolitan Statistical Area (MSA)?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.41 (0.26)	3.51* (1.37)	2.99* (1.26)
Central counties in MA $\times$ (House)Work	-0.25 (0.28)	-3.56** (1.38)	-2.87* (1.26)
Fringe counties in MA $\times$ (House)Work	-0.28 (0.30)	-3.43* (1.38)	-3.07* (1.26)
Counties in MA > 250 000 to 1 M $\times$ (House)Work	-0.42 (0.26)	-3.48* (1.37)	-2.93* (1.26)
Counties in MA < 250 000 $\times$ (House)Work	-0.37 (0.30)	-3.35* (1.38)	-2.87* (1.26)
Urban, > 20 000, adj. to a MA $\times$ (House)Work	-0.33 (0.28)	-2.93* (1.38)	-2.41+ (1.26)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work	-0.60* (0.29)	-3.42* (1.38)	-2.94* (1.31)
Urban, < 20 000, adj. to a MA $\times$ (House)Work	-0.35 (0.29)	-3.37* (1.38)	-3.08* (1.27)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work	-0.40 (0.27)	-3.50* (1.38)	-2.85* (1.26)
Education	0.12 (0.27)	0.46 (0.43)	-0.34+ (0.18)
Central counties in MA $\times$ Education	0.23	-0.39	0.39*

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.34)	(0.43)	(0.19)
Fringe counties in MA $\times$ Education	-0.02	-0.32	0.40*
	(0.29)	(0.44)	(0.20)
Counties in MA > 250 000 to 1 M $\times$ Education	-0.03	-0.31	0.40*
	(0.28)	(0.43)	(0.19)
Counties in MA < 250 000 $\times$ Education	0.02	-0.16	0.57*
	(0.32)	(0.44)	(0.24)
Urban, > 20 000, adj. to a MA $\times$ Education	-0.01	-0.27	0.51*
	(0.30)	(0.46)	(0.23)
Urban, > 20 000, not adj. to a MA $\times$ Education	-0.40	-0.43	0.54+
	(0.30)	(0.44)	(0.30)
Urban, < 20 000, adj. to a MA $\times$ Education	-0.03	-0.56	0.14
	(0.29)	(0.44)	(0.24)
Urban, < 20 000, not adj. to a MA $\times$ Education	-0.10	-0.39	0.41+
	(0.28)	(0.44)	(0.25)
Active Leisure	0.18	1.09*	-0.10
	(0.31)	(0.43)	(0.23)
Central counties in MA $\times$ Active Leisure	0.03	-1.05*	0.22
	(0.33)	(0.43)	(0.24)
Fringe counties in MA $\times$ Active Leisure	0.00	-1.01*	0.27
	(0.35)	(0.44)	(0.24)
Counties in MA > 250 000 to 1 M $\times$ Active Leisure	-0.06	-1.02*	0.09

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.31)	(0.43)	(0.24)
Counties in MA < 250 000 × Active Leisure	-0.40	-0.92*	0.24
	(0.36)	(0.45)	(0.28)
Urban, > 20 000, adj. to a MA × Active Leisure	-0.11	-0.74+	0.23
	(0.37)	(0.45)	(0.33)
Urban, > 20 000, not adj. to a MA × Active Leisure	-0.49	-0.89*	-0.01
	(0.37)	(0.45)	(0.40)
Urban, < 20 000, adj. to a MA × Active Leisure	-0.11	-0.86+	0.11
	(0.33)	(0.45)	(0.28)
Urban, < 20 000, not adj. to a MA × Active Leisure	-0.30	-1.23**	0.26
	(0.33)	(0.45)	(0.28)
Passive Leisure	0.22	1.05***	-0.70***
	(0.23)	(0.32)	(0.17)
Central counties in MA × Passive Leisure	-0.06	-1.13***	0.70***
	(0.27)	(0.32)	(0.19)
Fringe counties in MA × Passive Leisure	-0.09	-0.93**	0.56**
	(0.31)	(0.35)	(0.20)
Counties in MA > 250 000 to 1 M × Passive Leisure	-0.16	-0.93**	0.72***
	(0.24)	(0.33)	(0.19)
Counties in MA < 250 000 × Passive Leisure	-0.02	-0.70+	0.56*
	(0.28)	(0.37)	(0.26)
Urban, > 20 000, adj. to a MA × Passive Leisure	-0.23	-0.95**	0.70**

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.25)	(0.35)	(0.24)
Urban, > 20 000, not adj. to a MA $\times$ Passive Leisure	-0.39	-0.90**	0.24
	(0.33)	(0.35)	(0.41)
Urban, < 20 000, adj. to a MA $\times$ Passive Leisure	-0.37	-1.10**	0.68**
	(0.26)	(0.35)	(0.22)
Urban, < 20 000, not adj. to a MA $\times$ Passive Leisure	-0.42	-1.03**	0.79***
	(0.27)	(0.34)	(0.23)
(House)Work (with at least one parent)	-0.30	0.30*	-0.06
	(0.26)	(0.13)	(0.12)
Central counties in MA $\times$ (House)Work (with at least one parent)	0.32	-0.28*	0.01
	(0.27)	(0.14)	(0.13)
Fringe counties in MA $\times$ (House)Work (with at least one parent)	0.31	-0.43**	0.19
	(0.27)	(0.16)	(0.14)
Counties in MA > 250 000 to 1 M $\times$ (House)Work (with at least one parent)	0.42	-0.23	-0.06
	(0.27)	(0.15)	(0.15)
Counties in MA < 250 000 $\times$ (House)Work (with at least one parent)	0.38	-0.38*	0.18
	(0.29)	(0.17)	(0.16)
Urban, > 20 000, adj. to a MA $\times$ (House)Work (with at least one parent)	0.27	-0.63***	-0.33+
	(0.28)	(0.17)	(0.19)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work (with at least one parent)	0.16	-0.35*	0.06
	(0.27)	(0.15)	(0.18)
Urban, < 20 000, adj. to a MA $\times$ (House)Work (with at least one parent)	0.30	-0.48**	0.03

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.27)	(0.15)	(0.15)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work (with at least one parent)	0.22	-0.38**	0.07
	(0.27)	(0.14)	(0.16)
Education (with at least one parent)	-0.08	0.21	-0.03
	(0.12)	(0.13)	(0.11)
Central counties in MA $\times$ Education (with at least one parent)	0.09	-0.26+	-0.05
	(0.13)	(0.14)	(0.12)
Fringe counties in MA $\times$ Education (with at least one parent)	0.36*	-0.05	0.06
	(0.16)	(0.19)	(0.12)
Counties in MA > 250 000 to 1 M $\times$ Education (with at least one parent)	0.15	-0.16	-0.00
	(0.13)	(0.14)	(0.13)
Counties in MA < 250 000 $\times$ Education (with at least one parent)	-0.00	-0.13	-0.00
	(0.16)	(0.14)	(0.13)
Urban, > 20 000, adj. to a MA $\times$ Education (with at least one parent)	0.08	-0.11	0.03
	(0.17)	(0.17)	(0.16)
Urban, > 20 000, not adj. to a MA $\times$ Education (with at least one parent)	0.04	-0.32*	-0.22
	(0.14)	(0.14)	(0.14)
Urban, < 20 000, adj. to a MA $\times$ Education (with at least one parent)	0.28+	0.03	0.03
	(0.16)	(0.17)	(0.18)
Urban, < 20 000, not adj. to a MA $\times$ Education (with at least one parent)	0.14	-0.19	0.08
	(0.14)	(0.15)	(0.14)
Active Leisure (with at least one parent)	-0.19	-0.56**	-0.12

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.15)	(0.21)	(0.21)
Central counties in MA $\times$ Active Leisure (with at least one parent)	0.20	0.47*	0.10
	(0.16)	(0.21)	(0.22)
Fringe counties in MA $\times$ Active Leisure (with at least one parent)	0.16	0.56**	0.10
	(0.18)	(0.22)	(0.22)
Counties in MA $> 250\ 000$ to 1 M $\times$ Active Leisure (with at least one parent)	0.16	0.58**	0.19
	(0.16)	(0.21)	(0.22)
Counties in MA $< 250\ 000 \times$ Active Leisure (with at least one parent)	0.41*	0.72**	0.17
	(0.18)	(0.24)	(0.25)
Urban, $> 20\ 000$, adj. to a MA $\times$ Active Leisure (with at least one parent)	0.35	0.46+	-0.03
	(0.25)	(0.24)	(0.30)
Urban, $> 20\ 000$, not adj. to a MA $\times$ Active Leisure (with at least one parent)	0.55*	0.60*	0.21
	(0.27)	(0.24)	(0.29)
Urban, $< 20\ 000$, adj. to a MA $\times$ Active Leisure (with at least one parent)	0.39+	0.49*	-0.15
	(0.20)	(0.23)	(0.24)
Urban, $< 20\ 000$, not adj. to a MA $\times$ Active Leisure (with at least one parent)	0.25	0.70**	0.10
	(0.17)	(0.23)	(0.25)
Passive Leisure (with at least one parent)	-0.26	-0.66**	0.11
	(0.17)	(0.26)	(0.17)
Central counties in MA $\times$ Passive Leisure (with at least one parent)	0.20	0.70**	-0.07
	(0.19)	(0.26)	(0.18)
Fringe counties in MA $\times$ Passive Leisure (with at least one parent)	0.09	0.54+	-0.05

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Table A4.15 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.21)	(0.28)	(0.18)
Counties in MA > 250 000 to 1 M × Passive Leisure (with at least one parent)	0.28	0.67*	-0.03
	(0.17)	(0.26)	(0.18)
Counties in MA < 250 000 × Passive Leisure (with at least one parent)	0.19	0.58*	0.07
	(0.27)	(0.30)	(0.22)
Urban, > 20 000, adj. to a MA × Passive Leisure (with at least one parent)	0.03	0.91**	0.16
	(0.24)	(0.30)	(0.24)
Urban, > 20 000, not adj. to a MA × Passive Leisure (with at least one parent)	0.11	0.62*	0.33
	(0.24)	(0.28)	(0.28)
Urban, < 20 000, adj. to a MA × Passive Leisure (with at least one parent)	0.40*	0.72*	-0.26
	(0.19)	(0.28)	(0.22)
Urban, < 20 000, not adj. to a MA × Passive Leisure (with at least one parent)	0.34+	0.69*	-0.07
	(0.20)	(0.28)	(0.19)
Completely rural × (House)Work		-3.15*	-3.26**
		(1.24)	(1.24)
Observations	1086	1332	1401
Nb of Clusters	990.00	1078.00	1132.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

Table A4.16 – Time Input Production Functions : Does who is present matter? (Accessible Time); heterogeneous effect for Metropolitan Statistical Area (MSA)?

	Reading Score	Math Score	Non Cognitive Skills
(House)Work	0.83*** (0.21)	2.57+ (1.33)	3.78** (1.43)
Central counties in MA $\times$ (House)Work	-0.66** (0.24)	-2.62* (1.33)	-3.66* (1.43)
Fringe counties in MA $\times$ (House)Work	-0.77** (0.26)	-2.49+ (1.34)	-3.87** (1.43)
Counties in MA > 250 000 to 1 M $\times$ (House)Work	-0.85*** (0.22)	-2.54+ (1.33)	-3.72** (1.43)
Counties in MA < 250 000 $\times$ (House)Work	-0.78** (0.27)	-2.40+ (1.34)	-3.60* (1.44)
Urban, > 20 000, adj. to a MA $\times$ (House)Work	-0.39 (0.29)	-1.81 (1.35)	-3.17* (1.43)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work	-0.95*** (0.24)	-2.53+ (1.34)	-3.62* (1.44)
Urban, < 20 000, adj. to a MA $\times$ (House)Work	-0.75** (0.25)	-2.39+ (1.33)	-3.89** (1.44)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work	-0.77*** (0.22)	-2.59+ (1.34)	-3.67* (1.43)
Education	-0.12 (0.23)	0.51 (0.45)	-0.32 (0.20)
Central counties in MA $\times$ Education	0.48	-0.44	0.38+

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.31)	(0.45)	(0.21)
Fringe counties in MA $\times$ Education	0.16	-0.36	0.38+
	(0.25)	(0.46)	(0.21)
Counties in MA > 250 000 to 1 M $\times$ Education	0.21	-0.35	0.38+
	(0.24)	(0.45)	(0.21)
Counties in MA < 250 000 $\times$ Education	0.21	-0.29	0.48+
	(0.29)	(0.47)	(0.26)
Urban, > 20 000, adj. to a MA $\times$ Education	0.33	-0.29	0.41
	(0.28)	(0.48)	(0.25)
Urban, > 20 000, not adj. to a MA $\times$ Education	-0.18	-0.49	0.42
	(0.26)	(0.46)	(0.28)
Urban, < 20 000, adj. to a MA $\times$ Education	0.20	-0.58	0.17
	(0.25)	(0.46)	(0.27)
Urban, < 20 000, not adj. to a MA $\times$ Education	0.12	-0.41	0.38
	(0.25)	(0.45)	(0.26)
Active Leisure	0.18	1.04*	-0.02
	(0.23)	(0.42)	(0.27)
Central counties in MA $\times$ Active Leisure	0.03	-0.99*	0.15
	(0.25)	(0.42)	(0.27)
Fringe counties in MA $\times$ Active Leisure	-0.07	-0.94*	0.17
	(0.26)	(0.43)	(0.28)
Counties in MA > 250 000 to 1 M $\times$ Active Leisure	-0.07	-0.97*	0.02

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.23)	(0.42)	(0.28)
Counties in MA < 250 000 × Active Leisure	-0.36	-0.88*	0.25
	(0.30)	(0.45)	(0.31)
Urban, > 20 000, adj. to a MA × Active Leisure	-0.02	-0.58	0.04
	(0.30)	(0.45)	(0.33)
Urban, > 20 000, not adj. to a MA × Active Leisure	-0.24	-0.81+	-0.00
	(0.33)	(0.44)	(0.40)
Urban, < 20 000, adj. to a MA × Active Leisure	-0.13	-0.79+	0.03
	(0.25)	(0.43)	(0.31)
Urban, < 20 000, not adj. to a MA × Active Leisure	-0.30	-1.26**	0.19
	(0.26)	(0.43)	(0.31)
Passive Leisure	0.17	0.99**	-0.65***
	(0.16)	(0.34)	(0.18)
Central counties in MA × Passive Leisure	-0.01	-1.07**	0.67***
	(0.22)	(0.34)	(0.19)
Fringe counties in MA × Passive Leisure	-0.21	-0.89*	0.52*
	(0.23)	(0.37)	(0.20)
Counties in MA > 250 000 to 1 M × Passive Leisure	-0.12	-0.89*	0.69***
	(0.18)	(0.34)	(0.20)
Counties in MA < 250 000 × Passive Leisure	0.01	-0.70+	0.45+
	(0.22)	(0.38)	(0.25)
Urban, > 20 000, adj. to a MA × Passive Leisure	-0.06	-0.79*	0.63*

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.21)	(0.37)	(0.25)
Urban, > 20 000, not adj. to a MA $\times$ Passive Leisure	-0.32	-0.85*	-0.15
	(0.29)	(0.37)	(0.33)
Urban, < 20 000, adj. to a MA $\times$ Passive Leisure	-0.30	-0.96**	0.66**
	(0.23)	(0.37)	(0.25)
Urban, < 20 000, not adj. to a MA $\times$ Passive Leisure	-0.37+	-1.01**	0.71**
	(0.21)	(0.36)	(0.23)
(House)Work (with at least one parent)	-0.62**	0.40*	-0.01
	(0.21)	(0.18)	(0.13)
Central counties in MA $\times$ (House)Work (with at least one parent)	0.69**	-0.34+	-0.03
	(0.23)	(0.19)	(0.15)
Fringe counties in MA $\times$ (House)Work (with at least one parent)	0.56*	-0.56**	0.09
	(0.23)	(0.20)	(0.15)
Counties in MA > 250 000 to 1 M $\times$ (House)Work (with at least one parent)	0.78***	-0.34+	-0.05
	(0.23)	(0.20)	(0.16)
Counties in MA < 250 000 $\times$ (House)Work (with at least one parent)	0.85**	-0.31	0.38+
	(0.29)	(0.23)	(0.22)
Urban, > 20 000, adj. to a MA $\times$ (House)Work (with at least one parent)	0.61*	-0.54*	-0.07
	(0.25)	(0.24)	(0.17)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work (with at least one parent)	0.16	-0.29	-0.27
	(0.38)	(0.27)	(0.30)
Urban, < 20 000, adj. to a MA $\times$ (House)Work (with at least one parent)	0.70**	-0.64**	-0.01

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.23)	(0.21)	(0.18)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work (with at least one parent)	0.51*	-0.44*	0.06
	(0.23)	(0.19)	(0.17)
Education (with at least one parent)	0.57*	0.15	-0.00
	(0.25)	(0.28)	(0.31)
Central counties in MA $\times$ Education (with at least one parent)	-0.61*	-0.27	-0.03
	(0.26)	(0.29)	(0.32)
Fringe counties in MA $\times$ Education (with at least one parent)	-0.21	0.10	0.01
	(0.30)	(0.37)	(0.32)
Counties in MA > 250 000 to 1 M $\times$ Education (with at least one parent)	-0.57*	-0.04	-0.02
	(0.27)	(0.29)	(0.32)
Counties in MA < 250 000 $\times$ Education (with at least one parent)	-0.62+	0.06	-0.15
	(0.32)	(0.31)	(0.39)
Urban, > 20 000, adj. to a MA $\times$ Education (with at least one parent)	-0.58	0.27	0.32
	(0.81)	(0.30)	(0.32)
Urban, > 20 000, not adj. to a MA $\times$ Education (with at least one parent)	-0.66*	-0.30	0.13
	(0.29)	(0.29)	(0.35)
Urban, < 20 000, adj. to a MA $\times$ Education (with at least one parent)	-0.57*	0.22	0.14
	(0.29)	(0.31)	(0.37)
Urban, < 20 000, not adj. to a MA $\times$ Education (with at least one parent)	-0.55*	-0.13	0.19
	(0.26)	(0.30)	(0.32)
Active Leisure (with at least one parent)	-0.61***	-0.49+	-0.25

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.13)	(0.26)	(0.28)
Central counties in MA $\times$ Active Leisure (with at least one parent)	0.61***	0.37	0.21
	(0.15)	(0.26)	(0.28)
Fringe counties in MA $\times$ Active Leisure (with at least one parent)	0.70***	0.46	0.19
	(0.18)	(0.29)	(0.29)
Counties in MA $> 250\,000$ to 1 M $\times$ Active Leisure (with at least one parent)	0.59***	0.53*	0.36
	(0.15)	(0.27)	(0.29)
Counties in MA $< 250\,000$ $\times$ Active Leisure (with at least one parent)	0.45+	0.67+	0.02
	(0.23)	(0.36)	(0.34)
Urban, $> 20\,000$, adj. to a MA $\times$ Active Leisure (with at least one parent)	0.42	0.14	0.09
	(0.38)	(0.49)	(0.36)
Urban, $> 20\,000$, not adj. to a MA $\times$ Active Leisure (with at least one parent)	0.93**	0.40	0.09
	(0.29)	(0.29)	(0.37)
Urban, $< 20\,000$, adj. to a MA $\times$ Active Leisure (with at least one parent)	1.00***	0.51+	-0.13
	(0.24)	(0.30)	(0.32)
Urban, $< 20\,000$, not adj. to a MA $\times$ Active Leisure (with at least one parent)	0.55**	0.62*	0.28
	(0.17)	(0.28)	(0.32)
Passive Leisure (with at least one parent)	-1.36***	-1.34**	-0.20
	(0.25)	(0.45)	(0.49)
Central counties in MA $\times$ Passive Leisure (with at least one parent)	1.32***	1.40**	0.21
	(0.26)	(0.46)	(0.49)
Fringe counties in MA $\times$ Passive Leisure (with at least one parent)	1.17***	1.27**	0.33

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.31)	(0.48)	(0.50)
Counties in MA > 250 000 to 1 M × Passive Leisure (with at least one parent)	1.36***	1.33**	0.33
	(0.26)	(0.46)	(0.50)
Counties in MA < 250 000 × Passive Leisure (with at least one parent)	1.50***	1.40**	0.52
	(0.39)	(0.49)	(0.53)
Urban, > 20 000, adj. to a MA × Passive Leisure (with at least one parent)	1.42***	1.72***	0.51
	(0.34)	(0.52)	(0.53)
Urban, > 20 000, not adj. to a MA × Passive Leisure (with at least one parent)	1.58***	1.34**	1.20*
	(0.37)	(0.47)	(0.54)
Urban, < 20 000, adj. to a MA × Passive Leisure (with at least one parent)	1.43***	1.42**	0.11
	(0.29)	(0.48)	(0.53)
Urban, < 20 000, not adj. to a MA × Passive Leisure (with at least one parent)	1.53***	1.48**	0.02
	(0.30)	(0.47)	(0.51)
(House)Work (with parents together)	-0.15	-0.30**	-0.02
	(0.10)	(0.11)	(0.06)
Central counties in MA × (House)Work (with parents together)	0.04	0.27*	-0.00
	(0.12)	(0.12)	(0.09)
Fringe counties in MA × (House)Work (with parents together)	0.12	0.34*	0.25*
	(0.17)	(0.15)	(0.12)
Counties in MA > 250 000 to 1 M × (House)Work (with parents together)	0.07	0.28*	-0.02
	(0.12)	(0.12)	(0.11)
Counties in MA < 250 000 × (House)Work (with parents together)	0.04	0.21	-0.02

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.17)	(0.15)	(0.12)
Urban, > 20 000, adj. to a MA $\times$ (House)Work (with parents together)	-0.05	0.09	-0.25*
	(0.16)	(0.18)	(0.12)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work (with parents together)	0.28	0.26+	0.11
	(0.18)	(0.15)	(0.15)
Urban, < 20 000, adj. to a MA $\times$ (House)Work (with parents together)	0.01	0.34*	0.07
	(0.14)	(0.14)	(0.09)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work (with parents together)	0.09	0.30*	0.05
	(0.12)	(0.13)	(0.11)
Education (with parents together)	-0.40**	0.03	0.01
	(0.14)	(0.16)	(0.15)
Central counties in MA $\times$ Education (with parents together)	0.48**	0.00	-0.06
	(0.18)	(0.17)	(0.16)
Fringe counties in MA $\times$ Education (with parents together)	0.32+	-0.18	-0.00
	(0.18)	(0.22)	(0.17)
Counties in MA > 250 000 to 1 M $\times$ Education (with parents together)	0.45**	-0.13	-0.02
	(0.16)	(0.17)	(0.17)
Counties in MA < 250 000 $\times$ Education (with parents together)	0.38+	-0.10	0.26
	(0.22)	(0.20)	(0.25)
Urban, > 20 000, adj. to a MA $\times$ Education (with parents together)	0.46	-0.25	-0.28
	(0.54)	(0.17)	(0.18)
Urban, > 20 000, not adj. to a MA $\times$ Education (with parents together)	0.46**	-0.05	-0.25

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.16)	(0.16)	(0.18)
Urban, < 20 000, adj. to a MA $\times$ Education (with parents together)	0.55**	-0.08	-0.18
	(0.17)	(0.19)	(0.21)
Urban, < 20 000, not adj. to a MA $\times$ Education (with parents together)	0.50**	-0.06	-0.22
	(0.17)	(0.19)	(0.21)
Active Leisure (with parents together)	0.30+	-0.19	0.18+
	(0.18)	(0.21)	(0.10)
Central counties in MA $\times$ Active Leisure (with parents together)	-0.26	0.24	-0.16
	(0.20)	(0.22)	(0.12)
Fringe counties in MA $\times$ Active Leisure (with parents together)	-0.37	0.19	-0.11
	(0.23)	(0.23)	(0.12)
Counties in MA > 250 000 to 1 M $\times$ Active Leisure (with parents together)	-0.30	0.17	-0.17
	(0.19)	(0.22)	(0.12)
Counties in MA < 250 000 $\times$ Active Leisure (with parents together)	-0.01	0.20	0.18
	(0.25)	(0.26)	(0.19)
Urban, > 20 000, adj. to a MA $\times$ Active Leisure (with parents together)	0.16	0.47	-0.01
	(0.32)	(0.33)	(0.18)
Urban, > 20 000, not adj. to a MA $\times$ Active Leisure (with parents together)	-0.42	0.06	0.20
	(0.27)	(0.24)	(0.24)
Urban, < 20 000, adj. to a MA $\times$ Active Leisure (with parents together)	-0.49*	0.06	-0.07
	(0.23)	(0.25)	(0.17)
Urban, < 20 000, not adj. to a MA $\times$ Active Leisure (with parents together)	-0.09	0.25	-0.24

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.20)	(0.22)	(0.17)
Passive Leisure (with parents together)	1.10***	0.61	0.15
	(0.18)	(0.42)	(0.41)
Central counties in MA $\times$ Passive Leisure (with parents together)	-1.14***	-0.65	-0.10
	(0.20)	(0.43)	(0.42)
Fringe counties in MA $\times$ Passive Leisure (with parents together)	-1.04***	-0.59	-0.21
	(0.22)	(0.44)	(0.42)
Counties in MA $> 250\,000$ to 1 M $\times$ Passive Leisure (with parents together)	-1.07***	-0.55	-0.27
	(0.19)	(0.43)	(0.42)
Counties in MA $< 250\,000 \times$ Passive Leisure (with parents together)	-1.27***	-0.63	-0.32
	(0.24)	(0.44)	(0.44)
Urban, $> 20\,000$, adj. to a MA $\times$ Passive Leisure (with parents together)	-1.36***	-0.59	-0.12
	(0.25)	(0.46)	(0.44)
Urban, $> 20\,000$, not adj. to a MA $\times$ Passive Leisure (with parents together)	-1.47***	-0.73+	-0.52
	(0.24)	(0.43)	(0.44)
Urban, $< 20\,000$, adj. to a MA $\times$ Passive Leisure (with parents together)	-1.07***	-0.71	-0.10
	(0.22)	(0.44)	(0.44)
Urban, $< 20\,000$, not adj. to a MA $\times$ Passive Leisure (with parents together)	-1.23***	-0.77+	0.09
	(0.22)	(0.45)	(0.43)
(House)Work (with father only)	0.08	-0.06	-0.01
	(0.07)	(0.12)	(0.10)
Central counties in MA $\times$ (House)Work (with father only)	-0.09	-0.01	0.06

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.09)	(0.13)	(0.11)
Fringe counties in MA $\times$ (House)Work (with father only)	0.39	0.14	0.08
	(0.30)	(0.20)	(0.11)
Counties in MA > 250 000 to 1 M $\times$ (House)Work (with father only)	-0.09	0.07	-0.04
	(0.08)	(0.13)	(0.11)
Counties in MA < 250 000 $\times$ (House)Work (with father only)	-0.15	0.09	-0.07
	(0.16)	(0.16)	(0.16)
Urban, > 20 000, adj. to a MA $\times$ (House)Work (with father only)	-0.21	-0.24	-0.20
	(0.13)	(0.16)	(0.12)
Urban, > 20 000, not adj. to a MA $\times$ (House)Work (with father only)	4.54	0.05	-0.02
	(3.00)	(0.40)	(0.45)
Urban, < 20 000, adj. to a MA $\times$ (House)Work (with father only)	-0.06	0.16	-0.11
	(0.13)	(0.18)	(0.15)
Urban, < 20 000, not adj. to a MA $\times$ (House)Work (with father only)	-0.11	-0.08	-0.06
	(0.08)	(0.12)	(0.11)
Education (with father only)	-3.37	0.16	0.09
	(3.36)	(0.18)	(0.13)
Central counties in MA $\times$ Education (with father only)	3.41	-0.01	-0.16
	(3.36)	(0.19)	(0.14)
Fringe counties in MA $\times$ Education (with father only)	3.13	-0.31	-0.01
	(3.37)	(0.22)	(0.17)
Counties in MA > 250 000 to 1 M $\times$ Education (with father only)	3.41	-0.17	-0.09

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(3.36)	(0.19)	(0.14)
Counties in MA < 250 000 × Education (with father only)	3.18	-0.35	-0.23
	(3.37)	(0.26)	(0.23)
Urban, > 20 000, adj. to a MA × Education (with father only)	3.49	-0.15	-0.08
	(3.38)	(0.19)	(0.15)
Urban, > 20 000, not adj. to a MA × Education (with father only)	3.83	-0.13	-0.21
	(3.36)	(0.19)	(0.16)
Urban, < 20 000, adj. to a MA × Education (with father only)	3.46	-0.37+	-0.10
	(3.36)	(0.20)	(0.16)
Urban, < 20 000, not adj. to a MA × Education (with father only)	3.65	-0.12	-0.30+
	(3.37)	(0.20)	(0.17)
Active Leisure (with father only)	1.06***	0.61	0.25
	(0.24)	(0.49)	(0.61)
Central counties in MA × Active Leisure (with father only)	-1.07***	-0.54	-0.19
	(0.25)	(0.49)	(0.61)
Fringe counties in MA × Active Leisure (with father only)	-1.20***	-0.49	-0.28
	(0.25)	(0.50)	(0.61)
Counties in MA > 250 000 to 1 M × Active Leisure (with father only)	-1.07***	-0.57	-0.37
	(0.25)	(0.49)	(0.61)
Counties in MA < 250 000 × Active Leisure (with father only)	-0.82**	-0.67	-0.28
	(0.26)	(0.51)	(0.62)
Urban, > 20 000, adj. to a MA × Active Leisure (with father only)	-0.76**	-0.30	-0.01

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.27)	(0.50)	(0.63)
Urban, > 20 000, not adj. to a MA $\times$ Active Leisure (with father only)	-1.24***	-0.47	-0.61
	(0.29)	(0.50)	(0.63)
Urban, < 20 000, adj. to a MA $\times$ Active Leisure (with father only)	-1.22***	-0.65	-0.01
	(0.26)	(0.51)	(0.62)
Urban, < 20 000, not adj. to a MA $\times$ Active Leisure (with father only)	-1.04***	-0.58	-0.39
	(0.25)	(0.50)	(0.62)
Passive Leisure (with father only)	0.11	0.31	0.44+
	(0.22)	(0.33)	(0.26)
Central counties in MA $\times$ Passive Leisure (with father only)	-0.14	-0.28	-0.43
	(0.23)	(0.33)	(0.26)
Fringe counties in MA $\times$ Passive Leisure (with father only)	-0.04	-0.41	-0.52+
	(0.23)	(0.34)	(0.27)
Counties in MA > 250 000 to 1 M $\times$ Passive Leisure (with father only)	-0.10	-0.32	-0.42
	(0.23)	(0.33)	(0.27)
Counties in MA < 250 000 $\times$ Passive Leisure (with father only)	-0.25	-0.43	-0.48+
	(0.24)	(0.34)	(0.27)
Urban, > 20 000, adj. to a MA $\times$ Passive Leisure (with father only)	-0.48	-0.84*	-0.71*
	(0.46)	(0.36)	(0.32)
Urban, > 20 000, not adj. to a MA $\times$ Passive Leisure (with father only)	-1.37+	-0.41	0.08
	(0.83)	(0.35)	(0.73)
Urban, < 20 000, adj. to a MA $\times$ Passive Leisure (with father only)	0.05	-0.23	-0.60+

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Table A4.16 – *Continued from previous page*

	Reading Score	Math Score	Non Cognitive Skills
	(0.24)	(0.36)	(0.31)
Urban, < 20 000, not adj. to a MA × Passive Leisure (with father only)	-0.03	-0.21	-0.24
	(0.23)	(0.34)	(0.28)
Completely rural × (House)Work		-2.23+	-4.01**
		(1.26)	(1.37)
Observations	1086	1332	1401
Nb of Clusters	990.00	1078.00	1132.00

Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Sample drawn from the PSID-CDS.

A5 Supplementary materials

Table A5.1 – Behaviour Problem Index (BPI): Questionnaire

For the next set of statements, decide whether they are according to (CHILD)'s behavior.		Not True	Sometimes True	Often True
(He/She) has sudden changes in mood or feeling	[E]	1	2	3
(He/She) feels or complains that no one loves him/her.	[I]	1	2	3
(He/She) is rather high strung and nervous.	[E]	1	2	3
(He/She) cheats or tells lies.	[E]	1	2	3
(He/She) is too fearful or anxious.	[I]	1	2	3
(He/She) argues too much.	[E]	1	2	3
(He/She) has difficulty concentrating, cannot pay attention for long.	[E]	1	2	3
(He/She) is easily confused, seems to be in a fog.	[I]	1	2	3
(He/She) bullies or is cruel or mean to others.	[E]	1	2	3
(He/She) is disobedient.	[E]	1	2	3
(He/She) does not seem to feel sorry after (he/she) misbehaves.	[E]	1	2	3
(He/She) has trouble getting along with other children.	[E] [I]	1	2	3
(He/She) is impulsive, or acts without thinking.	[E]	1	2	3
(He/She) feels worthless or inferior.	[I]	1	2	3
(He/She) is not liked by other children.	[I]	1	2	3
(He/She) has difficulty getting (his/her) mind off certain thoughts.	[I]	1	2	3
(He/She) is restless or overly active, cannot sit still.	[E]	1	2	3
(He/She) is stubborn, sullen, or irritable.	[E]	1	2	3
(He/She) has a very strong temper and loses it easily.	[E]	1	2	3
(He/She) is unhappy, sad or depressed.	[I]	1	2	3
(He/She) is withdrawn, does not get involved with others.	[I]	1	2	3
(He/She) breaks things on purpose or deliberately destroys (his/her) own or another's things.	[E]	1	2	3
(He/She) clings to adults.	*	1	2	3
(He/She) cries too much.	[E]	1	2	3
(He/She) demands a lot of attention.	[E]	1	2	3
(He/She) is too dependent on others.	[I]	1	2	3
(He/She) feels others are out to get (him/her).	[I]	1	2	3
(He/She) hangs around with kids who get into trouble.	*	1	2	3
(He/She) is secretive, keeps things to (himself/herself).	[I]	1	2	3
(He/She) worries too much.	[I]	1	2	3

Notes: Items marked with an “E” are included within the Externalizing subscale; those marked with an “I” are included in the Internalizing subscale. All items are included in the Total Behavior Problems scale, * denotes those that are excluded from the externalising and internalising subscales but included in the Total BPI.



Child-Development Supplement

TIME DIARY

For: _____
(Child's name)

For: _____
(Day of the week)



The University of Michigan

Instructions

An important part of our research is to find out how children of all ages spend time during the week and on the weekends. The Diary is a listing of your child's activities during a weekday and during one weekend day. These diaries will help us collect the most accurate information possible, and your filling them out ahead of time will make the interview go more quickly. The time diary is from the perspective of the child and what the child was doing during a day.

- Please fill out the Time Diary for the **day of the week** specified on the front cover.
- Please fill out the Time Diary for the **child** listed on the front cover.
- Please use **one line** for each activity and write in what your child was doing.
 - If he/she was watching TV or playing a video or computer game, please write in the name of the program or game.
 - Please indicate who was doing the activity with the child and who else was in the same location (but not doing the activity with the child).
 - Please indicate if the child was doing any **other** activity at the same time.
- Please fill out the diary for the entire 24-hour time period, starting with midnight on the specified day and running until midnight on the next day. List the child's first activity of the day, the child's second activity of the day, on to the child's last activity on the day.
- On the following page, you will find some examples of these activities and how they would be filled out for this time diary. The following scenario is only an example of how to fill out a time diary. It may not be at all reflective of a day in the life of your child. Your interviewer will be glad to help you with any questions or problems you may have in completing the diary. Please give this diary to your interviewer at the time of your interview.

Any questions? Call 1-800-759-7947

Part II

PART II: Human Capital Inequalities and Family Size

Chapter 3

The Effect of Having an Additional Sibling on Child's Non-Cognitive Skills Evidence from the Millennium Cohort Study

This chapter was co-authored
with **Simon Briole** and **Anthony Lepinteur**.

Summary of the chapter

Though it is largely admitted that non cognitive skills matter a lot for adult outcomes, there is still scarce evidence on how they are affected by the family environment. In this chapter, we use a longitudinal dataset on children born in 2000-2001 in the UK (*Millennium Cohort Study*) to study the effect of family size on socio-emotional skills. To account for the endogeneity of fertility decisions, we take a well-known instrumental approach that exploits parents' preference for children's gender diversity. We show that an increase in family size negatively affects the socio-emotional skills of the two first children. Nevertheless, a heterogeneity analysis reveals that this negative effect is entirely driven by the youngest, while there is no effect of birth after the age of 5 and more surprisingly by girls, while boys seem to be unaffected by the birth of an additional child. We investigate two potential mechanisms to explain this gender effect: the unequal response of parents' time investments and the unequal demand for household chores. In addition, we show that the effect is persistent, even three periods after the event.

Classification

JEL Classification: I20, J13, J16

Keywords: Non-cognitive skills, Family Size, Birth Order, Child development.

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1. Introduction

It is now largely admitted that non cognitive skills are key determinants of adult outcomes. Over the last decade, several studies have shown that they are as important as cognitive skills in determining educational attainment, labour market outcomes, crime rates and health outcomes¹. A recent study by Deming (2017) [56] further shows that the labour market returns to these skills are greater for recent cohorts. Besides, childhood is generally considered as a critical period in the acquisition of these skills. Indeed, due to complementarities across periods, high levels of skills in childhood make investments at later stages in life more productive (Cunha and Heckman (2007) [47]). Yet, very little is known about the determinants of non cognitive skills formation during childhood.

In this chapter, we use a longitudinal dataset on children born in 2000-2001 in the UK (*Millennium Cohort Study*) to study the effect of family size on the formation of socio-emotional skills. Fertility decisions might be endogenous since it is likely to be correlated with parents characteristics such as parents education or earnings. Besides, fertility decisions might be correlated with the parents’ mental health, their life satisfaction, or their own non-cognitive skills; variables that are very likely to be correlated with the child’s non-cognitive skills (see Grönqvist et al. (2017) [74]). If parents with more highly non-cognitive skills tend to have more children, larger families are expected to be positively selected regarding non-cognitive skills.

Since these variables are unobserved, we use a well-known instrumental approach developed by Angrist and Evans (1998) [7] which exploits the fact that parents whose all children have the same sex have a higher probability to have an additional child than parents whose children are of opposite sex. Contrarily to most previous studies using this instrumental approach, we are able to follow children over time and to observe how they behave *before* and *after* an increase in family size. This wealth of data makes it possible to check that there is no pre-existing differences between children from families with children of the same sex and children from families with children of opposite sex.

Building on this result, we show that an increase in family size negatively affects the formation of socio-emotional skills for both the first and the second born. Nevertheless, an heterogeneity analysis reveals that an increase in family size affects only the youngest, while there is no effect of a birth after the age of 5. More surprisingly, it is entirely driven by girls, while boys seem to be unaffected by the birth of an additional child. We find that the unequal response of parents’ time investments and the unequal demand for household chores explain this gendered effect. Investigating the persistency of the effect, we do not

¹These studies include Nyhus and Pons (2005) [106], Heckman et al. (2006) [79], Conti et al. (2010) [45], Linqvist and Vestman (2011) [99], Cobb-Clark and Tan (2011) [44] and Fletcher (2013) [64].

find any evidence of a recovery, even three periods after the event.

These results add to the small literature which emphasizes the role of the family environment in shaping non-cognitive skills. In particular, two recent studies show that maternal time (Del Bono et al. (2016) [33]) and mothers' parenting style (Fiorini and Keane (2014) [62]) are crucial determinants of children non cognitive development. In addition to this, there is empirical evidence that maternal education (Carneiro et al. (2013) [37]), family income (Fletcher and Wolfe (2016) [65]) and parents' own non cognitive skills (Björklund and Jäntti (2012) [24]; Grönqvist et al. (2017) [74]) positively relate to children non cognitive development. Finally, Black et al. (2017) [29] show that birth order predicts socio-emotional skills and occupational choices. We complement these results by showing that the number of siblings also influence the formation of children socio-emotional skills.

We also contribute to the literature on the effect of family size on children development and adult outcomes. If family size is correlated with lower educational attainment and worse labour market outcomes, there is few evidence of a quality-quantity trade off based on quasi-experimental variations (Björklund and Salvanes (2011) [118]). In particular, studies using twin births (Caceras-Delpiano (2006) [50]; Angrist et al. (2010) [6]; Aslund and Grönqvist (2010) [10]; Black et al. (2005) [27]) or parents' preference for children's sex diversity (Angrist et al. (2010) [6]; Black et al. (2010) [28]) do not find strong evidence of a negative effect of family size on children cognitive skills and educational attainment². Given this lack of evidence, we argue that the negative effect of family size on children socio-emotional skills highlighted in this chapter may partially explain the negative correlation that is observed between family size and adult outcomes.

Silles (2010) [119] and Juhn et al. (2015) [86] are the closest papers to ours. Instrumenting family size by the mother's number of siblings and by the sex composition, Silles (2010) [119] find that an increase in family size reduces child's behavioural development. Juhn et al. (2015) [86] find also a negative correlation between family size and child's behaviour development, even after accounting for the individual fixed-effect. Silles (2010) [119] and Juhn et al. (2015) [86] rely on generations born in 1958, and in 1986 on average, respectively. Our work provides new evidence for a younger cohort: the Millennium Cohort.

The remainder of the chapter is organized as follows. Section 2 describes the dataset

²Black et al. (2010) [28] find no effect of family size when it is instrumented by sex diversity but they find a negative effect of an increase in family size instrumented by twin birth. In addition, Aslund and Grönqvist (2010) [10] find a small negative impact on children grades in compulsory and secondary school, but only for vulnerable children, as defined by low parental education, large sibships and high birth order.

and the main measure of socio-emotional skills exploited in this chapter. Section 3 presents our instrumental approach and provides evidence on the validity of the identifying assumption. Section 4 shows the effect of an increase in family size on children non cognitive skills. The final section concludes.

2. Data and estimation sample

2.1. The Millennium Cohort Study

The estimation sample used in in this chapter is based on the *Millennium Cohort Study* (MCS). This longitudinal birth cohort study tracks the live of 19,517 children born in the UK between 2000 and 2001. Six waves are now currently available: 2000/1; 2004/5; 2006; 2008; 2012 and 2015. One of the main advantages of the MCS is that, for the first time, it covers a whole year’s births and the whole of the United Kingdom. The sample was designed in order to be representative of the total population of all regions of the United Kingdom, but also to provide enough observations to study ethnic minorities, and areas of high child poverty. Since the beginning of the survey, the cohort members have been surveyed six times: at age nine months, three, five, seven, eleven and fourteen years. The survey has collected rich information on the family background as well as measures on diverse aspects of the lives of the children (health, schooling, well-being, cognitive development).

2.2. Measuring Socio-Emotional Skills

Our measures of socio-emotional skills come from the Strengths and Difficulties Questionnaire (henceforth SDQ). The SDQ is a behavioural-screening questionnaire for children about 3 to 16 years old and consists of 20 questions that are answered by an adult regarding the child’s concentration span, temper tantrums, happiness, worries and fears, whether the child is obedient, often lies or cheats... The answers to these questions can be used to produce four sub-scales (each consisting of five items) referring to emotional health, behavioural problems, hyperactivity/inattention and peer-relationship problems. Following Goodman et al. (2010) [71], we use two broader subscales: the *externalising* and *internalising* behaviour. The internalising behaviour score is the sum of the emotional and peer subscales, and can be argued to measure emotional health, while externalising behaviour is made up of the behavioural problems and hyperactivity subscales and refers to behaviour (cf. Table A9 for a detailed description of the questions). Both internalising and externalising SDQ are scored on a 0-20 scale; we reverse this scale so that higher values indicate better outcomes. The outcomes are standardized by age for a mean of 0

and a standard deviation of 1. SDQ is reported by the primary care giver in waves 2 to 6 (age 3 to 15).³

The SDQ is a popular measure of socio-emotional skills that has been developed by psychologists. An extensive literature in this discipline provides evidence regarding its validity and predictive power⁴. Over recent years, economists have widely exploited this measure and have shown that it strongly predicts a variety of adult outcomes⁵. In addition, a recent paper by Layard et al. (2014) [93] shows that socio-emotional skills as reported by the mother during childhood is the most important predictor of adulthood life satisfaction and life course success.

2.3. Defining family size, and control variables

Family size is defined as the number of natural children in the household. *Third* is a dummy that equals one if there is a third natural child in the household; more precisely, if a birth of a third child took place in child's family between t_0 and t ($t > t_0$).

We control for child's characteristics such as their sex, their age, mother's age at birth, their birth order, their month of birth; and for family background such as mother's age at first birth, household income, the presence of the father and parents' marital status. For *Household income*, we take the OECD Equivalised weekly family Income. The presence of the father is a dummy equals one if the father is a resident in household. A dummy equals one indicates if parents are married.

3. Empirical Strategy

3.1. Instrumental strategy: parents' preference for children sex diversity

Our objective is to estimate the impact of an increase in family size on the development of children socio-emotional skills between age 2 and 15. The main identification challenge comes from the fact that fertility decisions are unlikely to be randomly distributed across families. Indeed, these decisions depend on both observable and unobservable family characteristics that are likely to be correlated with the formation of socio-emotional skills

³The non-cognitive skills are also measured by teachers, but it is provided only for the fourth wave. Moreover, parents should give their consent, this may lead to a non representative sample (see Cornelissen and Dustmann (2018) [46]).

⁴See for example Piket et al. (2006) [108] or Hartas (2011) [78]

⁵This includes Gupta and Simonsen (2010) [76], Nghiem et al. (2015) [105], Del Bono et al. (2016) [33], Flèche (2017) [63], Kuehnle and Oberfichtner (2017) [91], Blundell et al. (2018) [30], and Cornelissen and Dustmann (2018) [46].

during childhood, such as family income, parental education or parenting style.

To account for the endogeneity of fertility decisions, we build on an instrumental variable (IV) approach developed by Angrist and Evans (1998) [7]. Due to parents’ preference for children sex diversity, parents whose two first children have the same sex have a higher probability to have an additional child than parents with two children of opposite sex. Since the sex of a child is random by nature, the sex composition of the two first children is arguably randomly distributed across families with two children⁶. Consequently, we consider families with two children in wave 2 and we instrument an increase in family size (i.e. the birth of a third child) in waves 3-6 by the sex composition of the two first children.

Let’s first denote our initial period of observation (wave 2) by t_0 . Given our instrumental approach, we restrict to families with 2 children in t_0 , and we construct a time-invariant instrumental variable $same\ sex_{i0}$ that equals 1 if the two first children in the family have the same sex and 0 if they are of opposite sex. We then use $same\ sex_{i0}$ as an instrument for an increase in family size (i.e., the birth of a third child) in subsequent waves⁷. Formally, we estimate the following model using a Two-Stages Least Squares (2SLS) procedure:

$$\begin{aligned} Third\ Child_{it} &= \alpha_1 same\ sex_{i0} + \gamma_1 X_{it} + \delta_t + \epsilon_{it} \\ Y_{it} &= \alpha_2 \widehat{Third\ Child}_{it} + \gamma_2 X_{it} + \delta_t + \mu_{it} \end{aligned} \quad (1)$$

where $Third\ Child_{it}$ is a dummy that equals 1 if there is a third child in the family, more precisely if the birth of a third child took place in child i ’s family between t_0 and t , with $t > t_0$. Y_{it} represents the socio-emotional skills of child i in period t . X_{it} is a vector of controls including children individual characteristics (sex, age, birth order, month of birth, age of the mother at birth) and family characteristics (income, marital status, presence of the father, age of mother at first birth). Finally, we complete the model with the full set of wave dummies (δ_t).

Since our measure of children socio-emotional skills is self-reported by the mother, it may be subject to measurement error. This would in turn bias our estimates if the measurement error is correlated with the decision to have a third child. To tackle this issue, we further control for children socio-emotional skills in t_0 in both equations. This term neutralizes mothers’ individual bias in the measurement of socio-emotional skills,

⁶We provide evidence on the validity of this assumption in the next section.

⁷It is worth noting that we use wave 2 only to construct our instrument. All regressions only include waves 3 to 6. Within this framework, wave 2 can be considered as a “pre-treatment” period.

provided that this bias is constant over time⁸. Formally, we estimate the following model:

$$\begin{aligned} Third\ Child_{it} &= \alpha_1 same\ sex_{i0} + \gamma_1 X_{it} + \delta_t + \beta_1 Y_{i0} + \epsilon_{it} \\ Y_{it} &= \alpha_2 \widehat{Third\ Child}_{it} + \gamma_2 X_{it} + \delta_t + \beta_2 Y_{i0} + \mu_{it} \end{aligned} \quad (2)$$

For the rest of the chapter, we consider this specification as our main specification, and we provide evidence that the inclusion of Y_{i0} is not driving our results (See Table A6).

3.2. Estimation sample

Given that our instrumental variable strategy is based on the sex composition of the two first children, we restrict the analysis to children from families with two children in our initial period of observation (t_0). We then extract all observations from this sample for which the dependent variable and the set of controls are non-missing, from the second to the sixth wave.

In total, this produces a final estimation sample of 5983 children coming from 5907 families.⁹ Table 1 and 2 report descriptive statistics on children and family characteristics in t_0 for all children included in our final estimation sample. Table A1 reports the number of observations for each wave.

Table 1 – Descriptive Statistics - Individual level in wave 2

	mean	sd	min	max
Non Cognitive Skills (Total SDQ)	30.77	5.10	8	40
Behaviour Skills	13.46	3.74	0	20
Emotional Skills	17.31	2.38	5	20
Female	0.49	0.50	0	1
Age	3.15	0.37	2	5
Age of Mother	29.55	5.41	15	52
1st born	0.40	0.49	0	1
2nd born	0.60	0.49	0	1
Observations	5983			

Notes: The scale of the SDQ variables have been reversed (i.e. the higher the SDQ here, the higher the child's non-cognitive skills).

Source: Estimation sample drawn from the Millennium Cohort Study.

⁸In A3.1, we also report the results for a Value Added Model

⁹Since the dataset only includes children who are born between 2000 and 2001, we don't have many siblings in the same family.

Table 2 – Descriptive Statistics - Family level in wave 2

	mean	sd	min	max
Age of Mother at first birth	27.46	5.24	12	52
Family Size	2.00	0.00	2	2
Household Income	5.71	0.70	3	7
Natural Father in Household	0.88	0.33	0	1
Parents are Married	0.73	0.45	0	1
Same Sex	0.49	0.50	0	1
Same Sex : girls	0.24	0.43	0	1
Same Sex : boys	0.25	0.43	0	1
Observations	5907			

Source: Estimation sample drawn from the Millennium Cohort Study.

3.3. Instrument validity

Our instrumental approach exploits the fact that parents with two children of the same sex are more likely to have a third child with respect to parents who had two children of different sex. Within this framework, the main identification assumption is that having a sibling of the same sex vs having a sibling of the opposite sex has no direct effect on children socio-emotional development. While we cannot directly test this exclusion restriction, we provide evidence that there is no pre-existing difference between children from families with two children of the same sex and children from families with children of opposite sex. To do so, we check that there is no imbalance between the two kinds of families in terms of individual and family characteristics in t_0 , that is, *before* any potential birth has occurred in subsequent periods. As can be seen in Tables A3 and A4, there is no difference between the two kinds of families neither in terms of family income, presence of the father in the household, marital status and age of the mother at first birth, nor in terms of children sex, age, age of the mother at birth and birth order. Importantly, results presented in Table A3 further show that there is no difference between the two kinds of families in terms of children socio-emotional skills. In total, these balancing tests suggest that growing up with a sibling of the same sex does not affect the non cognitive development of a child in a significant manner.

We construct an additional test to provide evidence that there is no direct effect of growing up with a sibling of the same sex on children non cognitive development. To construct this test, we restrict to families with two children of opposite sex in t_0 who will have a third child in subsequent waves, and we look at the effect of having a second sibling of the same sex (as compared to having a second sibling of the opposite sex) on children

socio-emotional skills, exploiting the fact that the sex of the third child is random. This allows us to catch the effect of having a sibling of the same sex without influencing the probability of increasing the family size. As can be seen in Table 3, children in families with two children of opposite sex in t_0 and who experience an increase in family size in subsequent periods are not affected by the sex of the third child. Again, this result suggests no direct impact of having a sibling of the same sex vs having a sibling of the opposite sex on children non cognitive development.

Table 3 – Instrument Validity: Any own gender effect?

	Boys			Girls		
	Total SDQ	Behaviour Skills	Emotional Skills	Total SDQ	Behaviour Skills	Emotional Skills
Same sex 3rd child	-0.174+ (0.098)	-0.132 (0.100)	-0.170+ (0.099)	0.047 (0.077)	0.091 (0.077)	-0.016 (0.078)
Observations	930	930	930	927	927	927
Nb of clusters	344.000	344.000	344.000	326.000	326.000	326.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study, focusing on families with two children of opposite sex in the second wave (t_0).

A second assumption that we make is that the sex of the two first children is randomly distributed across families. This assumption would be violated if parents in our sample had an absolute preference for a given sex. To test this assumption, we regress the probability to have a second child in $t \geq t_0$ on a dummy that equals one if the first child is a female on the sample of families with one child in wave 2. The estimate in Table 4 shows that the sex of the first child has no effect on the probability to have a second child: MCS parents do not have any absolute preference for boys or girls. This result is consistent with the notion that the sex of the two first children is randomly distributed across families.

Table 4 – Probability to have a second child and the sex of the first-born: OLS results

	Having a second child
First child is a girl	0.012 (0.018)
Observations	3134
R^2	0.000
Adjusted R^2	−0.000
Nb of clusters	3134.000

Notes: Standard errors in parentheses are clustered at the family level. Having a second child is a dummy equal to 1 if a second child was born in the family, 0 otherwise. No controls are added. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Millennium Cohort Study, Wave 6, families with only one child in t_0 .

4. Results

4.1. Benchmark Estimates

Let us start by presenting simple correlations between family size and child’s non-cognitive skills. Table 5 shows the results. For each outcome, the first column shows the correlation without any control, the second column controls for individual’s characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents’ marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. In the third column, we add a control for the outcome in the first wave; and the fourth column shows the fixed-effect results.

In Table 5, we can see that the correlation between family size and child’s non-cognitive skills is quite small but positive. This contrasts with the literature on family size and cognitive skills, where a larger family size is associated with lower cognitive skills. Interestingly, when we account for observed selection, the effect is larger, suggesting a negative selection on observables of the decision of fertility for child’s non-cognitive skills. When child’s non cognitive skill at the previous wave is accounted for, the correlation is smaller, and turns to be 0 for externalising SDQ. Accounting for the individual fixed effect, the correlation between family size and non-cognitive skills is not statistically significant anymore. This suggests a positive selection on the unobserved characteristics, consistent with Silles (2010) [119] and Juhn et al. (2015) [86] and with the assumption that having more

kids might be correlated with unobserved characteristics such as a better mental health, or higher non-cognitive skills, that are positively correlated with child's non-cognitive skills.

Another interesting question is whether the effect of family size is linear. Moreover, since our instrument leads us to consider only the effect of having a second sibling in a family of two children, this would shed light on the external validity of our results. In Table 6, we consider family size as a categorical variable, allowing the correlations between child's non-cognitive skills and family size to vary for each family size. The reference category is the singleton. The number of observations decreases with family size, such as the precision of the estimates. Since, there are less than 100 observations on all waves, whose family size is larger than 8, we will mainly focus on the effect of family size before it reaches 8 children. These effects are reported in Figure 1 for OLS and Fixed Effect Models.

Both models go in the same sense. The effect of family size seems quite linear. In the OLS estimation, the positive correlation between family size and non-cognitive skills seems to decrease from the 5th children, driven by the effect on externalising SDQ. In Table 6, we indicate whether the difference of the effect of one sibling is statistically different from the effect of a second sibling (Linearity of the effect (p-value)). The difference is never statistically significant. These results suggest that our findings, presented below, could be extrapolated to the effect of a first, or a third sibling.

Table 5 – Benchmark Estimates: Family Size and Non-cognitive skills: OLS and Fixed Effects Results

	Total SDQ				Externalising SDQ				Internalising SDQ			
Family Size	0.029*** (0.007)	0.043*** (0.008)	0.019** (0.007)	0.013 (0.015)	0.028*** (0.007)	0.037*** (0.008)	0.008 (0.007)	-0.004 (0.015)	0.020** (0.007)	0.035*** (0.008)	0.031*** (0.008)	0.026 (0.016)
Female		0.200*** (0.014)	0.109*** (0.012)			0.318*** (0.014)	0.216*** (0.012)			-0.003 (0.014)	-0.031* (0.012)	
Age		-0.108*** (0.025)	-0.026 (0.021)	-0.075* (0.035)		-0.082** (0.026)	-0.002 (0.021)	-0.051 (0.036)		-0.105*** (0.024)	-0.067** (0.022)	-0.076+ (0.041)
Age of Mother		0.010*** (0.003)	0.002 (0.002)			0.011*** (0.003)	0.003 (0.002)			0.004+ (0.003)	0.002 (0.002)	
Age of Mother at first birth		0.004 (0.003)	-0.000 (0.002)			0.005+ (0.003)	0.001 (0.002)			0.002 (0.003)	-0.001 (0.002)	
2nd born		0.048** (0.015)	0.029* (0.013)			-0.016 (0.015)	-0.002 (0.013)			0.110*** (0.014)	0.066*** (0.013)	
February		0.014 (0.034)	0.018 (0.028)			-0.002 (0.034)	-0.006 (0.029)			0.029 (0.034)	0.039 (0.030)	
March		-0.038 (0.034)	-0.031 (0.028)			-0.050 (0.034)	-0.047+ (0.029)			-0.010 (0.033)	-0.003 (0.030)	
April		0.015 (0.034)	0.001 (0.029)			0.010 (0.034)	-0.008 (0.029)			0.016 (0.034)	0.015 (0.031)	
May		-0.012 (0.033)	-0.011 (0.028)			-0.034 (0.033)	-0.025 (0.028)			0.020 (0.032)	0.010 (0.029)	
June		-0.070* (0.034)	-0.069* (0.028)			-0.108** (0.034)	-0.116*** (0.029)			0.000 (0.033)	0.010 (0.030)	
July		-0.070* (0.035)	-0.066* (0.029)			-0.083* (0.035)	-0.085** (0.029)			-0.034 (0.034)	-0.026 (0.031)	
August		-0.006 (0.034)	-0.025 (0.029)			-0.034 (0.035)	-0.045 (0.029)			0.030 (0.033)	0.012 (0.030)	
September		0.133*** (0.040)	0.068* (0.033)			0.090* (0.040)	0.025 (0.033)			0.144*** (0.039)	0.114** (0.036)	
October		0.149*** (0.039)	0.071* (0.033)			0.115** (0.039)	0.031 (0.032)			0.143*** (0.038)	0.115*** (0.035)	
November		0.090* (0.039)	0.031 (0.033)			0.021 (0.039)	-0.045 (0.032)			0.144*** (0.038)	0.126*** (0.035)	
Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Control for Y0	No	No	Yes		No	No	Yes		No	No	Yes	
Individual Fixed Effect	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes

Continued on next page

Table 5 – Continued from previous page

	(0.038)	(0.032)			(0.039)	(0.032)			(0.037)	(0.034)		
December	0.100**	0.028			0.078*	0.004			0.096*	0.066+		
	(0.039)	(0.032)			(0.039)	(0.032)			(0.038)	(0.034)		
Wave=4	0.170***	0.031	0.145*		0.125*	-0.013	0.102		0.169***	0.109*	0.147+	
	(0.051)	(0.043)	(0.071)		(0.052)	(0.042)	(0.072)		(0.050)	(0.046)	(0.083)	
Wave=5	-0.887***	-0.521***	0.476*		-0.797***	-0.572***	0.402+		-0.699***	-0.380**	0.411	
	(0.162)	(0.134)	(0.220)		(0.165)	(0.134)	(0.222)		(0.156)	(0.143)	(0.257)	
Wave=6	0.892***	0.203	0.675*		0.673**	-0.008	0.468		0.868***	0.560**	0.687+	
	(0.228)	(0.189)	(0.321)		(0.232)	(0.188)	(0.324)		(0.220)	(0.202)	(0.374)	
Household Income	0.345***	0.152***	-0.007		0.290***	0.132***	-0.021+		0.298***	0.176***	0.010	
	(0.013)	(0.011)	(0.011)		(0.013)	(0.011)	(0.011)		(0.013)	(0.012)	(0.013)	
Natural Father in Household	0.137***	0.148***	0.120***		0.117***	0.110***	0.091***		0.120***	0.145***	0.120***	
	(0.022)	(0.019)	(0.025)		(0.023)	(0.019)	(0.024)		(0.021)	(0.020)	(0.028)	
Parents are Married	0.093***	0.058***	0.020		0.124***	0.087***	0.025		0.024	0.010	0.003	
	(0.020)	(0.016)	(0.023)		(0.020)	(0.017)	(0.023)		(0.019)	(0.017)	(0.027)	
Total SDQ (t0)		0.471***										
		(0.007)										
Behaviour Skills (t0)						0.467***						
						(0.007)						
Emotional Skills (t0)										0.351***		
										(0.008)		
Constant	-0.028	-2.151***	-1.021***	0.346+	-0.033+	-2.066***	-1.087***	0.352+	-0.010	-1.555***	-0.892***	0.231
	(0.019)	(0.149)	(0.124)	(0.203)	(0.019)	(0.151)	(0.123)	(0.204)	(0.018)	(0.144)	(0.132)	(0.237)
Observations	44637	44304	44304	44304	44637	44304	44304	44304	44637	44304	44304	44304
R ²	0.001	0.102	0.299	0.003	0.001	0.106	0.305	0.002	0.000	0.055	0.171	0.002
Adjusted R ²	0.001	0.101	0.299	0.002	0.001	0.106	0.304	0.001	0.000	0.054	0.170	0.002
Controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Control for Y0	No	No	Yes		No	No	Yes		No	No	Yes	
Individual Fixed Effect	No	No	No	Yes	No	No	No	Yes	No	No	No	Yes
Nb of Clusters	13304.000	13258.000	13258.000	13258.000	13304.000	13258.000	13258.000	13258.000	13304.000	13258.000	13258.000	13258.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Family size is the number of children. Controls include individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. "Control_Y_0" indicates that the non-cognitive skills in wave 2 is controlled for, to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

THE EFFECT OF HAVING AN ADDITIONAL SIBLING ON CHILD'S NON-COGNITIVE
SKILLS

Table 6 – Benchmark Estimates: Linearity of the effect of Family Size on Non-cognitive skills

	Total SDQ		Externalising SDQ		Internalising SDQ	
Family Size=2	0.083*** (0.018)	-0.061* (0.028)	0.057** (0.018)	-0.061* (0.029)	0.096*** (0.019)	-0.048 (0.033)
Family Size=3	0.092*** (0.021)	-0.041 (0.038)	0.061** (0.021)	-0.068+ (0.037)	0.115*** (0.022)	-0.009 (0.043)
Family Size=4	0.136*** (0.028)	0.042 (0.048)	0.098*** (0.028)	0.020 (0.048)	0.153*** (0.029)	0.047 (0.055)
Family Size=5	0.078 (0.048)	-0.008 (0.077)	0.033 (0.048)	-0.087 (0.078)	0.109* (0.051)	0.078 (0.084)
Family Size=6	0.030 (0.080)	0.077 (0.121)	-0.042 (0.078)	-0.046 (0.113)	0.122 (0.078)	0.194 (0.138)
Family Size=7	-0.016 (0.111)	-0.053 (0.179)	-0.084 (0.117)	-0.195 (0.180)	0.067 (0.116)	0.108 (0.185)
Family Size=8	-0.016 (0.136)	0.081 (0.230)	-0.120 (0.140)	0.005 (0.234)	0.120 (0.169)	0.123 (0.243)
Family Size=9	0.026 (0.182)	0.188 (0.363)	-0.140 (0.191)	0.064 (0.492)	0.295+ (0.155)	0.190 (0.278)
Family Size=10	-0.819** (0.259)	-0.358 (0.479)	-0.529 (0.380)	-0.888+ (0.469)	-0.833** (0.260)	0.248 (0.414)
Family Size=11	0.360*** (0.036)	0.740** (0.250)	-0.010 (0.036)	0.494+ (0.299)	0.809*** (0.038)	0.659** (0.246)
Family Size=13	-0.347*** (0.051)	-0.610+ (0.364)	-0.212*** (0.051)	-0.570 (0.492)	-0.237*** (0.053)	-0.557* (0.278)
Family Size=14	-1.836*** (0.043)	-1.900*** (0.007)	-2.226*** (0.044)	-1.801*** (0.007)	-0.533*** (0.045)	-1.240*** (0.009)
Family Size=16	0.078+ (0.045)		-0.413*** (0.045)		0.725*** (0.047)	
Observations	44304	44304	44304	44304	44304	44304
R^2	0.301	0.004	0.306	0.003	0.172	0.002
Adjusted R^2	0.300	0.003	0.305	0.002	0.171	0.002
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Control for Y0	Yes		Yes		Yes	
Individual Fixed Effect	No	Yes	No	Yes	No	Yes
Nb of Clusters	13258.000	13258.000	13258.000	13258.000	13258.000	13258.000
Linearity of the effect (p-value)	0.561	0.435	0.771	0.769	0.229	0.155
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Control for Y0	Yes		Yes		Yes	
Individual Fixed Effect	No	Yes	No	Yes	No	Yes

Continued on next page

Table 6 – Continued from previous page

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Family size is a set of dummies indicating the number of children. Controls include individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. "Control_Y_0" indicates that the non-cognitive skills in wave 2 is controlled for, to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

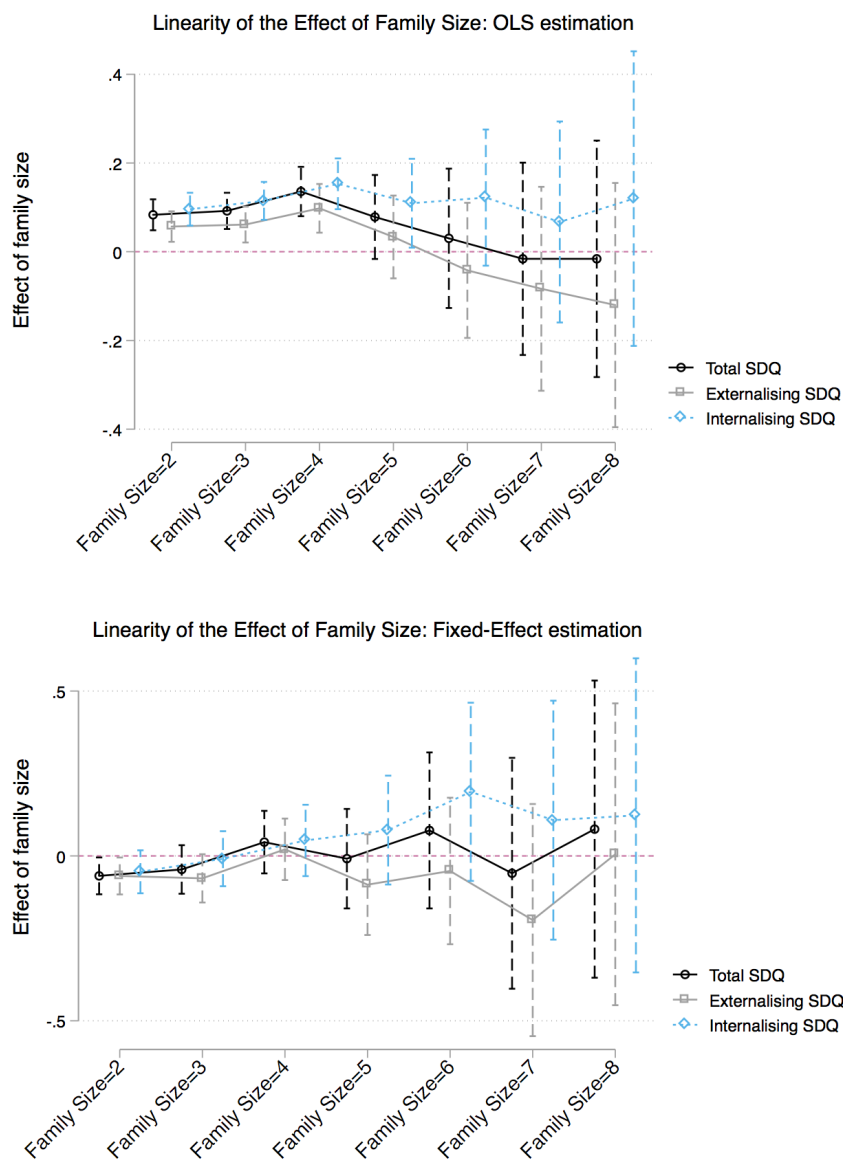


Figure 1 – Linearity of the effect of family size.

4.2. The effect of Family Size on children Socio-Emotional Skills

Before we turn to the estimation of the effect of an increase in family size on children socio-emotional skills, we first ask whether our instrument produces sufficient exogenous variation in fertility decisions. To address this issue, we first look at the estimate of the first stage (cf. Table A5). Consistently with previous findings, our instrument *same sex₁₀* predicts a statistically significant increase in the probability of having a third child. Besides, when implementing our 2SLS estimation procedure, the Cragg-Wald-F-Statistics is much greater than 10 (cf. Table 7) which is high enough to discard the concerns of weak instrument.

Table 7 shows the estimation of an increase in family size on children socio-emotional skills, estimated from equation (2) on our main sample. As can be seen in column (1), an increase in family size produces a statistically significant decrease in total SDQ of 0.665 point of a standard deviation. Columns (2) and (3) report the effect of an increase in family size on behavioural skills and emotional skills, respectively. While only the estimate on emotional skills is statistically different from zero, the magnitude of the two estimates remains comparable. This suggests that an increase in family size is likely to affect both subsets of socio-emotional skills.¹⁰

Table 7 – Family Size and Non-cognitive skills: 2SLS Results

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	-0.650+ (0.342)	-0.496 (0.340)	-0.627+ (0.354)
Female	0.097*** (0.018)	0.207*** (0.018)	-0.037* (0.018)
Age	-0.039 (0.030)	-0.019 (0.030)	-0.076* (0.032)
Age of Mother	-0.010 (0.011)	0.005 (0.011)	-0.024* (0.011)
Age of Mother at first birth	0.004 (0.007)	-0.007 (0.007)	0.018* (0.008)
2nd born	-0.059* (0.027)	-0.148*** (0.026)	0.089** (0.027)
February	-0.005 (0.043)	0.012 (0.043)	-0.025 (0.046)

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¹⁰Table A8 reports the results for each subscale of the indicators. Results on Emotion and Hyperactivity drive the results.

Table 7 – *Continued from previous page*

	Total SDQ	Behaviour Skills	Emotional Skills
March	-0.103* (0.044)	-0.104* (0.044)	-0.075+ (0.045)
April	0.026 (0.043)	0.015 (0.043)	0.025 (0.044)
May	-0.001 (0.043)	0.006 (0.044)	-0.015 (0.042)
June	-0.061 (0.043)	-0.093* (0.043)	-0.009 (0.044)
July	-0.073+ (0.043)	-0.077+ (0.044)	-0.056 (0.044)
August	-0.061 (0.044)	-0.075+ (0.044)	-0.012 (0.044)
September	0.074 (0.048)	0.041 (0.048)	0.109* (0.049)
October	0.113* (0.048)	0.084+ (0.047)	0.131** (0.049)
November	0.044 (0.046)	-0.005 (0.047)	0.098* (0.048)
December	0.032 (0.046)	0.013 (0.047)	0.056 (0.049)
Wave=4	0.138+ (0.080)	0.084 (0.079)	0.206* (0.084)
Wave=5	-0.057 (0.346)	-0.190 (0.342)	0.070 (0.355)
Wave=6	0.455 (0.302)	0.238 (0.299)	0.782* (0.320)
Household Income	0.091* (0.044)	0.089* (0.044)	0.112* (0.044)
Natural Father in Household	0.284*** (0.066)	0.224*** (0.065)	0.266*** (0.069)
Parents are Married	0.062* (0.029)	0.075** (0.028)	0.034 (0.030)
Total SDQ (t0)	0.469*** (0.012)		

Continued on next page

Table 7 – *Continued from previous page*

	Total SDQ	Behaviour Skills	Emotional Skills
Behaviour Skills (t0)		0.467*** (0.013)	
Emotional Skills (t0)			0.335*** (0.012)
Constant	-0.278 (0.473)	-0.482 (0.470)	-0.196 (0.475)
Observations	20131	20131	20131
R^2	0.235	0.274	0.102
Adjusted R^2	0.235	0.273	0.101
FSTAT	88.765	89.910	87.896
Nb of clusters	5983.000	5983.000	5983.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents’ marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

In Table A6, we test the same model without controlling for Y_{i0} , results are quite similar, suggesting that the measurement error due to the fact that the non-cognitive skills are provided by the Primary Care Giver is negligible.

The negative effects of an increase in family size on children non cognitive development outlined in this work are consistent with the idea that parents have a limited amount of resources (time and money) to invest in their children (Becker and Tomes (1976) [16]). Indeed, the birth of a new child in the family may distract parental resources away from previous children who may, in turn, end up with lower socio-emotional skills. This result is consistent with the abundant literature showing negative correlations between family

size and adult outcomes (Björklund and Salvanes (2011) [118]). Nevertheless, it contrasts with the lack of empirical evidence demonstrating a causal effect of family size on children cognitive development and educational attainment. In particular, studies using twin births (Black et al (2005) [27]; Caceras-Delpiano (2006) [50]; Angrist et al. (2010) [6]; Aslund and Grönqvist (2010) [10]) or parents' preference for children's sex diversity (Angrist et al. (2010) [6]; Black et al. (2010) [28]) find no evidence of a "children quantity-quality trade-off"¹¹.

We then ask whether the negative effects of an increase in family size on the development of children non-cognitive skills differ by the age of the children, by their birth order and their gender.

4.3. Heterogeneity Analysis

In this section, we look if the effect of family size is the same in different groups. T is a dummy equals 1 if the child is in the group of interest, 0 otherwise. Following the method described in Wooldridge (2002) [130]¹² we use an interaction term, instrumented itself by the interaction of the instrument *same sex* and T . Formally, we estimate this model:

$$\begin{aligned} Third\ Child_{it} &= \alpha_1 same\ sex_{i0} + \gamma_1 X_{it} + \delta_t + \beta_1 Y_{i0} + \epsilon_{it} \\ Third\ Child_{it} \times T_{it} &= \alpha_2 same\ sex_{i0} \times T_{it} + \gamma_2 X_{it} + \delta_t + \beta_2 Y_{i0} + \epsilon_{it} \\ Y_{it} &= \alpha_3 \widehat{Third\ Child}_{it} + \alpha_3 \widehat{Third\ Child}_{it} \times T_{it} + \gamma_3 X_{it} + \delta_t + \beta_3 Y_{i0} + \mu_{it} \end{aligned} \quad (1)$$

In each table, we also provide the average effect of the two groups.

Sensitive period and increase in family size

We ask whether the effect of family size is negative whatever the age of the child at the moment of birth. Here, T is the birth spacing; a dummy equals to 1 if the child is at least 5 years old at the moment of the birth of the third child.

Table 8 shows that the effect is negative for those who are younger than 5 at the moment of birth. Having a sibling produces a statistically significant decrease of the Total SDQ of -1.2 standard deviation. Again, only the estimate on emotional skills is statistically different from zero, but the magnitude of the two estimates remain comparable. More interesting, the difference between the two groups is positive and statistically different from zero, suggesting that there is no effect of a birth after the age of 5 ¹³.

¹¹Black et al. (2010) [28] find no effect of family size when it is instrumented by sex diversity but they find a negative effect of an increase in family size instrumented by twin birth.

¹²See Chapter 6, Section 6.2, pages 121 - 122

¹³We find similar results using a continuous variable for the birth spacing.

The resources of the parents being limited, an increase in the family size is likely to reduce the amount of resources per child and as such limit the development of non-cognitive skills. But the effect of limited parental resources could differ at different stages of childhood. Several studies highlight the importance of parental time in early childhood (See Del Bono et al. (2016) [33], Del Boca et al (2017) [54], Cunha and Heckman (2008) [48] and Cunha et al. (2010) [49]) emphasizes the existence of sensitive periods in the formation of non-cognitive skills.

Table 8 – Family Size and Non-cognitive skills: 2SLS Results by Birth Spacing

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	−1.204+ (0.677)	−0.885 (0.648)	−1.196+ (0.702)
Third Child at Age 5 or Older	0.976+ (0.569)	0.678 (0.544)	1.019+ (0.591)
Observations	20131	20131	20131
R^2	0.174	0.242	0.038
Adjusted R^2	0.174	0.242	0.037
Before Age 5	−1.204	−0.885	−1.196
At Age 5 or Older	−0.228	−0.207	−0.177
F-statistic	23.945	24.487	23.525
Nb of Clusters	5983.000	5983.000	5983.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t and Birth spacing is a dummy equal to 1 when the child was at least 5 years old at the moment of the birth of the third child. We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

Are first and second born equal facing the birth of a new sibling?

We ask whether the effect of family size is the same for first and second born. Here, T is the birth order; a dummy equals to 1 if the child is a second born.

As can be seen in Table 9, there is no significant difference in the effect of an increase in family size according to birth order¹⁴. This is consistent with Price (2008) [111] findings. Parents allocate the same amount of time at each child at any point in time, therefore, first born and second born will have the same amount of time and consequently face the same decrease in parental time after the birth of an additional sibling.

Looking more precisely at behavioural skills and emotional skills, it seems that second born suffer more from a birth when we look at their behavioural skills, but less when we look at their emotional skills.

Table 9 – Family Size and Non-cognitive skills: 2SLS Results by Birth Order

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	−0.688+ (0.359)	−0.329 (0.330)	−0.837* (0.393)
Third Child X 2nd Born	0.106 (0.718)	−0.468 (0.751)	0.591 (0.731)
Observations	20131	20131	20131
First Born	−0.688	−0.329	−0.837
Second Born	−0.582	−0.797	−0.246
F-Statistic	22.336	22.343	21.995
Nb of Clusters	5983.000	5983.000	5983.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

Are boys and girls equal facing the birth of a new sibling?

We ask whether boys and girls are affected in the same way by the birth of a third child. Here, T is the gender; a dummy equals to 1 if the child is a girl, 0 if a boy.

¹⁴Again, the F-Stats confirms that the instrument remains valid.

Results are appealing. The negative effect of family size is totally driven by girls. The effect of family size is positive but not statistically significant from zero for boys; while an increase in family size decreases by 2 standard deviation girls' total SDQ compared to boys. (cf. Table 10).

There is poor evidence in the literature of a gendered effect of family size. In the next section, we investigate two potential mechanisms driving this heterogeneous effect: unequal parental times and unequal demand on participation to household chores.

Table 10 – Family Size and Non-cognitive skills: 2SLS Results by Gender

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	0.343 (0.473)	0.451 (0.489)	0.195 (0.468)
Third Child X Female	−2.040** (0.775)	−1.945* (0.764)	−1.687* (0.759)
Observations	20131	20131	20131
R^2	0.038	0.096	−0.029
Adjusted R^2	0.037	0.095	−0.030
Boys	0.343	0.451	0.195
Girls	−1.696	−1.494	−1.491
F-statistic	40.153	40.164	39.588
Nb of Clusters	5983.000	5983.000	5983.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

Are first and second born equally affected depending on their gender by the birth of a new sibling?

We ask whether the gendered effect of the birth of a new sibling is the same for first and second born. Table 11 reports the results. Looking at Total SDQ, the most affected group are second born girls, this is driven by the behavioural skills, whereas looking at emotional skills, the most affected are first born girls. Second born boys are always the less affected. This means that being a second born is an advantage for boys, whereas it is a penalty for girls. The differential effect found for gender remains relevant for first and second born.

Table 11 – Family Size and Non-cognitive skills: 2SLS Results by Gender and Birth Order

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	0.029 (0.443)	0.328 (0.444)	−0.206 (0.455)
Third Child X Female	−1.604* (0.676)	−1.482* (0.675)	−1.396* (0.652)
Third Child X 2nd Born	0.848 (0.920)	0.313 (0.919)	1.104 (0.892)
Third Child X Female X 2nd Born	−1.455* (0.590)	−1.554* (0.609)	−0.972+ (0.542)
Observations	20131	20131	20131
R^2	−0.057	−0.019	−0.083
Adjusted R^2	−0.058	−0.020	−0.085
Boys - 1st born	0.029	0.328	−0.206
Girls - 1st born	−1.575	−1.153	−1.602
Boys - 2nd born	0.877	0.641	0.898
Girls - 2nd born	−2.182	−2.394	−1.469
F-statistic	10.982	10.966	10.767
Nb of Clusters	5983.000	5983.000	5983.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

4.4. Discussion of the effects and potential mechanisms

In this section, we investigate two potential mechanisms driving the difference in the effect of family by gender. First, an increase in family size may affect the allocation of the parental resources to the first children differently according to the child’s gender. Typically, parents may spend relatively more time with their sons than with their daughters when the birth of a new child has occurred, if boys and girls react differently to this event or if parents anticipate stronger detrimental effects on boys. Such compensating effect could explain why we observe negative effects only for girls.

Gendered effect mechanism: Parents Resources

Table 12 – Family Size and Parental Time: 2SLS Results by Gender

	Read with parent every day	Read with parent 2 every day	Being helped with reading every day
Third Child	0.839+ (0.447)	0.011 (0.231)	0.586 (0.412)
Third Child X Female	−0.924 (0.599)	0.426 (0.408)	−1.021+ (0.571)
Observations	10754	8233	8815
FSTAT	13.865	13.323	14.095
N_clust	5834.000	4750.000	5706.000

Notes: The dependent variables are dummies equal to 1 if the activities are done at least once per day. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents’ marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study with non-missing values for the dependent variables.

We test this hypothesis by measuring the extent to which an increase in family size affects parental time in our estimation sample. We use the following measures of parental times: the time spent with the mother in reading, the time spent with the parent 2 or the mother’s partner in reading, and the time being helped in reading. These variables are only available in waves 3 and 4 and we use dummies equal to 1 if the activity is done every day as dependent variables. Table 12 reports the effect of family size on parental time, and the difference between boys and girls. The results suggest that the primary care giver spends relatively more time in reading with the child after the birth if he is a boy. We find the same result looking at time the child was helped for reading. However, time spent with the second carer is unaffected by the birth of a third child and we do not

identify a significant difference between boys and girls. On average, girls do not benefit from compensations as boys do after the birth of a third child. This may partly explain the gender heterogeneity of our results in terms of non-cognitive skills.

Gendered effect mechanism: Demand for household chores

A second possible explanation relates to gender norms and the intra-household allocation of housework and caregiving activities. Previous studies show that female children spend more time than male children doing housework and taking care of other members in the family (Raley and Bianchi (2006) [112], Bonke (2010) [32], Vu (2014) [129]). Children tend to reproduce their parents household chores division (see Alvarez et al. (2012) [131], Solaz and Wolff (2015) [120]). Therefore, since the birth of a child is likely to increase the gendered division of chores among parents (see Solera and Mencarini (2018) [121]), this might reflect in a higher gendered division of chores among children.

Table 13 – Family Size and Housework Contribution: 2SLS Results by Gender

	Time involved in household chores	Time involved in household chores
Third Child	0.172 (0.177)	0.017 (0.236)
Third Child X Female		0.312 (0.334)
Observations	14470	14470
FSTAT	75.364	35.583
N_clust	5637.000	5637.000

Notes: The dependent variables are dummies equal to 1 if the cohort member contributes to household chores more than once per week. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
Source: Estimation Sample drawn from the Millennium Cohort Study with non-missing values for the dependent variables.

We explore this hypothesis in our estimation sample by checking whether the birth of a third child affects the contribution of children to household tasks. Parents are asked from wave 4 onward to what extent cohort members are involved in household chores. We show in Table 13 that an increase in the family size increases the probability to contribute to the household tasks (column 1). We differentiate the effect by gender in column 2 and show that the former positive estimate is mainly driven by girls. While the signs of

the estimates are consistent with our predictions, none of them is significantly different from zero at conventional level. Taking care of younger sibling may distract children from activities that are more productive for the formation of socio-emotional skills, such as educational activities or parental quality-time (see Chapter 2). Unfortunately, this dataset does not enable us to check to what activity household chores are substituted.

It is worth noting that this effect is measured on our compliers, who are children whose parents have a preference for gender diversity. Parents' preference for gender diversity might reveal that they consider that raising a boy differ from raising a girl. Therefore, they might be more likely to adopt gendered behaviours: gender differences across parents or children might be larger in those families.

4.5. Persistence of the effect

In this section we ask whether the negative effect of family size persists after the time of the shock. Following Jacobson et al. (1993) [84], we estimate the following model:

$$Y_{it} = \alpha_0 + \sum_{k \geq -3}^{-1} birth_{it}^k \alpha_k + \gamma X_{it} + \delta_t + \beta Y_{i0} + \mu_{it} \quad (2)$$

where $birth_{it}^k$ indicates that the child had a sibling k periods earlier. We estimate this model only on children from families with a third child, i.e. the birth has occurred. Having a sibling in period $k = 0$ is the benchmark. δ_k measures the difference in the effect of the birth on a child's non-cognitive skills k periods following this event, compared to just after the event. To account for the endogeneity of the event, we treat the selection bias through the Heckman selection model. This model assumes an underlying relationship between two regressions: the outcome equation (equation 2 here) and the selection equation. Individual is selected only if there was a birth in their family, i.e., under the following condition (selection equation):

$$Third_{it}^* = same\ sex_{i0} + \epsilon_{it}, \quad Third_{it} = \begin{cases} 1 & \text{if } Third_{it}^* > 0 \\ 0 & \text{if } Third_{it}^* \leq 0 \end{cases}$$

Table 14 shows the results. There is a small recovery after the birth, but it is not statistically different from 0. Results suggest that birth is a shock, and its effect remains even three periods latter.

Table 14 – Persistence of the Effect of Family Size on Child's Non Cognitive skills

	Total SDQ	Behaviour Skills	Emotional Skills
main			
Birth (-1)	0.052 (0.037)	0.049 (0.038)	0.051 (0.040)
Birth (-2)	0.033 (0.059)	0.065 (0.062)	0.010 (0.061)
Birth (-3)	0.079 (0.088)	0.077 (0.092)	0.088 (0.088)
Constant	-1.595*** (0.403)	-1.561*** (0.436)	-1.392*** (0.419)
Third Child			
Same sex	0.187*** (0.036)	0.189*** (0.036)	0.184*** (0.036)
Constant	-1.002*** (0.026)	-1.003*** (0.026)	-1.000*** (0.026)
athrho			
Constant	0.179** (0.067)	0.235*** (0.068)	0.070 (0.099)
Insigma			
Constant	-0.176*** (0.025)	-0.157*** (0.023)	-0.126*** (0.024)
Observations	19479	19479	19479
N_clust	5899.000	5899.000	5899.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

5. Concluding Discussion

In this chapter, we exploit a recent cohort of children born in the UK to assess the impact of an increase in family size on the development of non-cognitive skills. To account for the endogeneity of fertility decisions, we use a well-known instrumental approach that exploits parents' preferences for variety in the sex composition of their offspring, which consists in using the sex composition of the two first children as an instrument for an increase in family size. We find that family size have a significant and negative effect on the formation of both behavioural and emotional skills of the two first children. We do not find any evidence of a significant recovery, even three periods after the event. However, a further examination of the results reveals that this effect is negative only before the age of 5, while older children are not affected. More appealing, these effects are concentrated on girls, while boys are not affected by the birth of a new child in the family on average. Both parents' compensating behaviours and the gendered allocation of housework and caregiving activities within the family could explain why the negative effects are only observed for girls.

6. Appendix - Additional Tables

A1 Descriptive Statistics

Table A1 – Number of observations by wave

	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Total
Our sample	5983	5623	5206	5089	4578	26479
Total	14460	14700	13447	13416	11823	67846

Source: Estimation from the Millennium Cohort Study.

Table A2 reports the correlations over the different dimensions of the child's non-cognitive skills. The correlation between the two dimensions of the SDQ is around 0,4¹⁵.

Table A2 – Correlations between the different dimension of the Non-Cognitive Skills

	Total SDQ	Behaviour Skills	Emotional Skills
Non Cognitive Skills (Total SDQ)	1.00	0.88	0.80
Behaviour Skills	0.88	1.00	0.41
Emotional Skills	0.80	0.41	1.00

Source: Estimation from the Millennium Cohort Study.

¹⁵This is smaller than for the Behaviour Problem Index used in the Panel Study of Income Dynamics - Child Development Supplement in Chapter 2.

Table A3 – Instrument validity: Differences between individuals from families who have 2 children of same sex vs families who have 2 children of opposite sex in t_0

	Families with 2 children of:		
	Opposite Sex	Same Sex	Gap b/se
Total SDQ	0.07	0.06	0.011 (0.02)
Behaviour Skills	0.05	0.03	0.023 (0.03)
Emotional Skills	0.08	0.09	-0.012 (0.02)
Female	0.50	0.49	0.009 (0.01)
Age	3.16	3.15	0.010 (0.01)
Age of Mother	29.54	29.56	-0.025 (0.14)
1st born	0.40	0.41	-0.012 (0.01)
2nd born	0.60	0.59	0.012 (0.01)
Observations	5983		

Notes: The two first column show the mean for children of Opposite Sex, and of Same Sex, respectively. The third column reports the gap between the 2 mean, doing a t-test. Non-cognitive skills are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study, wave 2 (t_0).

Table A4 – Instrument validity: Differences between families with 2 first children of same sex and families with 2 first children of opposite sex in t_0

	Families with 2 children of:		
	Opposite Sex	Same Sex	Gap b/se
Household Income	5.71	5.70	0.007 (0.02)
Natural Father in Household	0.88	0.88	0.003 (0.01)
Parents are Married	0.72	0.73	-0.008 (0.01)
Age of Mother at first birth	27.45	27.47	-0.016 (0.14)
Observations	5907		

Notes: The two first column show the mean for children of Opposite Sex, and of Same Sex, respectively. The third column reports the gap between the 2 mean, doing a t-test. Standard errors in parentheses. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study, wave 2 (t_0).

A2 First Stage

Table A5 – Family Size and Non-cognitive skills: First Stage

	Third Child	Third Child	Third Child
Same sex	0.051*** (0.009)	0.051*** (0.009)	0.051*** (0.009)
Female	-0.008 (0.009)	-0.010 (0.009)	-0.004 (0.009)
Age	-0.028 (0.019)	-0.028 (0.019)	-0.032+ (0.018)
Age of Mother	-0.029*** (0.002)	-0.029*** (0.002)	-0.029*** (0.002)
Age of Mother at first birth	0.014*** (0.002)	0.014*** (0.002)	0.015*** (0.002)
2nd born	-0.021 (0.014)	-0.019 (0.014)	-0.019 (0.014)
February	-0.012 (0.023)	-0.013 (0.023)	-0.011 (0.023)
March	0.009 (0.023)	0.008 (0.023)	0.008 (0.023)
April	0.000 (0.023)	-0.001 (0.023)	0.000 (0.023)
May	-0.008 (0.023)	-0.008 (0.023)	-0.009 (0.023)
June	0.005 (0.023)	0.004 (0.023)	0.004 (0.023)
July	-0.006 (0.023)	-0.006 (0.022)	-0.006 (0.023)
August	0.004 (0.023)	0.004 (0.023)	0.005 (0.023)
September	-0.011 (0.028)	-0.012 (0.028)	-0.008 (0.028)
October	0.023 (0.028)	0.022 (0.028)	0.026 (0.028)
November	0.008 (0.028)	0.007 (0.028)	0.009 (0.028)

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Table A5 – *Continued from previous page*

	Total SDQ	Behaviour Skills	Emotional Skills
December	-0.003 (0.027)	-0.004 (0.027)	-0.001 (0.027)
Wave=4	0.155*** (0.037)	0.154*** (0.037)	0.161*** (0.037)
Wave=5	0.829*** (0.118)	0.826*** (0.118)	0.821*** (0.118)
Wave=6	0.439** (0.167)	0.435** (0.167)	0.467** (0.167)
Household Income	-0.117*** (0.009)	-0.117*** (0.009)	-0.111*** (0.009)
Natural Father in Household	0.169*** (0.014)	0.168*** (0.014)	0.169*** (0.014)
Parents are Married	0.036** (0.013)	0.036** (0.013)	0.038** (0.013)
Total SDQ (t0)	0.019*** (0.005)		
Behaviour Skills (t0)		0.023*** (0.005)	
Emotional Skills (t0)			0.002 (0.005)
Constant	1.235*** (0.107)	1.238*** (0.107)	1.200*** (0.107)
Observations	20131	20131	20131
Nb of clusters	5983.000	5983.000	5983.000

Notes: Standard errors in parentheses are clustered at the family level. “Same sex” is a dummy equal to 1 if the first two children of a given family have the same sex. We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents’ marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

A3 Other Results

A3.1 Results without controlling for Y_{i0} or with a Value Added Model

Table A6 – Family Size and Non-cognitive skills: 2SLS Results (not controlling for Y_{i0})

	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	-0.733+ (0.412)	-0.684 (0.421)	-0.548 (0.383)
Female	0.204*** (0.021)	0.319*** (0.021)	0.003 (0.019)
Age	-0.130*** (0.037)	-0.105** (0.039)	-0.118*** (0.035)
Age of Mother	-0.012 (0.013)	0.004 (0.013)	-0.027* (0.012)
Age of Mother at first birth	0.017+ (0.009)	0.003 (0.009)	0.028*** (0.008)
2nd born	-0.009 (0.031)	-0.151*** (0.032)	0.167*** (0.030)
February	0.004 (0.051)	0.037 (0.052)	-0.039 (0.049)
March	-0.115* (0.053)	-0.101+ (0.054)	-0.096* (0.048)
April	0.021 (0.051)	0.040 (0.053)	-0.010 (0.047)
May	-0.025 (0.050)	-0.015 (0.053)	-0.028 (0.045)
June	-0.074 (0.052)	-0.088+ (0.053)	-0.033 (0.047)
July	-0.093+ (0.052)	-0.080 (0.053)	-0.083+ (0.048)
August	-0.023 (0.052)	-0.047 (0.054)	0.015 (0.046)

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Table A6 – *Continued from previous page*

	Total SDQ	Behaviour Skills	Emotional Skills
September	0.156** (0.057)	0.136* (0.060)	0.129* (0.053)
October	0.203*** (0.057)	0.188** (0.059)	0.153** (0.052)
November	0.086 (0.056)	0.049 (0.059)	0.103* (0.050)
December	0.088 (0.057)	0.083 (0.059)	0.065 (0.053)
Wave=4	0.311** (0.097)	0.263** (0.100)	0.272** (0.091)
Wave=5	-0.224 (0.410)	-0.168 (0.419)	-0.204 (0.383)
Wave=6	1.253*** (0.370)	1.033** (0.385)	1.121** (0.345)
Household Income	0.255*** (0.051)	0.210*** (0.052)	0.227*** (0.047)
Natural Father in Household	0.300*** (0.080)	0.284*** (0.081)	0.225** (0.075)
Parents are Married	0.109** (0.035)	0.128*** (0.035)	0.048 (0.032)
Constant	-1.138* (0.550)	-1.100* (0.561)	-0.818 (0.512)
Observations	20131	20131	20131
R^2	0.016	0.033	0.011
Adjusted R^2	0.015	0.032	0.010
FSTAT	88.003	88.003	88.003
Nb of clusters	5983.000	5983.000	5983.000

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Table A6 – *Continued from previous page*

Total SDQ	Behaviour Skills	Emotional Skills

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents’ marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

In Table A7, we provide the main results controlling for $Y_{i,t-1}$ rather than Y_{i0} in the first three columns. The effect of family size is smaller but qualitatively similar than when we control for Y_{i0} . Since the measurement error attenuates the coefficient on $Y_{i,t-1}$, the coefficient of the input is likely to be biased. To handle with this issue, we provide the value added model instrumenting $Y_{i,t-1}$ by $Y_{i,t-2}$. As expected, the persistence effect is larger. The effects are still negative but not statistically significant anymore. The F-stat is much smaller.

Table A7 – Family Size and Non-cognitive skills: 2SLS Results (Value Added Model)

	Controlling for Y(t-1)			Controlling for Y(t-1), instrumented by Y(t-2)		
	Total SDQ	Behaviour Skills	Emotional Skills	Total SDQ	Behaviour Skills	Emotional Skills
Third Child	-0.394+ (0.210)	-0.296 (0.206)	-0.432+ (0.244)	-0.102 (0.170)	-0.017 (0.170)	-0.217 (0.201)
Female	0.058*** (0.011)	0.128*** (0.011)	-0.029* (0.012)	0.003 (0.010)	0.058*** (0.010)	-0.045*** (0.011)
Age	-0.043* (0.019)	-0.025 (0.019)	-0.069** (0.022)	-0.015 (0.018)	-0.005 (0.019)	-0.035 (0.022)
Age of Mother	-0.005 (0.007)	0.004 (0.007)	-0.016* (0.008)	-0.002 (0.006)	0.006 (0.006)	-0.011 (0.007)
Age of Mother at first birth	0.003 (0.004)	-0.003 (0.004)	0.013* (0.005)	0.001 (0.004)	-0.004 (0.004)	0.008+ (0.004)
2nd born	-0.036* (0.016)	-0.087*** (0.015)	0.055** (0.019)	-0.024 (0.015)	-0.029+ (0.015)	-0.009 (0.017)
February	0.016 (0.026)	0.018 (0.025)	-0.001 (0.031)	0.042+ (0.023)	0.028 (0.023)	0.038 (0.028)
March	-0.049+ (0.027)	-0.053* (0.026)	-0.041 (0.030)	0.026 (0.023)	0.018 (0.023)	0.013 (0.027)
April	0.023	0.019	0.017	0.030	0.033	0.015

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Table A7 – *Continued from previous page*

	Controlling for Y(t-1)			Controlling for Y(t-1), instrumented by Y(t-2)		
	Total SDQ	Behaviour Skills	Emotional Skills	Total SDQ	Behaviour Skills	Emotional Skills
	(0.026)	(0.026)	(0.030)	(0.023)	(0.023)	(0.028)
May	-0.004	0.000	-0.015	0.010	0.017	-0.007
	(0.026)	(0.026)	(0.029)	(0.024)	(0.023)	(0.028)
June	-0.026	-0.043+	-0.003	0.018	0.013	0.013
	(0.027)	(0.026)	(0.030)	(0.024)	(0.024)	(0.028)
July	-0.036	-0.043	-0.031	0.004	-0.016	0.018
	(0.027)	(0.026)	(0.031)	(0.024)	(0.024)	(0.028)
August	-0.016	-0.031	0.009	0.033	0.025	0.029
	(0.027)	(0.026)	(0.030)	(0.024)	(0.024)	(0.028)
September	0.077**	0.051+	0.096**	0.063*	0.051+	0.066*
	(0.029)	(0.029)	(0.033)	(0.027)	(0.027)	(0.032)
October	0.086**	0.060*	0.106**	0.050+	0.034	0.068*
	(0.029)	(0.029)	(0.034)	(0.027)	(0.028)	(0.032)
November	0.050+	0.017	0.083*	0.070**	0.043	0.085**
	(0.029)	(0.029)	(0.033)	(0.027)	(0.028)	(0.031)
December	0.044	0.026	0.056+	0.049+	0.036	0.054+
	(0.028)	(0.028)	(0.033)	(0.027)	(0.027)	(0.032)
Wave=4	0.108*	0.056	0.180**			

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Table A7 – *Continued from previous page*

	Controlling for Y(t-1)			Controlling for Y(t-1), instrumented by Y(t-2)		
	Total SDQ	Behaviour Skills	Emotional Skills	Total SDQ	Behaviour Skills	Emotional Skills
	(0.052)	(0.052)	(0.060)			
Wave=5	-0.016 (0.211)	-0.118 (0.209)	0.101 (0.243)	-0.105 (0.170)	-0.176 (0.173)	-0.016 (0.197)
Wave=6	0.424* (0.191)	0.228 (0.192)	0.688** (0.223)	0.100 (0.136)	0.019 (0.142)	0.252 (0.163)
Household Income	0.073** (0.026)	0.066* (0.026)	0.088** (0.029)	0.036 (0.029)	0.042 (0.029)	0.037 (0.033)
Natural Father in Household	0.179*** (0.041)	0.142*** (0.040)	0.182*** (0.047)	0.099** (0.038)	0.062 (0.038)	0.129** (0.044)
Parents are Married	0.031+ (0.019)	0.041* (0.018)	0.018 (0.022)	-0.004 (0.018)	0.002 (0.017)	-0.003 (0.020)
L.Total SDQ	0.630*** (0.008)			0.847*** (0.011)		
L.Behaviour Skills		0.633*** (0.008)			0.850*** (0.011)	
L.Emotional Skills			0.509*** (0.010)			0.773*** (0.016)
Constant	-0.214	-0.344	-0.121	-0.138	-0.342	0.109

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Table A7 – Continued from previous page

	Controlling for Y(t-1)			Controlling for Y(t-1), instrumented by Y(t-2)		
	Total SDQ	Behaviour Skills	Emotional Skills	Total SDQ	Behaviour Skills	Emotional Skills
	(0.283)	(0.280)	(0.323)	(0.327)	(0.331)	(0.381)
Observations	19265	19265	19265	13248	13248	13248
R^2	0.431	0.455	0.272	0.452	0.472	0.271
Adjusted R^2	0.431	0.454	0.271	0.451	0.471	0.270
FSTAT	83.711	84.377	82.676	32.756	33.204	31.736
Nb of clusters	5860.000	5860.000	5860.000	5095.000	5095.000	5095.000

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

A3.2 Effect on the four subscales

Table A8 – Family Size and each subscale of Non-cognitive skills: 2SLS Results

	Behavioural Skills		Emotional Skills	
	Conduct	Hiperactivity	Emotion	Peer
Third Child	-0.077 (0.327)	-0.757* (0.375)	-0.729* (0.371)	-0.266 (0.337)
Female	0.116*** (0.017)	0.235*** (0.020)	-0.102*** (0.019)	0.069*** (0.017)
Age	-0.025 (0.031)	-0.027 (0.035)	-0.093** (0.033)	-0.045 (0.033)
Age of Mother	0.023* (0.011)	-0.008 (0.012)	-0.021+ (0.012)	-0.021+ (0.011)
Age of Mother at first birth	-0.018** (0.007)	0.003 (0.008)	0.011 (0.008)	0.025*** (0.007)
2nd born	-0.118*** (0.025)	-0.146*** (0.028)	0.059* (0.028)	0.125*** (0.027)
February	0.001 (0.042)	0.028 (0.047)	-0.067 (0.049)	0.029 (0.041)
March	-0.097* (0.042)	-0.081+ (0.048)	-0.075 (0.046)	-0.057 (0.043)
April	0.019 (0.042)	0.014 (0.047)	-0.009 (0.047)	0.044 (0.040)
May	0.045 (0.041)	-0.029 (0.049)	-0.041 (0.044)	0.018 (0.041)
June	-0.077+ (0.041)	-0.078+ (0.047)	-0.030 (0.045)	0.014 (0.042)
July	-0.070+ (0.042)	-0.057 (0.047)	-0.080+ (0.046)	-0.016 (0.042)
August	-0.060 (0.042)	-0.056 (0.048)	-0.022 (0.046)	0.014 (0.040)
September	0.061 (0.047)	0.044 (0.055)	0.066 (0.051)	0.126** (0.048)
October	0.080+ (0.046)	0.096+ (0.054)	0.119* (0.050)	0.111* (0.050)
November	0.011	-0.003	0.093+	0.072

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Table A8 – *Continued from previous page*

	Behaviour Skills		Emotional Skills	
	(0.047)	(0.053)	(0.049)	(0.047)
December	0.039	0.011	0.007	0.095*
	(0.046)	(0.052)	(0.050)	(0.048)
Wave=4	0.059	0.123	0.249**	0.112
	(0.080)	(0.088)	(0.088)	(0.085)
Wave=5	-0.438	0.053	0.369	-0.405
	(0.336)	(0.377)	(0.369)	(0.353)
Wave=6	0.246	0.348	0.983**	0.409
	(0.305)	(0.339)	(0.331)	(0.326)
Household Income	0.144***	0.052	0.072	0.164***
	(0.042)	(0.048)	(0.045)	(0.043)
Natural Father in Household	0.171**	0.231**	0.265***	0.165*
	(0.064)	(0.071)	(0.072)	(0.066)
Parents are Married	0.060*	0.096**	0.045	0.016
	(0.028)	(0.031)	(0.032)	(0.029)
Conduct (t0)	0.356***			
	(0.011)			
Hiperactivity (t0)		0.452***		
		(0.013)		
Emotion (t0)			0.290***	
			(0.013)	
Peer (t0)				0.266***
				(0.011)
Constant	-0.976*	-0.131	0.269	-0.925*
	(0.454)	(0.511)	(0.496)	(0.465)
Observations	20131	20131	20131	20131
R^2	0.203	0.186	0.036	0.116
Adjusted R^2	0.202	0.185	0.034	0.115
FSTAT	90.255	88.545	87.978	87.549
Nb of clusters	5983.000	5983.000	5983.000	5983.000

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Table A8 – *Continued from previous page*

	Behaviour Skills	Emotional Skills

Notes: Dependent variables are reported by the primary care giver and have been standardized by age group (mean of 0 and standard deviation of 1). The scale of the dependent variables has been reversed to ease the interpretation. Standard errors in parentheses are clustered at the family level. Third Child is a dummy equal to 1 if a birth of a third child happens between t_0 and t . We control for individual characteristics (sex, age, birth order, month of birth, the age of the mother at birth), family background (income, parents' marital status, and the presence of a father, the age of mother at first birth) and include wave fixed-effects. We also control for the non-cognitive skill in wave 2 to account for the measurement error of the mother. + $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Source: Estimation Sample drawn from the Millennium Cohort Study.

Table A9 – Strengths and Difficulties Questionnaire (SDQ) in the Millennium Cohort Study

Please give your answers on the basis of cohort member's behaviour over the last six months.		Not True	Somewhat True	Certainly True
Restless, overactive, cannot stay still for long	[E-H]	1	2	3
Often complains of headaches, stomach-aches or sickness	[E-H]	1	2	3
Often has temper tantrums or hot tempers	[E-H]	1	2	3
Rather solitary, tends to play alone	[I-P]	1	2	3
Generally obedient, usually does what adults request	[E-C]	1	2	3
Many worries, often seems worried	[I-E]	1	2	3
Constantly fidgeting or squirming	[E-H]	1	2	3
Has at least one good friend	[I-P]	1	2	3
Often fights with other children or bullies them	[E-C]	1	2	3
Often unhappy, down-hearted or tearful	[I-E]	1	2	3
Generally liked by other children	[I-P]	1	2	3
Easily distracted, concentration wanders	[E-H]	1	2	3
Nervous or clingy in new situations, easily loses confidence	[I-E]	1	2	3
Often lies or cheats	[E-C]	1	2	3
Picked on or bullied by other children	[I-P]	1	2	3
Thinks things out before acting	[E-C]	1	2	3
Steals from home, school or elsewhere	[E-C]	1	2	3
Gets on better with adults than with other children	[I-P]	1	2	3
Many fears, easily scared	[I-E]	1	2	3
Sees tasks through to the end, good attention span	[I-E]	1	2	3

Notes: [E] and [I] indicate that the question builds the externalising SDQ (Behaviour Skills), and the internalising SDQ (Emotional Skills), respectively. [E-H] is for hyperactivity problems, [E-C] is for conduct problems, [I-P] is for peer problems, and [I-E] is for emotional problems.

General conclusion

This thesis aims at improving the understanding of family influence in the formation of child's human capital. In particular, it focuses on family structure considering two aspects of family structure: the number of parents who live with the child (Chapters 1 and 2) and the number of siblings (Chapter 3). This conclusion presents a summary of the results of these two parts, discussing the policy implications, as well as the limits; I finish by drawing lines for future research.

New results, for new policies

The first part investigates the effect of being in a single-parent family. Results of the first chapter suggest that those who experience a parental separation have one semester less of schooling than those who do not, they also experience a lower quality education; and have a social position associated with a wage 4% lower than those who do not experience a parental separation. This is true even after accounting for family fixed effect. Several channels might be at stake. First, single-parent families might face some economic difficulties, such as father's default of payments of the alimony. Second, individuals' access to the non-custodial social network might be affected. Third, a psychological effect of the parental separation might also be a relevant mechanism. Fourth, time spent with parents might decrease. The second chapter investigates this specific channel.

Estimating the impact of family structure on child time investments, and time spent with at least one parent. I find that being in a single-mother family decreases time spent with at least one parent present by 30%. The breakdown of accessible and engaged parental time is highly affected. The negative effect of parental separation on child's non cognitive skills is reduced by 30% when time spent with at least one parent is accounted for, suggesting that the decrease in time spent with at least one parent is a driving channel for this outcome.

Policies should aim to increase the time parents spend with their children. Labour market policies going in the sense of a decrease in working hours or more flexible schedules for single parents, such as the development of teleworking might participate to decrease the causal effect of parental separation on non-cognitive skills. On the other hand, those policies might have adverse effects, since it may negatively impact the custodial parent's

future labour market outcomes. Moreover, since single-mothers families are much more common than single-father families, this kind of policies might exacerbate gender discriminations on the labour market. That's why such policies should be accompanied by encouraging the alternating custody. Other policies such as developing transports infrastructures to reduce the time parents spend in transports might also increase time parents spend with their children.

Another new finding is that the estimation of cognitive and non-cognitive skills production functions reveals that not all parental time investments have the same impact on child development, meaning the time spent with the mother does not have the same impact as time spent with father or both parents. Time spent with both parents in active leisure and educational activities are important for child's development, the implication of both parents should be encouraged by policies. The extension of the length of paternity leave might be a tool to increase father's implication.

In the second part, we ask whether the number of siblings affects child's non-cognitive skills. We find that having a new sibling has a significant and negative effect on the formation of both behavioural and emotional skills of the two first children, whatever their birth order. These effects are driven by children who have a new sibling before the age of 5, and are concentrated on girls. This gendered effect comes from an unequal response of parents investments to the birth across genders, and to an unequal demand for household chores. It is known that the birth of a child is likely to increase the gendered division of chores among parents (see Solera and Mencarini (2018) [50]), this might reflect in a higher gendered division of chores among children. Since, children tend to reproduce their parents household chores division (see Alvarez et al. (2012) [53], Solaz and Wolff (2015) [49]), the birth of an additional child exacerbates the gendered inequalities at the parents level and at the child level. Again, one policy recommendation is to increase the involvements of fathers as soon as the child is born. Increasing paternity leave might be the solution to curb the gender inequalities at the parents level and at the child level.

Limits of the analysis

The principal limits of the findings on the effect of parental separation on child's development in the two first chapters, is their causal interpretation, already discussed. Moreover, the third chapter estimates the effect of having a child using an instrumental variable. This effect is local and might not be extrapolated to the rest of the population, especially for the gendered effects, as discussed in Chapter 3. The method however

enables to interpret the relation in a causal way.

Another bunch of limits rely on data improvements. I use measures of non-cognitive skills provided by the primary care giver. If models attempt to deal with this issue, it would be interesting to compare the results using measures of non-cognitive skills provided by teacher or even more objective persons such as psychologists, to relax assumptions on the possible measurement error. Besides, the estimation of child's development production functions require a lot of data, especially on past inputs and past skills. Therefore if we want to study the child's development production functions in early childhood - known to be a crucial period in the determination of the skills, we need data on their skills when they are even younger. Estimation of child's development production function would benefit from longer panels and closer spacing between waves.

What about the next steps?

This section identifies three possible axes for future research that could help improving and extending the work presented in this thesis.

First, future research can be devoted to explore recovery channels of the effect of parental separation. Chapter 2 focuses on parental time investments, but we could extend this work to time spent with grand parents. In a period where the family seem to be mainly nuclear, intergenerational links might be back in the game to overcome the shock of parental separation. Are grand-parents a possible way to shield children from the parental separation? We could look at the effect of a change in family structure on time spent with grand parents, available in the Child-Development Supplement dataset. Alternating custody that developed in the recent generations might also be a key element to contain the negative effect of parental separation. Children would continue to spend time with each of their parents, and this might force parents to enhance their relationship. Nevertheless identifying a causal effect of alternating custody is not an easy task. Using random judge assignment might be a possible instrument.

Second, little attention is paid to time-use data, while this might reveal a form of cultural capital. This thesis explores parental time investments as a driving channel for the effect of parental separation of child development, but a future research question may ask about time-use as a driving channel for other types of inequalities. How much time-use explains the inequalities in human capital across social background, or across gender? This thesis draws attention on the differences of time input production functions

across gender and across parents' education. The typology retained in this work might hide differences in the type of activity. For example, the positive effect of active leisure on non-cognitive skills is mainly driven by boys and by children whose primary care giver is more highly educated. Taking a more detailed typology would help to understand if these differences come from differences in the type of leisure; for example, do individual sports have different effect from collective sports that might be more common among boys? Do playing chess has a different effect than playing soccer? If we find that it does not come from differences in the type of active leisure, then peer effect might be a reliable candidate to explain these differences. Nevertheless if we observe differences in the effect of activities that are socially determined, it would be difficult to distinguish the effect of the type of activity from the effect of peers. Moreover, it would be interesting to extend the analysis of the effect of allocation of time on the long run. Does individual's allocation of time in childhood shape their labour market outcomes? This thesis find effects of child's allocation of time on non-cognitive skills, do they persist into adulthood?

Third, it is worth noting that the observed family structure omits the quality of the relations between family members. This element is likely to be key to understand the influence of family environment. Future research should be devoted to explore the quality of the relations. Studying the effect of alternating custody might partially answer this question. Moreover, the influence of family environment is often seen as a vertical influence from parents to children, future research should explore the relations between siblings and the effect of siblings' interactions.

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Inégalités de Capital Humain : de l'Importance de la Structure Familiale

Résumé: Ces dernières décennies, la famille a connu des changements majeurs dans la majorité des pays de l'OCDE. D'une part, le taux de fertilité a baissé ; d'autre part, le nombre de séparation a fortement augmenté. Cette thèse se propose d'étudier les effets de ces changements de la structure familiale sur le capital humain des individus, en l'envisageant comme une nouvelle source d'inégalités. Dans un cadre micro-économique, cette thèse mobilise les outils économétriques pour les appliquer à de larges bases de données. Les trois chapitres de cette thèse présentent des résultats nouveaux sur l'effet de la séparation parentale et de la taille de la famille sur le capital humain de l'individu. Le premier chapitre porte sur l'effet de la séparation parentale en France sur la réussite professionnelle des individus, et montre un effet négatif de la séparation parentale sur le niveau d'étude et la position sociale de l'individu. En s'appuyant sur des données américaines, le second chapitre s'intéresse aux mécanismes expliquant cet effet, et en particulier, sur les changements du temps passé avec les parents. Ainsi, 30% de l'effet de la séparation parentale sur le développement socio-émotionnel des enfants serait expliqué par la baisse du temps passé avec au moins un parent présent. Le troisième chapitre considère un autre aspect de la structure familiale : la taille de la famille. Nous trouvons que l'arrivée d'un troisième enfant dans la famille diminue les compétences socio-émotionnelles des autres enfants, en particulier chez les filles.

Mots-clés: Education, Compétences Cognitives, Compétences Non-Cognitives, Structure Familiale, Séparation, Taille de la Famille, Allocation du Temps des Enfants, Temps Passé avec les Parents.

Human Capital Inequalities: Family Structure Matters

Abstract: Family has known great transformations in the last decades in a large number of OECD countries. On one hand, fertility rates have decreased. On the other hand, the number of separations has increased sharply. This thesis asks whether these major changes of family structure affect child's human capital, being a new source of inequalities. Using very large datasets and micro-econometric methods, the three chapters present original empirical evidence on whether parental separation and family size impact individual's human capital. The first chapter studies the effect of parental separation in France on individual's achievement, and find a negative effect of parental separation on individual's educational attainment and social position. Using an American dataset, the second chapter asks whether this effect is driven by changes in time spent with parents, and find that 30% of the effect of parental separation on socio-emotional skills is explained by the decrease in time spent with at least one parent present. The third chapter accounts for another aspect of family structure: the number of children. Using a British dataset, we find that having a second sibling in the United Kingdom decreases the child's socio-emotional skills, especially for girls.

Keywords: Education, Cognitive Skills, Non-Cognitive Skills, Family Structure, Marital Dissolution, Family Size, Child Time Investments, Parental Time Investments.