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Carine Meslot

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## THÈSE

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Interuniversitaire de Psychologie (LIP)**  
dans l'**École Doctorale Ingénierie pour la Santé, la Cognition  
et l'Environnement**

## **Étude des Facteurs et des Interventions basées sur le Planning dans les Comportements de Santé : Applications à l'Activité Physique et à l'Adhésion Médicamenteuse**

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## SUMMARY

Individuals do not always enact their intentions into behaviours, which may lead to severe outcomes especially in health-related fields. Self-regulation strategies, like cue-dependent plans interventions, have shown efficiency to help to counter the intention-behaviour gap. Yet, no review has been realised recently to bring a qualitative and quantitative analyses of this effect.

Firstly, we carried out a qualitative review to evaluate the effectiveness of cue-dependent planning intervention to increase health-related behaviours. We included 329 studies with experimental and prospective designs that measured or evaluated the effect of cue-dependent plans (e.g. implementation intention, action planning, coping planning) on health-related behaviours, among general, clinical and student population. The qualitative analysis revealed for instance that implementation intentions were used in majority, even if the *if-then format* was not systematically adopted. However, we noticed confusion between the terminologies of the plans and the theories. A quantitative review will be realised to evaluate the effect size and the moderators that could magnify or diminish the effects of cue-dependent planning interventions on health-related behaviours.

Second, we presented two studies that tested the effectiveness of cue-dependent planning interventions on physical activity, which was the most represented health outcome in cue-dependent planning interventions, according to our review. Motivational (mental simulation) and volitional (implementation intention) interventions were combined to promote physical activity participation. The first study, adopting a cluster randomised controlled trial design among students, did not show any significant effect neither of the mental simulation plus implementation intention intervention, nor of the implementation intention intervention compared to the control condition. The second study adopted a more

rigorous methodology with a full-factorial randomised controlled design, with a larger sample and objective measures of physical activity (attendance to gym centre). Nevertheless, the study revealed no statistically significant main or interactive effects of the mental simulation and implementation intention conditions on physical activity outcomes. Findings were not in line with previous research that showed effects of cue-dependent plans to promote physical activity. This adds to the necessity of identifying the moderators of these interventions in health behaviours.

Thirdly, cue-dependent planning interventions are needed in illness behaviours. In chronic disease, non-adherence to medication is a public health problem that can lead to negative health outcomes. Even if the patients want to take their treatment, they may, for instance, forget it and fail to enact the behaviour. We tested the ability of an intervention adopting implementation intention and coping planning to promote medication adherence. In a randomized controlled trial, outpatients with cardiovascular diseases were randomly allocated to either an implementation intention and coping planning condition, or to a no-planning control condition. Findings revealed no significant effect of the intervention on medication adherence. However, post hoc moderator analyses showed that the beliefs moderated the effect of the intervention, which was effective in patients with lower necessity beliefs compared to those with higher necessity beliefs. The design used in the study did not enable to test the direct or interactive effect on medication adherence, so it would be necessary to replicate these findings with a full factorial design among patients with cardiovascular diseases.

Fourthly, a medication adherence measure to identify the barriers to medication adherence is needed among chronic patients. Therefore, we developed a medication adherence questionnaire based on semi-structured interviews with patients and caregivers and on literature review (194 items). An expert committee gathered to exclude the non-relevant

items (62 items). Then, 116 patients with diabetes mellitus type 2, chronic obstructive pulmonary disease and heart failure filled in the questionnaire. An exploratory factor analysis reduced the scale in a final version with 14 items and 4 dimensions: the general beliefs, the specific beliefs, the management of the treatment, and the relation between the patient and the healthcare system. Showing good psychometric properties so far, the next stage will be to validate the scale among 330 patients against clinical criteria with a confirmatory factorial analysis. Finally, it will be necessary to evaluate the sensibility of the scale with the help of an intervention that will be based on cue-dependent plan. On the long view, this scale may be complementary to cue-dependent planning interventions with the identification of the barriers to medication adherence for each patient, and to propose a tailored intervention, like coping planning to manage the personal barriers to medication adherence.

Up to this point, the studies and the qualitative review showed that it remains important for the interventions to state explicitly the format used, to be clear about the theory and the type of plan used, to adopt full factorial designs when needed, to take into account the intention (by measuring it or manipulating it), and to use manipulation checks, among a sufficient amount of participants. Testing the moderators with the meta-analysis, which is the next step, will enable to know the magnitude of the effect and also to know under which conditions the cue-dependent planning interventions are effective, with the format used, the need of assistance, the presence of boosters, for which follow-up, for which health-related outcome and among which population.



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## PRÉAMBULE

« Cette année, je me remets au sport ! » Pourquoi lorsqu'un individu essaie de tenir ses bonnes résolutions, il éprouve des difficultés à s'y atteler, même avec toutes les bonnes intentions du monde ? Si l'intention seule suffisait à mettre en place un comportement, cela simplifierait grandement la tâche des psychologues et chercheurs dans le domaine de la santé. Ce phénomène que l'on appelle « intention-behaviour gap » en anglais, ou écart entre l'intention et le comportement, est de plus en plus étudié depuis des dizaines d'années mais demeure difficile à expliquer. Il existe, malgré tout, des interventions basées sur le planning (e.g. implémentation d'intention, action planning, coping planning), dont un nombre important a montré une relative efficacité dans la promotion des comportements de santé, que ce soit dans la population générale ou dans la population clinique auprès de patients.

Dans ce manuscrit, nous allons dans un premier temps présenter une revue systématique de la littérature regroupant les études relatives au planning dans les comportements de santé. Dans ces études, le planning était soit manipulé, au cours d'une intervention, soit mesuré, en lien avec un comportement de santé (e.g. activité physique, alimentation, consommation d'alcool, adhésion médicamenteuse).

Dans un deuxième temps, nous allons présenter les résultats de deux études ayant associé l'implémentation d'intention, ciblant cet écart entre l'intention et le comportement, à la simulation mentale, dans le but de renforcer l'intention en amont. Nous verrons que malgré l'adoption d'un design rigoureux, nous pouvons être face à un pattern de résultats différents de ce qui est habituellement observé dans la littérature, ce qui questionne la manière dont on peut opérationnaliser les variables liées au planning dans ce type d'interventions.

Dans un troisième temps, nous nous orienterons vers les comportements du malade, plus spécifiquement l'adhésion médicamenteuse dans les maladies chroniques, auprès de

patients présentant une maladie cardio-vasculaire, avec une intervention combinant l'implémentation d'intention et le coping planning. Nous discuterons les aspects liés à la nécessité de tester les modérateurs, notamment ceux liés à la motivation, lors de la mise en place d'un comportement en santé.

Dans un quatrième temps, l'adhésion médicamenteuse reste un comportement difficile à évaluer, comme nous avons pu le voir dans l'essai randomisé contrôlé auprès de patients ayant une maladie cardio vasculaire. Nous avons donc voulu développer un outil permettant de mesurer les barrières à l'adhésion médicamenteuse dans un but de routine clinique. Après la phase de validation, ce questionnaire pourra être complémentaire à des techniques d'autorégulation telles que le coping planning.

Bien que la revue qualitative de la littérature ait montré un manque de précisions relatives à l'opérationnalisation du planning dans certaines études, les analyses qualitatives prévues à la suite de la revue de la littérature éclaireront davantage sur la manière de construire une intervention optimale et efficace en fonction du type de comportements. Cela aidera ainsi à expliquer cet écart existant entre l'intention et le comportement, en posant les jalons des études futures sur les pistes à explorer dans les interventions basées sur le planning dans les comportements de santé, que ce soit dans la population clinique mais aussi plus largement dans la population générale.

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## INTRODUCTION GENERALE

### Comportements de santé

#### *Définitions*

Le model biopsychosocial (Engel, 1977) explique le comportement par l'intermédiaire de trois grandes dimensions. En effet, le biologique (e.g. prédispositions génétiques), le socioculturel (e.g. environnement familial, influence des pairs) et le psychologique (e.g. croyances, stress, émotions) influencent l'individu dans l'adoption d'un comportement. Etre en bonne santé concerne « un état de complet bien-être physique, mental et social, et ne consiste pas seulement en une absence de maladie ou d'infirmité » (OMS, 1948). Matarazzo (1983) distingue deux types de comportements en faveur de la santé : les comportements immunogènes et les comportements pathogènes. Les comportements immunogènes, de protection, permettent de protéger contre la maladie et la mort (e.g. faire de l'activité physique de manière régulière, aller chercher son traitement à la pharmacie, manger des fruits et légumes). Tandis que les comportements pathogènes, dangereux pour la santé, augmentent le risque d'entraîner la maladie, le handicap, la mort (e.g. ne pas prendre son traitement médicamenteux, ne pas porter de ceinture de sécurité). D'après, Kasl et Cobb (1966), il existe trois types de comportements liés à la santé : les comportements de santé, les comportements liés à la maladie, et les comportements du malade. Les comportements de santé englobent les comportements effectués par un individu s'autoévaluant comme étant en bonne santé et agissant dans un but d'éviter une maladie ou de détecter les symptômes d'une potentielle maladie. Les comportements liés à la maladie sont les comportements entrepris par une personne se considérant comme malade, qui analyse son état de santé et qui va agir pour se soigner. Les comportements du malade font référence aux comportements adoptés par un individu se considérant comme malade également, mais dans un objectif de bien-être.



Cela rejoint la définition de l’OMS estimant qu’une bonne santé ne fait pas seulement référence à l’absence de maladie mais également à l’atteinte d’un bien-être. Or, cet état de santé dépend en partie du comportement effectué par l’individu.

### *Enjeux de santé publique*

La recherche a montré que l’adoption de certains comportements était associée à une bonne santé. Les chercheurs ont observé qu’il était possible de repousser l’espérance de vie moyenne de 11 à 14 ans par l’intermédiaire du suivi d’un régime alimentaire sain, la pratique d’une activité physique régulière, la consommation modérée d’alcool et la non-consommation de tabac (Ford, Zhao, Tsai, & Li, 2011). D’autres études ont montré que les individus en bonne santé avaient tendance à pratiquer une activité physique régulièrement, ne pas fumer, boire de l’alcool en modération, rarement manger entre les repas, prendre un petit déjeuner tous les matins, s’astreindre à un poids normal, et dormir 7 à 8 heures en moyenne par nuit (Belloc, 1973; Belloc & Breslow, 1972; Breslow & Enstrom, 1980; Ford et al., 2011). Une revue systématique a mis en évidence une relation entre l’IMC (Indice de Masse Corporelle) et le risque de mortalité chez les patients ayant une maladie coronarienne (Romero-Corral et al., 2006). Le Comité spécial de la chambre des communes au Royaume-Uni a observé que 6.8% des décès étaient dus à l’obésité en Angleterre. Plus alarmant, l’OMS a estimé qu’il y avait 1.5 milliards d’adultes en surpoids et 400 millions de personnes obèses dans le monde. Dans l’adhésion médicamenteuse, malgré un lien entre l’adhésion au traitement et les pronostics des patients tels que l’augmentation du risque de mortalité (DiMatteo, Giordani, Lepper, & Croghan, 2002; Ho et al., 2008), l’adhésion médicamenteuse a été estimée à seulement 50% dans les maladies chroniques (DiMatteo, 2004).

### **Identification des facteurs prédisant les comportements de santé**

De nombreuses variables permettent d'expliquer le fait qu'un individu va initier voire maintenir un comportement de santé. Certains facteurs reviennent régulièrement dans de nombreux modèles ayant pour objectif d'expliquer les comportements de santé (e.g. l'HAPA que nous aborderons plus loin). Tout d'abord, les croyances et les connaissances à propos de la maladie ont un impact sur l'adoption d'un comportement de santé spécifique. Une catégorie de croyances prédisant en partie la réalisation des comportements de santé est l'auto-efficacité. Bandura (1986) la définit comme étant le fait de croire « en ses propres capacités à faire face à une situation en organisant et exécutant les réponses adaptées ». Il s'agit de la croyance en sa propre capacité à prendre les mesures pour agir en direction d'un comportement particulier, en sachant surmonter les obstacles (Schwarzer, 2008). Certaines études ont pu montrer un rôle de l'auto-efficacité dans l'alimentation (e.g. Pearson, Ball, & Crawford, 2011) ou encore dans l'activité physique (e.g. Lippke, Ziegelmann, & Schwarzer, 2005). La perception du risque constitue aussi un des médiateurs impliqués dans les comportements de santé, faisant notamment partie du modèle HAPA (Schwarzer, 1992, 2008). Un individu peut en effet percevoir un risque élevé ou faible de contracter une maladie par exemple. Lorsque sa perception du risque est faible ou inadaptée par rapport à la situation, on peut parler d'« optimiste irréaliste » (Weinstein, 1983). Une méta-analyse a pu identifier un lien fort entre la perception du risque et le comportement de vaccination par exemple (Brewer et al., 2007). Cependant, la perception du risque peut parfois avoir un effet contre-productif dans le sens où un individu peut le contrecarrer en décidant de prendre un risque (e.g. avoir une alimentation non saine) et d'adopter des comportements compensatoires (e.g. pratiquer beaucoup de sport), avec la croyance sous-jacente que cela va permettre de diminuer voire annuler le risque pris. Le comportement passé fait partie des facteurs expliquant le comportement futur, évalué à 13% d'après Conner et Armitage (1998). Cela se ferait par le biais de deux processus dépendant du degré de nouveauté de ce

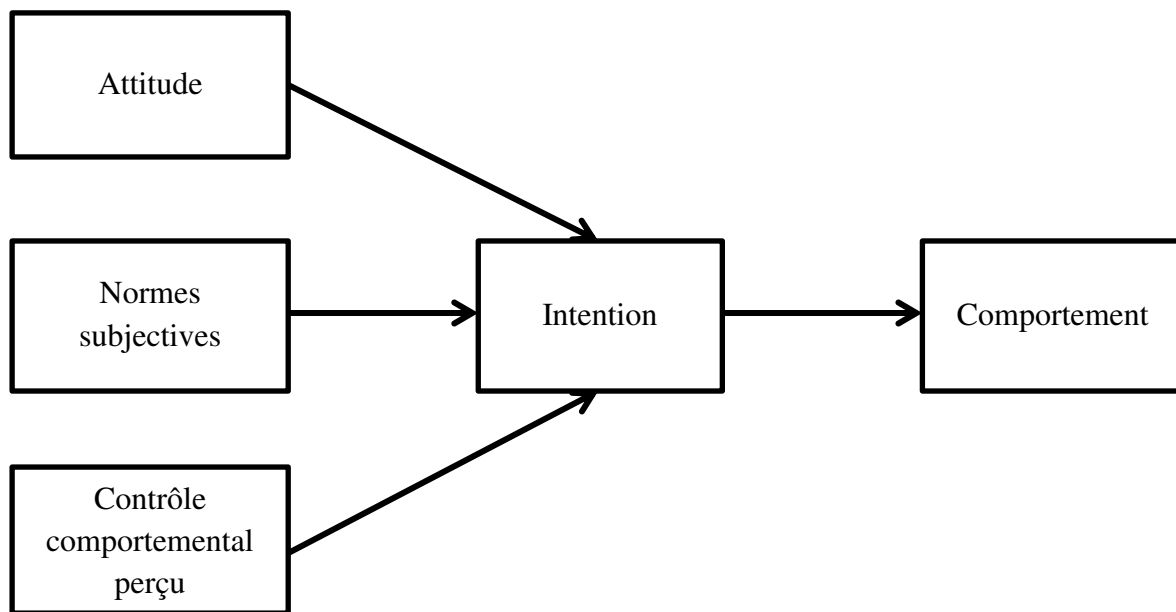
comportement (Ouellette & Wood, 1998). D'abord, les comportements passés recèlent un caractère automatique, liés à l'habitude d'initiation du comportement. Ils sont peu coûteux à mettre en place, requérant moins de ressources cognitives pour être réalisés. Ensuite, les comportements nouveaux ont plus de probabilités d'être adoptés par la suite lorsque les bénéfices de ce comportement sont perçus, en renforçant la motivation à effectuer à nouveau le comportement. Cependant, ce n'est pas parce qu'un comportement présente des bénéfices qu'un individu le réalisera effectivement.

### **Ecart intention-comportement**

Outre le comportement passé, l'intention joue également un rôle dans la mise en place du comportement. L'intention se définit comme un ensemble d'"instructions que les personnes se donnent à elle-même pour se comporter d'une certaine manière" et atteindre un but particulier (Triandis, 1980). D'après Ajzen (1991), l'intention expliquerait 20 à 30% de la variance du comportement. Dans une revue plus récente, Sheeran (2002) l'a évaluée en la précisant à 28% auprès de 422 études. L'intention joue donc relativement pour une grande part dans le comportement. Or, il reste un large pourcentage, majoritaire, qui n'est pas expliqué par l'intention mais qui peut être expliqué par d'autres facteurs. D'après la Théorie du Comportement Planifié d'Ajzen (1991), les variables telles que l'attitude, les normes subjectives et le contrôle comportemental perçu participent à expliquer les comportements. Dans le modèle HAPA (Schwarzer, 1992), Schwarzer ajoute également l'auto-efficacité, l'évaluation de la menace, et les attentes relatives aux conséquences. Les individus ayant des difficultés à traduire leur intention en comportement sont désignés des « abstinentes enclins » (« inclined abstainers » ; Orbell & Sheeran, 1998) ou des « intentionnés manqués » (« unsuccessful internders » ; Rhodes & Bruijn, 2013).

### **La Théorie du Comportement Planifié (TPB)**

La Théorie du Comportement Planifié (Theory of Planned Behaviour, TPB ; Ajzen, 1991) accorde une place centrale à l'intention dans l'initiation d'un comportement. Elle joue le rôle de médiateur entre, d'une part l'attitude, les normes subjectives et le contrôle comportemental perçu, et d'autre part, le comportement en lui-même (voir Figure 1). D'après Ajzen (1991), l'intention est la mesure dans laquelle un individu va investir des efforts et planifier de s'engager dans un comportement donné. C'est un construit motivationnel qui est le plus proche prédicteur du comportement d'un point de vue temporel et explicatif. L'attitude est l'évaluation, par l'individu, de l'utilité d'un comportement et de sa probabilité à mener à des résultats spécifiques. La norme subjective fait référence aux croyances que l'individu a concernant le fait que les personnes importantes de son entourage souhaiteraient ou non qu'ils s'engagent dans un comportement particulier. Le contrôle comportemental perçu englobe les croyances de l'individu en sa capacité personnelle à effectuer le comportement. L'attitude, les normes subjectives et le contrôle comportemental perçu vont avoir une influence sur l'intention, et l'intention va prédire le comportement, dans le sens où plus ces variables seront présentes chez un individu plus il aura tendance à effectuer ce comportement. La Théorie du Comportement Planifié a été appliquée dans de nombreux domaines notamment dans un but d'expliquer les comportements de santé (Hagger & Chatzisarantis, 2009; Hagger, Chatzisarantis, & Biddle, 2002; McEachan, Conner, Taylor, & Lawton, 2011).

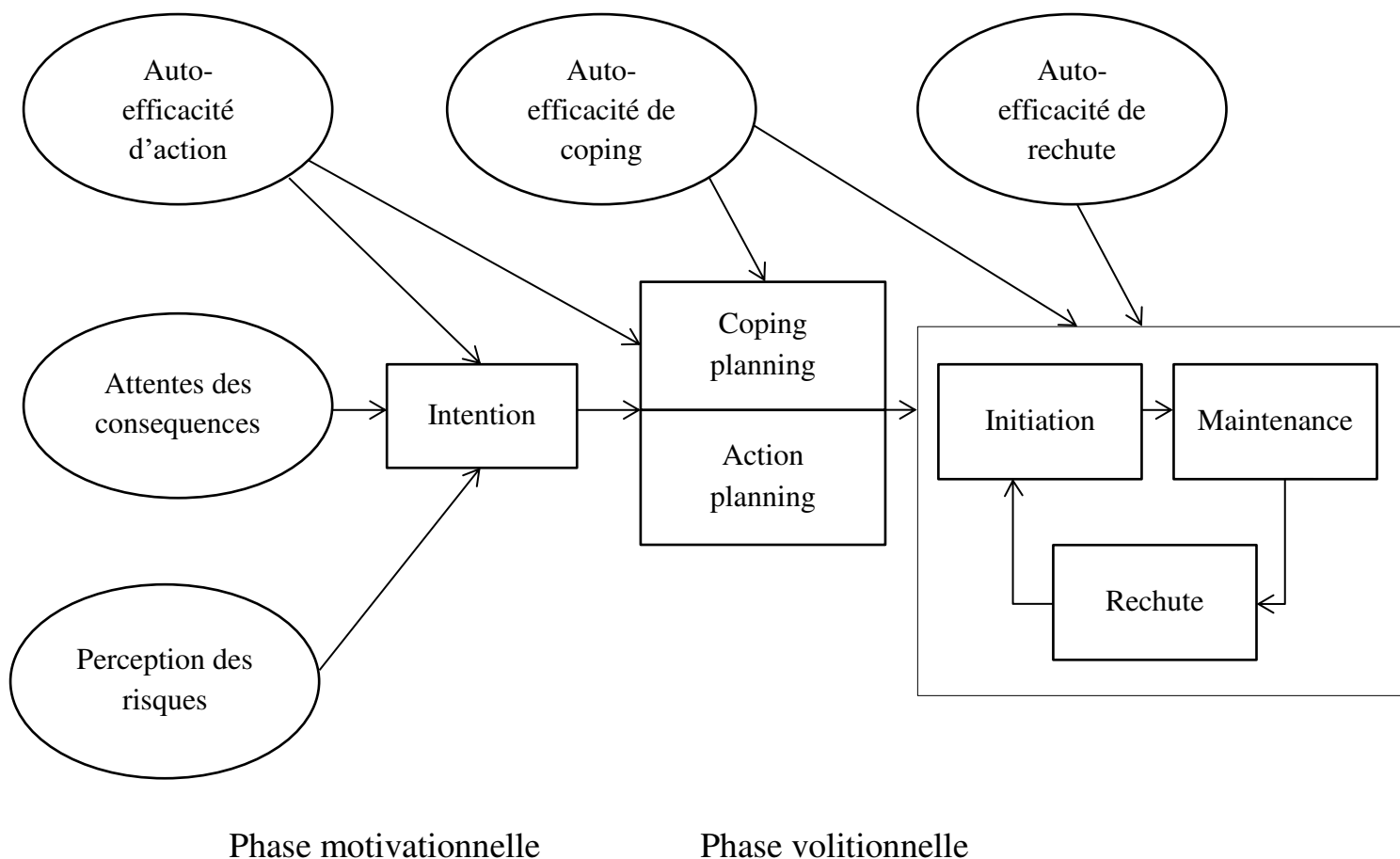


**FIGURE 1.** Théorie du Comportement Planifié (TPB, Ajzen, 1991).

### **L'Approche des Processus de l'Action en Santé (HAPA)**

Le modèle HAPA (Schwarzer, 1992, 2008), soit l'approche des processus de l'action en faveur de la santé, permet d'expliquer et prédire les changements de comportement de santé, dans une logique de processus temporels (voir Figure 2). L'objectif de ce modèle est de comprendre l'écart entre l'intention d'initier un comportement et sa mise en place effective. D'après le modèle, le planning peut aider à surmonter cette étape et renforcer ce lien intention-comportement. Deux grandes phases se succèdent avant l'initiation du comportement. D'abord, la phase motivationnelle décrit la formation de l'intention, au cours de laquelle l'attente des conséquences, l'auto-efficacité et la perception du risque interviennent. La phase motivationnelle peut par exemple se manifester par une décision de prendre son traitement, de la part du patient. Ensuite, la phase volitionnelle, qui, littéralement, permet de concrétiser l'acte de la volonté, décrit le planning et l'action mise en place. Cela

pourra se traduire par la mise en place de plans d'actions pour ne pas oublier son traitement par exemple. L'HAPA postule que l'auto-efficacité perçue joue un rôle à chaque étape du processus. L'auto-efficacité perçue liée à l'action aide à initier l'intention durant la phase motivationnelle mais participe également à expliquer l'auto-efficacité perçue liée à la maintenance de l'action, jouant un rôle dans le planning, au cours de la phase volitionnelle. Enfin au cours de la mise en place du comportement, l'auto-efficacité perçue va aider à initier l'action *per se*, au cours de la phase volitionnelle. L'action planning et le coping planning vont donc s'effectuer au cours de cette même phase volitionnelle, précédant la mise en place du comportement. L'action planning consiste en un plan d'action, pour effectuer un comportement, pour lequel l'individu s'engage à réaliser, spécifiant quand, où et comment il va mettre en place l'action. Il permet principalement d'initier le comportement. Le coping planning peut aussi se définir comme un plan d'action, mais ayant un rôle différent de l'action planning : il aide à la mise en place de stratégies pour surmonter les potentielles barrières liées à la réalisation du comportement visé, et à anticiper les solutions. Le coping planning a une action à plus long terme que l'action planning (Sniehotta, Schwarzer, Scholz, & Schüz, 2005).

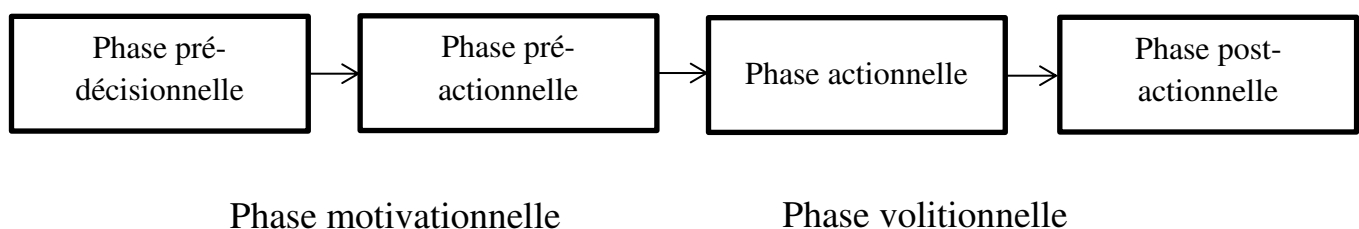


**FIGURE 2.** Approche des Processus de l'Action liés à la Santé (HAPA, Schwarzer, 1992).

### **Le Modèle des Phases de l'Action (MAP)**

Le Modèle des Phases de l'Action (Heckhausen & Gollwitzer, 1987) est un modèle expliquant les différentes phases, les facteurs et les contextes menant à l'initiation d'un comportement (voir Figure 3). Bien que ce soit un modèle issu, à la base, des théories de la cognition sociale non appliqué à la santé, de nombreuses études l'ont emprunté dans un but de promotion de comportements de santé que ce soit dans l'activité physique (Bélanger-Gravel, Godin, & Amireault, 2013), l'alimentation (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011) ou les comportements de santé en général (Gollwitzer & Sheeran, 2006). Ce modèle comporte quatre phases principales autour de la mise en place de l'action. La phase

*pré-décisionnelle* est la première phase de l'action, durant laquelle le patient évalue les coûts et les bénéfices avant de prendre la décision d'agir. Ensuite la phase *pré-actionnelle* permet au patient d'élaborer ses stratégies liées à l'action. C'est à ce moment qu'intervient l'implémentation d'intention puisque l'individu se demande où, quand et comment il va agir, que ce soit volontaire ou non. Succède ensuite la phase *actionnelle*, où la personne initie et met en place son action, en direction du but cherché. Enfin, la dernière phase est la phase *post-actionnelle* lors de laquelle, une fois l'action achevée, l'individu peut évaluer son action a posteriori, en comparant son désir de départ (lors de la phase pré-décisionnelle) à l'action réalisée (lors de la phase actionnelle). L'implémentation d'intention permet de faciliter le passage à l'action en activant les indices présents dans l'environnement, les conditions, le lieu et le temps de l'action. Sur le plan cognitif, l'implémentation d'intention permet de rendre plus accessible la situation et de la détecter rapidement dès qu'elle se présente dans l'environnement (Aarts, Dijksterhuis, & Midden, 1999; Webb & Sheeran, 2004, étude 1). Un fort lien cognitif est en effet établi entre la situation et la réponse dirigée vers le but, initiant automatiquement l'action. Dans leur méta-analyse, Gollwitzer et Sheeran (2006) ont également montré une dimension automatique et une plus forte accessibilité des signaux liés aux plans lors de la formation d'implémentation d'intention. D'autres points communs coexistent dans l'HAPA et le MAP. Tout comme l'HAPA, le MAP comporte également une phase motivationnelle et une phase volitionnelle.



**FIGURE 3.** Modèle des Phases de l'Action (MAP, Heckhausen et Gollwitzer, 1987).



## **Implémentation d'intention, action planning et coping planning**

Certaines interventions basées sur le planning ont également montré une efficacité à combler l'écart entre l'intention et le comportement. L'implémentation d'intention basée sur le Modèle des Phases de l'Action (Heckhausen & Gollwitzer, 1987) peut apporter une aide pour initier un comportement, en complément de l'intention (Gollwitzer & Sheeran, 2006). Il s'agit donc d'un acte mental reliant une situation critique identifiée et une réponse effective dirigée vers le but à atteindre (Gollwitzer, 1993). Concrètement, si le but est de pratiquer une activité physique de manière régulière, un individu peut formuler ce type d'implémentation d'intention : « Si je rentre chez moi à 18h après le boulot, alors je prends mes baskets et je vais courir. » La différence entre l'intention du but et l'implémentation d'intention est que l'intention seule concerne une performance, un but, un résultat désiré alors que l'implémentation d'intention précise le contexte dans lequel l'individu souhaite mettre en place l'action.

L'action planning et le coping planning sont également des stratégies d'autorégulation, proches de l'implémentation d'intention, aidant à mettre en place un comportement. Outre le fait que l'implémentation d'intention est issu d'une théorie de la cognition sociale et que l'action et le coping planning sont issus d'une théorie adaptée à la santé, ces stratégies diffèrent dans leur opérationnalisation. Une récente méta-analyse de Bélanger-Gravel et al. (2013) a montré que le coping planning utilisé en complément de l'action planning était plus efficace que lorsqu'il était utilisé en remplacement de l'action planning pour promouvoir l'activité physique.

## **Efficacité des interventions basées sur le planning en santé**

Des revues de la littérature ont déjà été effectuées afin d'évaluer l'efficacité des interventions basées sur le planning dans les comportements de santé. Une première revue

quantitative a été réalisée par Gollwitzer et Sheeran (2006), regroupant 94 études présentant une mesure de l'effet de l'implémentation d'intention, manipulé ou non, dans tout type de comportement. Cet effet s'est révélé être d'une amplitude moyenne à grande. Des sous-analyses se focalisant sur les comportements de santé ont évalué un effet moyen à grand, légèrement plus faible, de l'implémentation d'intention, auprès de 23 études. Plus récemment, une méta-analyse de Bélanger-Gravel, Godin, & Amireault (2013) a montré une taille d'effet petite à moyenne des interventions basées sur l'implémentation d'intention ou l'action planning dans l'activité physique, que ce soit immédiatement après l'intervention ou plusieurs semaines après, quelque soit la manière dont avait été opérationnalisé le plan. Cependant, la durée du suivi et la présence de « boosters » (i.e. répétition de la formation des plans) ne présentaient pas d'évidence d'un impact significatif de la capacité des interventions à promouvoir l'activité physique. Quant à l'alimentation, Adriaanse et al. (2011) se sont basés sur 9 études pour montrer un effet de taille moyenne de l'implémentation d'intention et de l'action planning pour promouvoir un régime d'alimentation sain (e.g. consommer des fruits et légumes). Tandis que ce type d'intervention présentait une taille d'effet petite à moyenne pour diminuer les comportements non sains liés à l'alimentation (e.g. consommer des aliments ayant un indice calorique élevé).

Ainsi, de nombreuses interventions basées sur le planning ont utilisé la TPB, l'HAPA et/ou le MAP dans une logique de modèles complémentaires, dans le cadre des comportements de santé. L'implémentation d'intention, l'action planning et le coping planning ont montré une efficacité pour aider à combler l'écart entre l'intention et le comportement. Malgré tout, ces stratégies d'autorégulation ne permettent pas d'initier et de maintenir le comportement dans toutes les situations. Quels sont les facteurs qui vont permettre aux interventions basées sur le planning d'aider à mettre en place un

comportement ? Pourquoi certains individus réussissent à pratiquer une activité physique régulièrement ou manger plus sainement après avoir formulé des implémentations d'intention alors que d'autres n'y arriveront pas ? Comment développer une intervention qui sera efficace et pour quel type de comportements de santé ?

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# **PARTIE I : A Systematic Review and Meta-Analysis of the Effect of Cue-Dependent Plans on Health-Related Behaviours**

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## ABSTRACT

**Introduction:** A considerable amount of studies have shown an efficacy to counter the intention-behaviour gap on health behaviour. More and more studies about cue-dependent planning interventions have been published following Gollwitzer and Sheeran's meta-analysis (2006). The objective of this review and meta-analysis is to update the testing of the effectiveness of cue-dependent plans in health-related behaviours. First we wanted to evaluate the effectiveness of cue-dependent planning intervention to increase health-related behaviours. Second, we identified the mediators and moderators that could magnify or diminish the effects of cue-dependent planning interventions on behaviour. **Method:** We included experimental and prospective design that measure or evaluate the effect of cue-dependent plans (e.g. implementation intention, action planning, coping planning) on health-related behaviours among general, clinical and student population. **Results:** 329 studies were included in the systematic review with 238 studies where the cue-dependent plans were manipulated and 114 correlational studies. The qualitative analysis showed that the implementation intention was more used than the action planning or the coping planning. Besides, the "if-then format" was not systematically adopted alongside implementation intention. **Discussion:** The next stage will be to quantitatively evaluate the effectiveness of cue-dependent-plans on health behaviours and carry on analyses in function of the different variables that could moderate these effects. Theses analyses will give a clue about the optimal way to operationalise the cue-dependent plans to promote health behaviours in particular contexts.

**Keywords:** planning, implementation intention, action planning, coping planning, health behaviours, systematic review, meta-analysis, cue-dependent plans

## INTRODUCTION

Developing interventions that increase the capacity of individuals to effectively translate their intentions into actual behaviours are needed. Self-regulation strategies may help to counter the intention-behaviour gap and promote health behaviour change. Specifically, planning strategies have shown an efficacy to promote the enactment of the behaviour (Gollwitzer, 1993; Gollwitzer & Sheeran, 2006), but no recent qualitative or quantitative analyses have reviewed the efficacy of cue-dependent plan interventions to promote health behaviours.

### **Health and behaviour**

According to Engel (1977), the biopsychosocial model implies an integration of the psychological, environmental and biomedical dimensions. Individuals' behaviours play a considerable role in their health even if it remains difficult to evaluate. Nevertheless, research has shown a strong link between being healthy and adoption of health-oriented behaviours. For instance, researchers observed that individuals in good health tend to adopt more frequently seven major behaviours, namely doing regular physical activity, rarely drinking alcohol, not smoking, having an average sleep of 7 or 8 hours, rarely eating between meals, keeping a normal weight and taking a breakfast everyday (Belloc, 1973; Belloc & Breslow, 1972; Breslow & Enstrom, 1980). Similarly, having an healthy diet, following an adequate physical activity, consuming alcohol moderately and not smoking have been associated with 11 to 14 years delay in all-cause mortality (Ford, Zhao, Tsai, & Li, 2011; Khaw et al., 2008). Numerous theories got on with understanding the variables that predict health behaviours. The Health Beliefs Model (HBM ; Rosenstock, 1974), the Protection Motivation theory (PMT ; Rogers, 1975), the Theory of Planned Behaviour (TPB ; Ajzen, 1991) and the Health



Action Process Approach (HAPA ; Schwarzer, 1992) theorised the underlying mechanisms of health behaviour, giving a prevailing role to beliefs, attitude and especially intention.

### **The Theory of Planned Behaviour**

The Theory of Planned Behaviour (TPB; Ajzen, 1991) is a leading theory of intentional behaviour. This theory postulates that intention, attitude, subjective norms and perceived behavioural control are an integral part of the factors that influence the individual's behaviour. Intention is a mediating factor in the process by which the three belief-based components, namely attitudes, subjective norms, and perceived behavioural control, impact behaviour. It is a motivational construct reflecting the extent to which an individual will invest effort and plan to engage in a given behaviour and it is the most proximal predictor of behaviour. Attitude reflects an individual's evaluation of the utility of the behaviour and whether it will lead to certain outcomes. Subjective norms reflect the individual's beliefs that most people that are important to him or her want him or her to engage in the target behaviour. Perceived behavioural control reflects the individual's beliefs in their ability and personal capacity to enact the behaviour. According to the TPB, the stronger an individual's attitude, subjective norms, and perceived behavioural control are, the stronger their intentions will be, and the more likely the behaviour will be enacted. The TPB has been applied to understand the factors underlying behaviour in different health-related contexts (Hagger & Chatzisarantis, 2009; Hagger, Chatzisarantis, & Biddle, 2002; McEachan, Conner, Taylor, & Lawton, 2011).

### **Health Action Process Approach**

The Health Action Process Approach (HAPA, Schwarzer, 1992) got down integrating the intention and the behaviour, explaining and predicting behaviour change with a temporal

dimension. It enables to understand the link between intention and health-oriented action that may be strengthening by planning. The motivation phase describes the formation of intention towards the goal depending on the outcome expectancies, self-efficacy and risk perception. The volitional phase describes the planning and action enactment. Self-efficacy plays a role in each phase with the auto-efficacy action initiating behaviour, during the motivational phase. Maintenance auto-efficacy enables to initiate action and coping planning and recovery self-efficacy helping to initiate the action itself, during the volitional phase. Action planning is a plan that individuals commit to themselves, specifying when, where, and how they will enact the behaviour. Action planning helps to initiate the behaviour. Coping planning is also a plan but it helps to initiate the behaviour and to maintain it as well, by anticipating the management of potential barriers to the behaviour.

### **The intention-behaviour gap**

According to Triandis (Triandis, 1980), behavioural intentions are defined as “instructions that people give to themselves to behave in certain ways”. Some motivation-based theories, like the Model of Action Phases (Heckhausen & Gollwitzer, 1987) or the HAPA (Schwarzer, 1992), identified intention as a key predictor of behaviour. Yet, in a meta-analysis of meta-analysis (2002), Sheeran evaluated this intention-behaviour gap at 28%, which means that intention measures explained 28% of the variance of the behaviour which is close to what quantified Ajzen (1991) with 20% to 30%. Even if some individuals have strong intentions to engage in health behaviour, they have difficulty in enacting their intentions into actual behaviour. These individuals are called “inclined abstainers” (Orbell & Sheeran, 1998) or “unsuccessful intenders” (Rhodes & Bruijn, 2013).

Some strategies based on self-regulation have shown to be effective in countering the gap between intention and behaviour. Specifically, implementation intention is a mental act

linking an anticipated critical situation and an effective goal-directed response (Gollwitzer, 1993). Gollwitzer first distinguished goal intention and implementation intention. Goal intention « specified a certain end point that may be either a desired performance or an outcome » (Gollwitzer, 1999). An individual may have the intention to enact “x”, x being either the behaviour or the final outcome. Although, implementation intention specified the context of the behaviour or the outcome “x” (e.g. « I intent to enact “x” when I will encounter the situation y »).

## **Cue-Dependent Plans**

### *Implementation intention*

Implementation intention may be a good strategy to help converting intention into action by specifying where, when and how to enact the behaviour (Gollwitzer, 1993). As mentioned before, it is conceptualised as a mental link between the critical situation and an efficient response directed to the goal. It enables to “connect a certain goal-directed behaviour with an anticipated situation context” (Gollwitzer, 1993) once it is encountered in the environment. Implementation intention enables to define a specific action plan towards a goal and to initiate it, contrary to the goal intention alone.

In the Model of Action Phases (Heckhausen & Gollwitzer, 1987), the first phase is the *predecisional phase* where the individual makes choices about the goal to reach. It enables to strengthen the goal intention, where the individual compares the pros and the cons in function of different factors as the feasibility and the desirability (Faude-Koistivo, Wuerz, & Gollwitzer, 2009). The second phase is the *preactional phase*, including the implementation intention. The individual wonders where, when and how one will act. The third phase is the *actional phase*, where the individual initiates and enacts the behaviour, towards the directed

goal. And finally, the fourth and last phase is the *postactional phase* or *postactional evaluation phase* which enables to evaluate and summarize one's action by comparing one's first desires (during the *predecisional phase*) to the actual behaviour. According to Gollwitzer (1999), the specific cues of the plan in the implementation intention (e.g. the place or the moment) will be more salient. Therefore, once the individual meets these cues at the moment when the situation is taking place (e.g. "it is Monday, it is 8 o'clock, I have just arrived at the office"), the specific plan will go back in memory (e.g. "I have to read my articles"), alongside the cues linked with when, where and how to act, that will be cognitively connected to the outcome behaviour. Implementation intention enables to increase the accessibility of the situation on the cognitive dimension as the cue is detected rapidly once it is encountered in the environment (Aarts, Dijksterhuis, & Midden, 1999; Webb & Sheeran, 2004, Experiment 1). A strong link is established between the cue and the goal-oriented response, initiating the behaviour automatically once the cue is perceived in the environment.

### *Action planning*

Action planning is derived from the HAPA (Schwarzer, 1992, 2008). Like implementation intention, it is a plan that people commit to themselves and that is generally written. Contrary to implementation intention, action planning usually follows a global or open-ended format plans where individuals specify where, when and how to act. There is some variability in the operationalisation of the action planning, as in some cases, individuals are also prompted to specify with whom they will act for instance (Darker, French, Eves, & Sniehotta, 2010). In accordance to the theory, action planning does not usually follow an 'if-then' format. For instance, some authors (Sniehotta, Scholz, et al., 2005) used it to promote physical activity in a rehabilitation centre where the patients were prompted to think about when, where and how they could be physically active and write their plans as specifically as possible.

### *Coping planning*

Coping planning is another behaviour change technique developed to overcome barriers to anticipate situations that may prevent individuals from engaging in the desired behaviour (Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Forming a coping planning may help individuals to find new ways to manage health behaviour by heightening situational and response cues for the new, desired behaviour and assist in replacing cues to the habitual, unintended behaviour. Coping planning has been shown to promote better participation in health-related behaviour (Kwasnicka, Pesseau, White, & Sniehotta, 2013).

### *Action planning, implementation intention and coping planning in the literature*

There is heterogeneity in the terminology used in the cue-dependent planning interventions. Sometimes action planning, coping planning and implementation intention are used in turns within the same study or in reference to both models. These three self-regulation strategies are closely-related forms of planning, although action planning and coping planning are derived from HAPA (Schwarzer, 1992) and implementation intention is derived from the MAP (Heckhausen & Gollwitzer, 1987). According to Gollwitzer (2014), implementation intentions follow the if-then format where the critical situation is preceded by “if” and the intended behaviour preceded by “then”. Yet coping planning may follow an if-then format as well, even if the two main differences are that coping planning is derived from the HAPA and displays long-term practical implications. Action planning tends to follow a global or open-ended format plans without an if-then format (Chapman, Armitage, & Norman, 2009) and individuals are prompted to state “what, when, and where” they will enact the behaviour. We reckon that the operationalisation of plans moderates the effectiveness of cue-dependent planning intervention but no research has tested it yet so far.

## **Moderators in Planning Interventions**

Many moderators to cue-dependent plans have been identified through the literature (Hagger & Luszczynska, 2014; Hagger et al., 2016) but they have not been tested in a review gathering all health-related behaviours after 2006 (Gollwitzer & Sheeran, 2006). Beliefs can be a variable that moderate the effect of cue-dependent planning interventions. Brown, Sheeran, and Reuber (2009) described that medication adherence increased more among individuals with low concerns who formed implementation intentions. Additionally, self-efficacy can help promote health behaviour alongside cue-dependent planning intervention, which has been shown in fruit and vegetable consumption (Kellar & Abraham, 2005). Thus, identifying the moderators of cue-dependent planning interventions will enable to know the conditions under which health behaviours can be promoted therefore helping to tailor the type of interventions to administer for each behaviour.

*Intention: not necessary and not sufficient to enact the behaviour?*

Consistent with the motivational phase of Heckhausen and Gollwitzer's model (Heckhausen & Gollwitzer, 1987), individuals are more likely to enact their behaviour when they intended to do so. Goal intention may be not sufficient to enact the behaviour, but implementation intention may help to counter this gap. In accordance with MAP, motivation alongside planning formation can help to promote a behaviour (Chatzisarantis, Hagger, & Wang, 2010; Koestner et al., 2006; Koestner, Lekes, Powers, & Chicoine, 2002; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008; Sheeran, Webb, & Gollwitzer, 2005). Yet, other studies nuanced the consensus about the importance of high intention to enable cue-dependent planning intervention to be effective. For instance, Brandstätter, Lengfelder and Gollwitzer (2001; Study 2) showed that implementation intention intervention was also helpful among people with fluctuant action control (i.e. with a diagnostic of schizophrenia). More generally, implementation intention has been shown to initiate the behaviour

automatically, after its formation, without any conscious processes (Brandstätter et al., 2001; Sheeran et al., 2005, Study 2; Webb & Sheeran, 2004).

### **Need for an evaluation of the effect of cue-dependent plans on health-related behaviours**

Some meta-analyses have already tested the effectiveness of implementation intentions and/or action planning and/or coping planning in promoting different health-related behaviours.

#### *Physical activity*

Belanger-Gravel, Godin, & Amireault (2013) evaluated the effectiveness of implementation intentions and action planning interventions to promote physical activity and exercise among adults, which was small-to-medium ( $d = .31$  at post-intervention and  $d = .24$  at follow-up). About the research strategy criteria, they selected articles from 1990 to 2009 and included the RCTs and the quasi-experimental designs with longitudinal data. In addition, they only compared the groups with equivalent duration and intervention components. Meta-regression analyses showed that neither the operationalisation of the plans, neither the follow-up duration did influence significantly the effect of the interventions, nor the assistance for the plans formations. The management of barriers was more efficient when it was added to the action planning formation than when it was used in replacement of the action planning. However, results were less consensual and did not reveal a real effect for the formation of plans boosters. Yet, they found that the planning interventions were more efficient to increase physical activity among student and clinical samples, contrary to general population.

#### *Dietetic behaviours*

Adriaanse et al.'s meta-analysis (2011) estimated a medium effect size of the implementation intention and action planning for promoting a healthy diet ( $d = .51$ ) and a small-to-medium effect size for diminishing unhealthy food habits ( $d = .29$ ). They chose to compare the strictest control group with the planning group, taking into account the latest available post-measure for the experimental studies, and to measure the correlation between planning and eating-related behaviour, for the cross-sectional studies. Nine studies were included in total. When conducting a meta-regression, they did not find any significant effect of the quality of the outcome measures and control conditions moderators.

### *General behaviours*

The meta-analysis about implementation intentions that gathered the most studies so far was carried out by Gollwitzer and Sheeran's (2006) with 94 studies in total. Although the review was not restricted to health behaviours, they conducted a sub-analysis on health behaviours as well with 19 studies, displaying a medium effect size ( $d = .59$ ). Yet, they conducted meta-regression to see the impact of different moderators on behaviours in general. Results showed that implementation intentions interventions were more efficient among people that had self-regulation difficulties. No significant difference were found neither when comparing objective vs. subjective (e.g. self-reports) measures nor between correlational vs. experimental studies. They also found evidence of the automaticity of goal-directed responses alongside a stronger accessibility of the cues for the individuals that formed the plans.

### **Contribution of our systematic review and meta-analysis**

The first objective of this review is to update the testing of the effectiveness of cue-dependent plans in health-related behaviours. The last published meta-analysis referencing the studies in all health-related behaviours was Gollwitzer and Sheeran's (2006). Numerous



studies have been published in the meantime. Based on a frequentist analysis of the effect we tested and on the law of large numbers: “the epistemological value of probability theory is based on the fact that chance phenomena, considered collectively and on a grand scale, create a non-random regularity” (Gnedenko, Kolmogorov, Gnedenko, & Kolmogorov, 1954). Thus, we worked on the assumption that the more we include studies in the meta-analysis the closer we will approach to the real effect size of cue-dependent plans in health-related behaviours.

### **Review questions**

Given the numerous studies testing cue-dependent plans in promoting health-related behaviours, the aim of the present study was to examine the effectiveness of cue-dependent planning interventions on health-related behaviours. Firstly, we conducted a systematic review of the literature to gather the studies examining the effect of cue-dependent planning intervention to increase health-related behaviours. Secondly, we analysed the mediators and moderators of the effects of cue-dependent planning interventions on behaviour. Indeed, we examined which factors explain the effects of cue-dependent planning interventions on outcomes and which contexts or factors magnify or diminish the cue-dependent planning interventions on health behaviours.

## **METHOD**

The protocol of this systematic review and meta-analysis was registered on Prospero (see ANNEXE I).

### **Inclusion and exclusion criteria**

*Types of study*

We included experimental or intervention studies (e.g., randomized controlled trials), quasi-experimental, and longitudinal, prospective and cross-sectional correlational studies. We also included studies which displayed quantitative data from which the effect of the implementation intention, action planning intervention and manipulation on health behaviours could be extracted (consistent with the definition provided below).

#### *Conditions and domains*

We included studies for which the outcome measures were relevant to health behaviour (e.g., alcohol consumption, tobacco use, physical activity, diet, medication adherence, etc.). It could be assessed via self-reports (e.g., questionnaires), objective behavioural measures (e.g., accelerometers or attendance), or physiological measures (e.g., carbon monoxide breath test).

#### *Participants/ population*

Studies involving participants of all ages (i.e., adults, elderly and children) were included and studies involving participants with mental health problems, dementia, frontal lobe damage were excluded.

#### *Intervention(s), exposure(s)*

We included studies in which participants explicitly stated, or were prompted to state, a cue-dependent plan (i.e., forming a plan explicitly linking a specific cue with future participation in a specific health behaviour) including, but not limited to, an implementation intention, namely, stating a plan that “furnishes the goal intention with an if-then plan specifying when, where, and how the person will instigate responses that promote goal realization” (Gollwitzer & Sheeran, 2006, p. 70), that “commit[s] the person to executing an

intended goal-directed behaviour once the specified situational context is encountered” (Gollwitzer, 1993, p. 152) or an action plan, that is, to state a plan including “specific situation parameters (‘when’, ‘where’) and a sequence of action (‘how’)” (Schwarzer, 2008, p. 9).

#### *Comparator(s) and control*

Interventions based on cue-dependent plans were compared to standard or active control or comparison groups in which the cue-dependent planning intervention was absent. If there were several control groups in the study, the control group which was most similar to the intervention condition (minus the cue-dependent planning intervention) was chosen.

#### *Context*

To be included, the health behaviour had to be directly related to the planner’s own health behaviour, i.e. the planner would need to refer to modifying their own behaviour in their plan rather than that of others. The measure of behaviour had also to directly correspond to the planner’s behaviour. For example, studies with adult participants who form plans, but in which the target behavioural assessment is that of their children, were excluded.

#### *Systematic review*

We carried a systematic review of the literature on the PsycINFO, PubMed, Web of Science and Scopus databases (see ANNEXE II). Our research keywords were "action plan\*" OR “coping plan\*” OR “implementation intention\*” adapted to each database. We restricted our research to studies in English and French, conducted on humans. Endnote was used to classify the references of the systematic review. After the full-text screening stage, a manual search was carried in completion of the systematic review, by screening the references of the

included articles and the meta-analyses relative to cue-dependent plans. Two French-native speakers (CM and AG) screened the references in French.

The missing data were managed by sending mails to the authors of the articles for which the following information was missing: the age, gender and type of sample, the mean, SD and sample size for each group and each time cells, the correlation matrix between the plan, the moderators (self-efficacy, intention, attitude, subjective norms and perceived behavioural control) and the main outcome, attrition and randomization checks information; and the number of plans formed, the statements of the formation of the plan, its format, the mode of presentation (paper vs. computer), if it was assisted or not, for the experimental studies. We sent mails to the main authors on the field of cue-dependent plans to require for unpublished studies.

### **Outcome(s)**

We extracted the data used to compute the effect size for studies that manipulated the cue-dependent plan (e.g., means and standard deviation of the main outcome measure for each group, F, t or Chi-square and the probability value (p)), and the zero-order Pearson correlation coefficient between the planning measure and the outcome measures (if applicable) such as measures of planning.

### *Primary outcomes*

The primary outcomes were measures of the health-related behaviour (e.g., alcohol consumption, tobacco use, physical activity, diet, medication adherence) referred to by the planner in their cue-dependent plan. Validation and other quality characteristics of outcome measures were noted. If the study reported multiple measures of the primary dependent variable (e.g., across two or more time points), the second and the final data point were

extracted. The health behaviour measure had to be related to the behaviour specified by the planner in their cue-dependent plan (e.g., a self-reported measure of physical activity as an outcome measure would correspond with the formation of a cue-dependent plan of when, where and/or how to participate in physical activity).

### *Secondary outcomes*

The secondary outcomes were potential mediators of the effects including theory-related variables such as attitudes, subjective norms, perceived behavioural control, intention, self-regulation, self-efficacy and planning.

## **Data extraction**

### *Coding procedure*

The principal investigator (CM) screened all studies and extracted the data (see ANNEXE III). Three other researchers will independently coded 10% of the randomly selected studies and the extracted data. The first researcher (AG) coded 10% of the title and abstract screening (selection of the articles on the base of the title and abstract reading). The second researcher (DK) coded 10% of the full-text screening (selection of the articles on the base of the full-text reading). And the third researcher (MSH) will code 10% of the data extraction. The outcome of the double coding was/will be compared across coders. If there were discrepancies between the two researchers that cannot be solved via arbitration, then a third researcher will help to reach consensus.

### *Characteristics of the included studies*

To characterise the samples from the articles, we extracted sample age; sample gender; sample education level; sample ethnicity, the dropout rate, the sample size, the planning manipulation check measures and the presence of attrition and randomization checks. We also extracted the potential moderators like the type of goal intention, the theoretical approach referred to by the authors, the sample type (e.g., general population, students, patients), the incentive for study participation, the study design (e.g., randomized controlled trial, cross-sectional study), the study quality (risk of bias assessment), the planning intervention type (e.g., implementation intention, action planning, coping planning), the instructions given to participants, the planning intervention format (e.g., global format as what/where/when/how, if-then, both), the mode of delivery (e.g., written or read aloud), the mode of presentation (e.g., paper, online), the type of administration (e.g., individual, collective, assisted or non-assisted), the presence of boosters and their time intervals, the number of plans, the plan quality, the additional intervention included alongside planning intervention, the length of the follow-up and the assessment of plan fidelity. We also extracted the choice of the experimental and control groups (and the reasons for the choice).

### *Moderators*

We also extracted the characteristics of the planning intervention (the type – implementation intention, action planning, coping planning; the statements given to the participants; the format of the plan – global format in what/where/when/how or if-then or both; the mode of delivery – written or read; the mode of presentation – paper or online; the type of administration – individual or collective, assisted or non-assisted; study boosters and their time intervals; the number of plans), the length of the follow-up, the main outcome related to health behaviours (type of measure; mode of administration – questionnaire,

behavioural measure, physiological measure, objective measure; the validation of the measure), and whether or not an intention-to-treat analysis was adopted.

#### *Risk of bias (quality) assessment*

Risk of bias assessment was based on the Cochrane Collaboration's tool for assessing risk of bias (Higgins et al., 2011). One reviewer (CM) assessed 100% and another will assess 10% (MSH) of the quality of the sequence generation, the allocation concealment, the blinding of participants, the personnel and outcome assessors, the completeness of outcome data, the selective outcome reporting, and other sources of bias. Thus, a study was assessed as low or high quality related to the risk of bias, or unclear if there was not enough information to assess study quality. The quality of the studies will be added as a moderator in the analysis.

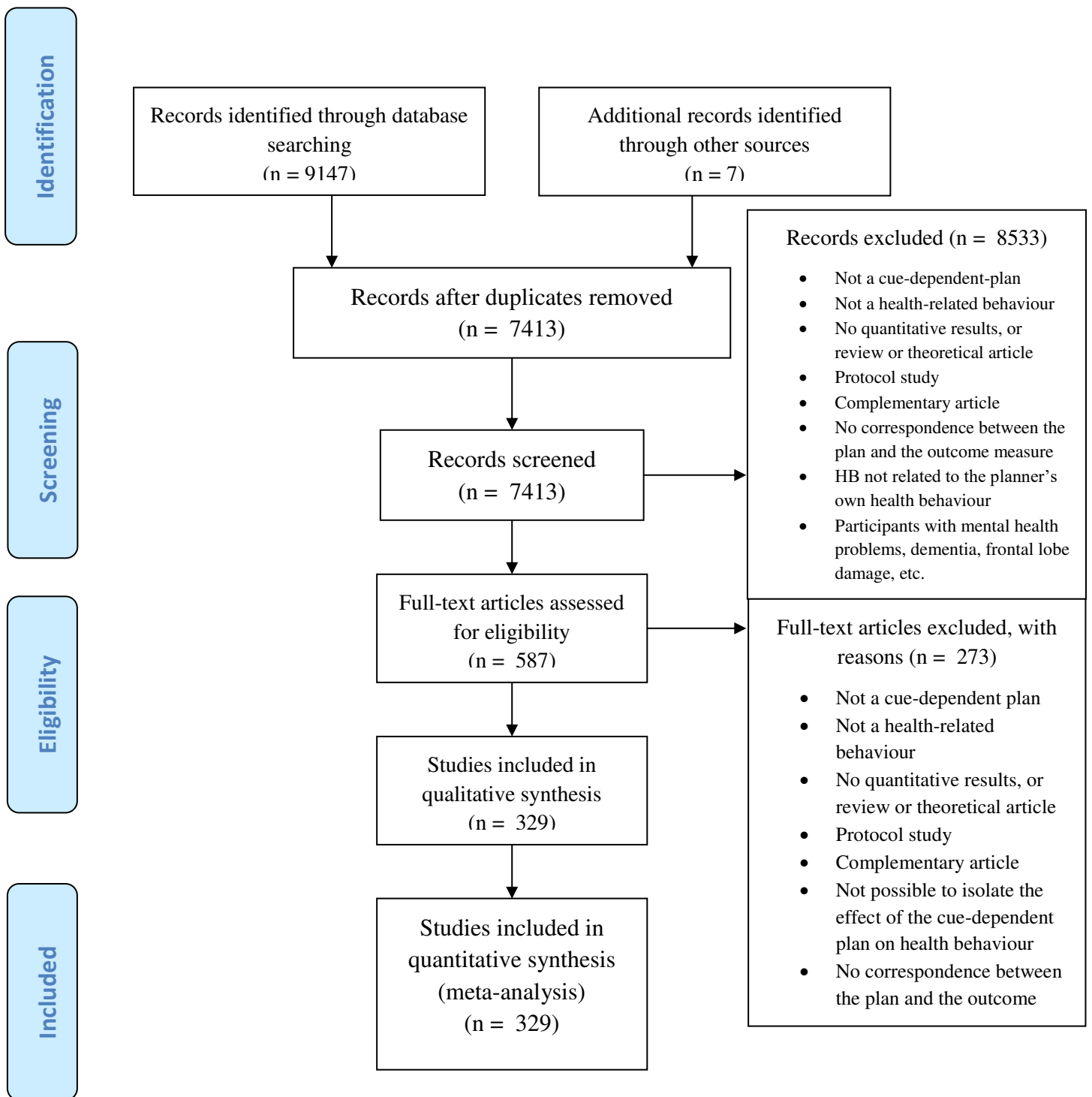
## **RESULTS**

### **Systematic review**

9147 records were identified through database searching (PsycInfo, PubMed, Web of Science and Scopus). 7 additional records were identified through other sources like grey literature or references from other reviews (see Figure 1). 7413 were screened after duplicates removed. 6826 records were excluded after the title and abstract screening because the article did not depict a cue-dependent plan, health-related behaviour, quantitative results (e.g. review, theoretical article), correspondence between the plan and the outcome measures, or the health behaviour was not related to the planner's own health behaviour, or the article was a protocol study or a complementary article or included participants with mental health problems, dementia, or frontal lobe damage etc. Therefore, 587 full-text articles were assessed for eligibility. 273 articles were excluded after having read the full-text because the

article did not depict a cue-dependent plan, a health-related behaviour, quantitative results (e.g. review, theoretical article), correspondence between the plan and the outcome measures, or the article was a protocol study or a complementary article or it was not possible to isolate the effect of the cue-dependent plan on health behaviour (missing data). In total 329 articles were included in the qualitative and quantitative analyses.





**FIGURE. 1** Prisma flow diagram for the systematic review.

## **Data extraction**

The theoretical approach was extracted, namely which theory(ies) is(are) cited in the article to frame the cue-dependent plans. Then the congruence between the theoretical approach and the designation of the cue-dependent plan (only when they cited HAPA and not MAP or MAP and not HAPA) was coded. If the authors used “action plan”, “action planning”, “coping plan”, “coping planning”, “planning”, or “plan” and they cited HAPA then it is congruent (Schwarzer, 1992). If the authors used “implementation intention”, “planning”, or “plan” and there is a reference to MAP (Heckhausen & Gollwitzer, 1987) then it is congruent. Otherwise it is incongruent.

The attrition rate was calculated, which is the ratio the number of participants at baseline or T1 (that filled in the dependent variable at the first measurement point) and the number of participants at the last follow-up (the number of participants that filled in the measure of the dependent variable at the last measurement point).

The sample details (gender, education and ethnicity) of the participants at baseline or of the per-protocol sample were extracted. The type of sample was coded to categorise the population as a clinical population (when participants were patients and/or take a treatment), students or general population. When general population, population of students or clinical population were in the same sample, we coded as a general sample. The remuneration was coded, i.e. when the participants were paid either with money, with course credit, or reimbursed for the travel, or any type of non-monetary remuneration, or not paid.

The type of Study design was coded to differentiate the studies for which the cue-dependent plan was manipulated or not (i.e. only correlations reported). Information about the groups was extracted. For the experimental study, we coded the type of control group as simple control or active control group, when there is no intervention to replace implementation intention (e.g., if there is an additional intervention for the experimental

group and the control group, and the control group = the experimental group minus the implementation intention, then it is coded a simple control group). We detailed which experimental group was chosen, so that we opted for the intervention the closest to implementation intention manipulation only. We also specified which control group(s) was chosen, in such a way as to choose the intervention the closest to the experimental group minus implementation intention. When there were an active control group and a simple control group, we reported the results of both. We coded the characteristics of the cue-dependent plan intervention. For all the studies (cue-dependent plans manipulated or not), we reported the type of plan (the designation by the authors; e.g. “action planning”, “implementation intention”). We also coded the number of plan(s) the participants were prompted to form, if they were prompted with  $\geq 2$  components (i.e. “prompted”) or  $< 2$  components (i.e. “not prompted”), if the plan was individual or collective plan, if it was non-assisted or assisted (i.e. when they were helped to form the plan *per se*) and if there were boosters (cue-dependent plan intervention at more than one time).

Regarding the characteristics of the dependent variable related to health behaviours, it was chosen so that it is the closest to the cue-dependent plan, by giving priority to behavioural measures, then validated self-report, then non validated self-report, then physiological measures (which are proximal measures). The validation of the dependent variable was coded as validated, when they were self-reports with references to validation, or already used in previous studies or when there were behavioural measures, otherwise it was non validated. As regard to the results, priority was given to intention-to-treat or multiple imputation results when available.

The means, standard deviations or the rate or percentage of the experimental and control groups were reported for the main dependent variable, intention, self-efficacy and physiological measures if available, at each time point. We chose to report the sample sizes

that were used in the analyses, to give priority to report mean and standard deviations (and to report the effect sizes or the F, t, Chi<sup>2</sup> and p-value when it is the only available data), the raw data (the estimated marginal and adjusted means were included but flagged when they were the only available data).

The presence of planning manipulation or manipulation checks were reported, that is to say, if they used a check for the formation of the plan (e.g. action planning scale or manipulation checks of implementation intention).

The correlations were also extracted, namely among the cue-dependent plan and the health-related dependent variables, among the cue-dependent plan and the moderator (attitude, perceived behavioural control, subjective norms, intention, self-efficacy), among the moderator and the health-related dependent variables. For the studies with experimental design with several groups, the plan had to be dummy coded in the correlation (e.g., 0: control group; 1: experimental group).

## **Qualitative analysis**

### *Design, type of sample and participants*

We included 114 correlational studies and 238 experimental studies, i.e. where the cue-dependent plans were manipulated (see ANNEXE IV). In total, 151126 participants were included, at the last follow-up and/or in the analysis, making up 172 studies with general population, 115 studies with students and 65 studies with a clinical population.

### *Characteristics of the outcome*

129 studies were related to physical activity outcomes, 88 about diet (i.e. healthy diet, organically produced food consumption, testing a bio-shop, multivitamin intake,

carbohydrate-electrolyte solution drinking), 18 about smoking, 13 about medication and treatment adherence, 12 about alcohol consumption, 14 about dental hygiene (e.g. dental floss), 4 about condom use, 1 about driving behaviour, 8 about hygiene behaviour (i.e. handwashing, food hygiene), 3 about pelvic-floor exercise, 4 about sunscreen use, 11 about screening (i.e. cervical cancer screening, mammography), 5 about vaccination, 3 about safe water consumption, 2 about sleeping, 1 about facemask use, 1 about seat belt use, 7 about self-examination (i.e. 5 for breast self-examination, 2 for testicular self-examination). Concerning the type of included outcome measures, 307 were self-reports, 41 were behavioural measures and 2 were physiological measures. 235 measures were validated (i.e. (physiological measure, behavioural measure or validated self-report or already used in previous studies) and 108 were non-validated.

#### *Characteristics of the plan*

Among the experimental studies included in the review, 148 used the designation “implementation intention”, 54 used “action planning”, 42 used “coping planning” and 13 used the word “planning”. 5 studies used the designations “action planning”, “coping planning” or “implementation intention” in turns. Yet, 13 made incongruent reference, where the theoretical approach was not in accordance with the cue-dependent plan designation. 70 studies used the if-then format, 133 did not and 7 used another format (i.e. “When, I”, “As soon as”, “When, then”, “If, I”). The format used was unclear for 26 studies. 109 studies used a booster to repeat the cue-dependent planning intervention and 128 did not. 88 studies used a manipulation check for the cue-dependent planning intervention, although 147, which constitute the majority, did not.

## **DISCUSSION**

## **Major findings**

As we decided to include the correlational studies alongside the experimental studies, we reached to include 329 articles in the review in total. Gollwitzer and Sheeran (2006) included 23 studies relative to implementation intentions based interventions in health behaviours. Almost 10 years later, we observed a massive number of published articles that tested and/or measured the effects of cue-dependent plans on health behaviours. Although, we enlarged our inclusion criteria, not only for the type of design, but also for the type of cue-dependent plan, including implementation intention, action planning, and coping planning among others. The type of health-related behaviour that is the most represented is physical activity, with 129 studies. Bélanger-Gravel, Godin, & Amireault (2013) included 24 studies about interventions focusing on physical activity but their inclusion criteria were RCTs and quasi-experimental studies referring to implementation intention and action planning, focusing on group with equivalent follow-up and operationalisation of the cue-dependent plans, which limited their inclusion criteria. Dietetic behaviours were the second type of studies the most represented in our review with 88 studies, with a panel of very different behaviours as healthy and unhealthy diet, but also organically produced food consumption, or multivitamin intake. Adriaanse et al.'s meta-analysis (2011) estimated the effect size of planning based interventions with nine studies, with a smaller effect size for diminishing unhealthy behaviours compared to increasing healthy behaviours.

Many more studies are included in this review as our objective was to be as exhaustive as possible about the type of studies, design and operationalisation of the cue-dependent plans, to be closer to the genuine effect of cue-dependent plans on health-related behaviours, focusing also on the moderators that may have an impact on the effect of the interventions. As the plans were manipulated for almost two third of the included studies (i.e., experimental studies like RCTs), involving a large number of participants, we will be able to

base the meta-analysis and the meta-regression on studies that are in majority with a solid design, even if the risk of bias will enlighten us about their methodological issues and accuracy. A large number of studies are among general population, but approximately one third was among a population of students which may provide relatively generalizable findings. We also have a non-negligible number of studies that involved clinical population, like patients with chronic disease (e.g. epilepsy or cardiovascular disease), which would enable us to have a more tailored idea about the conditions under which cue-dependent planning interventions may be effective in health care setting and/or among a specific type of patients.

There are eclectic types of health-related outcomes included in the review, from medication adherence, to hygiene (dental and food hygiene for instance), including sunscreen use or even sleeping behaviour. It is noteworthy that these behaviours are really different from each other implying various underlying mechanisms of the enactment of each type of behaviour, in function of the population. These differences may constitute different moderators on the effect of the interventions. The meta-regression will give us some guidance about what may increase or decrease the effects of these interventions according to the type of health behaviour.

We expected to find some positive effects in favour of specific types of interventions for different behaviour. Besides, even if the majority of the included measures were validated (validated questionnaires, physiological and behavioural measures) a lot of measures of the outcome variables are self-reported. Therefore, it will be important to compare if the validation of the outcome measures impacts the amount of the effect size of cue-dependent interventions. Therefore, we will nuance the interpretation of the results bearing in mind that a lot of measures are self-reported. In addition, the use of planning check was not systematic across the studies with one fourth of the studies having checked the planning formation with

a questionnaire alongside the intervention. This gives us another clue regarding the bias that may comprise our quantitative analysis. Besides, even if in Bélanger Gravel et al's meta-regression (2013), they did not observe an effect of repeated implementation intentions, approximately half of our study sample used a booster during the cue-dependent planning intervention. As we have a large number of studies and a relatively equal number of studies that used the booster vs. that did not use the booster – even if the sample sizes were different – it will be an opportunity to test this moderator.

We would expect that the cue-dependent plans would refer more to the HAPA in our review because it focuses on health-related behaviours. Contrary to our expectations, the majority of the studies referred to the MAP, with an implementation intention manipulation or measure. Even if this model is stemmed from social cognition theories, it has been massively used in health-related context. Yet, we can observe a major issue: five studies used the terms “action planning”, “coping planning” or “implementation intention” in turns. An above all, 13 studies have been coded as referring to incongruent theories. Therefore, the designations may have been conflated using a term that was not consistent with the theoretical approach. Despite Gollwitzer's advice (2014) about the importance of the if-then format in implementation intention, it was not systematically used in interventions. Moreover, some cue-dependent plans formulations claimed to be close to the if-then format. However, they did not follow the strict if-then format but used the formulations “when, I”, “as soon as”, “when, then”, “if I”). Plus, in 26 studies, the format used in the plans that the participants were prompted to form was not explicitly stated. The lack of consistence and clarity about the operationalisation of the plans and the references to the theoretical approach among the studies are other arguments in favour of the necessity to enlighten the moderators of efficient health-related behaviours change interventions based on cue-dependent plans.

## **Perspectives**



The next step will be to run the analyses to compare the effectiveness of cue-dependent plans in function of different moderators. The data will be aggregated at the study level and meta-analysed comparing the effect sizes for the main effect of the cue-dependent plans on behavioural outcomes. Moderator analysis will be conducted on the key moderators identified a priori (e.g., time frame of follow up, format of intervention, intervention duration, study quality) and then included in a regression of the effect size on the set of moderators. Qualitative data (e.g., type of plan) will be summarised quantitatively. Several subgroup analyses have been planned for the review. Potential subgroups will include the types of health behaviours and their valence (increasing health promoting behaviours or decreasing health risk behaviours), the theoretical approach which the authors referred to (e.g., model of action phases, HAPA), the type of sample (e.g., general population, patients, students), the type of plan (e.g., implementation intention, action planning, coping planning), the format of the plan (e.g., global format with what/where/when/how, if-then format), the mode of presentation (e.g., paper, online, face-to-face), the assistance, the utilization of booster(s) (and the duration), the length of the follow-up, the number of plan(s) and the use of additional interventions alongside the cue-dependent plans, and the quality of plans generated. It will also be important to look carefully the funnel plot to have an idea of the effect and the theoretical estimation of bias of publication on the effect of cue-dependent plans on health-related behaviours to see if the calculated effect size approaches the true effect.

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La revue qualitative de la littérature nous a permis de constater que l'activité physique était le type de comportement de santé le plus représenté dans les études portant sur le planning. Dans la deuxième partie, nous allons présenter les résultats de deux études qui ont testé l'efficacité isolée (étude 2) et combinée (étude 1 et 2) de la simulation mentale (ciblant la phase motivationnelle) et de l'implémentation d'intention (ciblant la phase volitionnelle) pour augmenter l'activité physique. Ces études vont à l'encontre des résultats rencontrés habituellement dans la littérature puisqu'elles n'ont pas mis en évidence un effet significatif des interventions pour promouvoir l'activité physique, bien que l'étude 2 présente un design à plan factoriel complet, des mesures comportementales et une puissance a priori suffisante pour faire ressortir un effet. Les résultats seront discutés au regard de la nécessité de tester les effets des modérateurs dans les interventions basées sur le planning en santé.



**PARTIE II : “Theory-based interventions combining mental simulation and planning techniques to improve physical activity: Null results from two randomized controlled trials”**

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## ABSTRACT

**Background:** Interventions to assist individuals in initiating and maintaining regular participation in physical activity are not always effective. Psychological and behavioural theories advocate the importance of both motivation and volition in interventions to change health behaviour. Interventions adopting self-regulation strategies that foster motivational and volitional components may, therefore, have utility in promoting regular physical activity participation. **Methods:** We tested the efficacy of an intervention adopting motivational (mental simulation) and volitional (implementation intentions) components to promote a regular physical activity in two studies. Study 1 adopted a cluster randomised design in which participants (n=92) were allocated to one of three conditions: mental simulation plus implementation intention, implementation intention only, or control. Study 2 adopted a 2 (mental simulation vs. no mental simulation) x 2 (implementation intention vs. no implementation intention) randomised controlled design in which fitness centre attendees (n=184) were randomly allocated one of four conditions: mental simulation only, implementation intention only, combined, or control. Physical activity behaviour was measured by self-report (Study 1) or fitness centre attendance (Study 2) at 4- (Studies 1 and 2) and 19- (Study 2 only) week follow-up periods. **Results:** Findings revealed no statistically significant main or interactive effects of the mental simulation and implementation intention conditions on physical activity outcomes in either study. **Discussion:** Findings are in contrast to previous research which has found pervasive effects for both intervention strategies. Findings are discussed in light of study limitations including deviations in the operationalization of the intervention components from previous research, the lack of a prompt for a goal intention, and the relatively small sample sizes. Future research should focus on the format of the intervention components, test the effects of each component alone

and in combination using standardized measures across multiple samples, and systematically explore effects of candidate moderators.

**Keywords:** Implementation intention, mental simulation, physical activity, volitional phase, motivational phase.

## INTRODUCTION

Physical inactivity is related to all-cause mortality and implicated in 6% of total deaths globally (WHO, 2010a). Physical inactivity is also associated with increased risk from multiple chronic illnesses and conditions including cardiovascular disease, diabetes, some cancers, and obesity (Bell et al., 2014; Blair et al., 1995; Brenner, 2014; Jeon, Lokken, Hu, & van Dam, 2007). Numerous studies have demonstrated the benefits of participating in regular physical activity. Population studies have shown that participation in regular physical activity is likely to reduced all-cause mortality, notably deaths caused by cardiovascular disease (Blair et al., 1995). This has led to the development of national guidelines for the type, frequency, intensity and duration of physical activity thought to confer health benefits. While there are idiosyncratic differences in guideline content, most advocate at least 30 minutes of moderate-to-vigorous physical activity on at least 5 days of the week (NHS, 2008; WHO, 2010b).

As a consequence many governments have aimed to develop national programs to intervene and promote participation in physical activity at the population level (Department of Health, 2011). The development of such interventions, however, needs to be based on persuasive techniques and strategies to encourage individuals to take up physical activity and to provide them with the skills and personal resources to do so. Research on such techniques and strategies is based on formative psychological research that identifies the factors underpinning health behaviour. At the forefront of this research are social cognitive theories derived from social psychology, which have provided insight into the factors that impact on decision making and have demonstrated efficacy in understanding the processes involved (Conner & Norman, 2005; Hagger & Luszczynska, 2014; Heckhausen & Gollwitzer, 1987). These factors can then be targeted in behavioural interventions using specific techniques to manipulate or change the influential factors (Biddle, Hagger, Chatzisarantis, & Lippke,

2007). Research, however, is needed to target and manipulate each specific component to fully understand the precise mechanisms underpinning behaviour change. This can be done in factorial designs in which one or more intervention techniques can be targeted and their individual and interactive effects on a behavioural outcome evaluated (Peters, de Bruin, & Crutzen, 2015). This is also important if the effectiveness of theories of behaviour change in guiding behaviour change interventions is to be evaluated.

Many social cognitive theories applied to predict and understand health behaviour have intention as a focal variable and the most proximal predictor of behaviour (Biddle et al., 2007; Conner & Norman, 2015; McEachan, Conner, Taylor, & Lawton, 2011; Rich, Brandes, Mullan, & Hagger, 2015). However, research has consistently noted the generally weak link between intentions and behaviour, known as the intention-behaviour ‘gap’ (Orbell & Sheeran, 1998; Rhodes & de Bruijn, 2013; Sheeran & Webb, 2016; Sniehotta, Pesseau, & Araújo-Soares, 2014). According to Sheeran (2002), intention measures account only for 28% of the behaviour. Furthermore, interventions focusing on changing intentions and its antecedents have been shown to be successful in changing intentions but are much less effective in changing behaviour (Webb & Sheeran, 2006). Research has shown that some individuals can have strong intentions to engage in health behaviour but experience difficulties in converting those intentions into action. These individuals have been identified as ‘inclined abstainers’ (Orbell & Sheeran, 1998) or ‘unsuccessful intenders’ (Rhodes & de Bruijn, 2013). Researchers have therefore sought to examine the process by which intentions are converted into action.

One approach has been to focus on volitional processes, that is, the processes involved in the enactment of intentions after they have been formed (Heckhausen & Gollwitzer, 1987; Schwarzer, 1992). Prominent among these is the model of action phases (Gollwitzer, 1993; Heckhausen & Gollwitzer, 1987), which makes the distinction between volitional and

motivational phases prior to action. The motivational phase makes reference to the formation of actual intentions in which individuals form intentions based on their beliefs, similar to the process outline in the theory of planned behaviour. The volitional phase occurs after the individual has formed an intention and made the decision to act. This phase outlines the process by which an individual enacts their intentions and is dependent on the individual developing a sufficient future strategy to enact the planned behaviour. Whether individuals are successful in enacting a plan is, therefore, dependent on whether they have an intention to act and whether they have a sufficient strategy to carry out their intention. Accordingly, the model of action phases implies that the motivation is a necessary but not sufficient condition for behavioural enactment, which is where the intention-behaviour gap arises. Intentions must, therefore, be augmented with sufficient strategies in the volitional phase that enables individuals to carry out their plans (Chatzisarantis, Hagger, & Wang, 2010; Koestner et al., 2006; Koestner, Lekes, Powers, & Chicoine, 2002; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008; Sheeran, Webb, & Gollwitzer, 2005).

A prominent strategy that has been purported as a means to assist individuals in enacting their intentions and countering the gap between intention and behaviour is implementation intentions (Sheeran & Webb, 2016). An implementation intention is a self-regulation strategy by which an individual augments their intention with a cue-initiated plan to increase the likelihood that they will carry out their intention. An implementation intention is a mental act linking an anticipated critical situation or 'cue' with the appropriate intended response (Gollwitzer, 1993). By identifying a cue present in the environment and pairing it with the intended action, the individual will increase the likelihood of the intention being enacted. The cue should be an appropriate condition, time and place in which the action should be performed. Gollwitzer (1993) suggests that the implementation intention leads to the establishment of a strong link between the cue and the goal-directed response. The

mechanism by which implementation intentions exerts its effects is through the formation of effective plans at the post-intentional stage i.e. rather than being mediated by intentions, implementation intentions should affect behaviour through planning (Luszczynska, 2006). Meta-analyses of implementation intention interventions have shown a medium-to-large effect size in promoting health-related behaviours generally (Gollwitzer & Sheeran, 2006) and a small-to-medium effect size in promoting physical activity (Bélanger-Gravel, Godin, & Amireault, 2013). However, it is important to note that these meta-analyses included few unpublished studies and there are some indications of null or detrimental effects for implementation intention interventions in the literature (Huang, 2012; Jackson et al., 2005; Jackson et al., 2006; Jessop, Sparks, Buckland, Harris, & Churchill, 2014; Scholz, Ochsner, & Luszczynska, 2013; Skar, Sniehotta, Molloy, Prestwich, & Araujo-Soares, 2011).

While implementation intentions have been found to be effective across studies, meta-analyses have also identified considerable heterogeneity in the effects of implementation intention across the literature. Hagger et al. (2016b) indicated that the way implementation intention manipulations are operationalized could potentially moderate their effect. The format and presentation of plans feature prominently as a potential moderator of planning interventions. Research has suggested that implementation intention effects are often facilitated by prompting individuals to form plans using an ‘if-then’ format, that is, prompting individuals to identify a critical situation and pair it with their intended behaviour (Gollwitzer, 2014), as opposed to more ‘global’ or open-ended plans without an ‘if-then’ prompt (Chapman, Armitage, & Norman, 2009). Other critical moderators that have been identified include intrapersonal factors such as individual differences in planning capacity and time delay between the administration of the planning technique and the enactment of the target behaviour. There have, however, been few systematic tests of these moderators using factorial designs in the literature (Hagger, Luszczynska, et al., 2016).

The effectiveness of implementation intentions is also dependent on individuals having sufficient motivation to engage in the behaviour. Maximising intentions, a construct that reflects an individual's level of motivation toward a given behaviour and the amount of effort they are prepared to invest in pursuing it, is an important prerequisite for the effectiveness of any planning intervention (Hagger & Chatzisarantis, 2009; Sheeran et al., 2005). This is based on the assumption in the model of action phases that volitional components like planning affect behaviour in a post-decisional manner. Means to bolster motivation to participate in the behaviour alongside a volitional strategy like implementation intentions, therefore, will ensure that an individual is in an optimal motivational and volitional state to enact their intentions and engage in the behaviour. An effective means to bolster motivation is through mental simulation. Mental simulation is a strategy in which individuals visualize or imagine engaging in the intended action (Pham & Taylor, 1999) and is supposed to reinforce individuals' intention to act by increasing their propensity and the readiness to act (Pham & Taylor, 1999). As a consequence, the effects of mental simulation occur through changes in self-efficacy and it is considered to affect behaviour as part of the motivational phase in Heckhausen and Gollwitzer's (1987) model. Specifically, mental simulations boost self-efficacy as the imagined action serves as a 'self-model' or subjective 'vicarious experience' (Bandura, 1977). The effects are therefore expected to be mediated by self-efficacy perceptions. A sequential multiple mediation model can therefore be envisaged in which effects of mental simulations on action occur through changes in self-efficacy followed by changes in motivation or intention. There are two types of mental simulations. Outcome mental simulation requires individuals to imagine the achievement of the goal (e.g., simulating the situation once the goal is reached alongside the emotions and cognitions the individual is likely to have). Process mental simulation requires individuals to imagine the means required to attain the behavioural goal (e.g., simulating how the individual is enacting



the behaviour focusing on the details, like body sensations, emotions, details of the environment). Research on mental simulations has shown them to be effective in boosting behavioural engagement and goal-progress in many domains including health (Hagger, Lonsdale, & Chatzisarantis, 2012; Pham & Taylor, 1999; Vasquez & Buehler, 2007).

A further proposed mechanism for the effects of mental simulation on behaviour change is through their capacity to ‘activate’ or make salient certain action-oriented mindsets or behavioural tendencies. Mental simulations may work by providing a bridge between thoughts and goal-directed behaviour (Pham & Taylor, 1999). Mental representations of the goal-directed behaviours may involve fantasizing about past events that have already been experienced or future events that have never been realised. For example, studies have suggested that mental simulation activates an open-minded mindset while implementation intention activates an implemental mindset by focusing on the relevant components of if-then plans (Faude-Koivisto, Wuerz, & Gollwitzer, 2009). But when mental simulation is realised before implementation intention, it would enable the individual to reflect on the different paths to set up a goal in the motivational phase of decision making and then set up strategies to achieve the goal in the volitional phase (Heckhausen & Gollwitzer, 1987).

Studies have investigated the effectiveness of combined mental simulation and implementation intentions interventions to promote reductions in alcohol consumption. The interventions were based on the hypothesis that combining a mental simulation intervention that promotes motivation with an implementation intention that promotes volition will optimise participation in health behaviour (Hagger, Lonsdale, & Chatzisarantis, 2012; Hagger, Lonsdale, Koka, et al., 2012; Knauper et al., 2011). This follows research that suggests that creating conditions that maximize intentions to engage in the health behaviour and augmenting the intentions with means to implement the intentions should lead to optimal conditions for behavioural enactment (Prestwich & Kellar, 2014). A review of nine studies

testing effects increasing intention strength and implementation intentions using full-factorial designs revealed that six showed significant interaction effect such that behaviour participation was optimal when intentions were strengthened alongside implementation intentions. Hagger et al. (2012) adopted a similar full-factorial design to examine the independent and interactive effects of mental simulations and implementation intentions on alcohol consumption. Results revealed that the combination of mental simulation and implementation intention interventions resulted in a significant decrease in the number of alcohol units consumed relative to participants receiving each of the intervention conditions alone or neither, but only among participants with high baseline alcohol consumption. Research adopting the same design has found that only implementation intention intervention was effective in evoking change (Hagger, Lonsdale, Koka, et al., 2012). While these findings provide some indication that the combination of mental simulation and implementation intention strategies can lead to optimal engagement in health behaviour, results do not provide unequivocal support and Hagger et al.'s (2012) conditional findings for high alcohol consumers suggest that effects are most substantive when motivation is low and individuals are resistant to change and have high levels of an undesired behaviour.

The model of action phases clearly dictates that motivation is a necessary but insufficient condition for behavioural enactment, and that behavioural enactment is also dependent on conditions in the volitional phase such as planning that lead to better behavioural enactment. Research has provided some support for the interactive effect of motivational and volitional interventions in promoting health behaviour, including mental simulations with implementation intentions (Hagger, Lonsdale, & Chatzisarantis, 2012; Milne, Orbell, & Sheeran, 2002), but some research has not supported the interactive effect. These may be findings that are specific to a particular behaviour or particular context, or, as in the Hagger et al. study, among participants with high levels of the undesirable behaviour to

be changed (Hagger, Lonsdale, Koka, et al., 2012). In the present study we aimed to conduct a series of interventions using mental simulations and implementation intentions to promote physical activity behaviour. In Study 1, we examined the effect of an intervention combining implementation intentions and mental simulations on physical activity participation relative to an implementation intention intervention alone and a no intervention control condition in a student sample. We expected that the combined intervention condition would yield greater participation in physical activity relative to the implementation intention only condition and the control condition after controlling for baseline physical activity. We also expected participants in the implementation intention condition to report greater physical activity participation than those in control condition. In Study 2 we examined the unique and interactive effects of these manipulations on physical activity using a full-factorial design. In addition, we aimed to provide a robust test of the interactive effects of these interventions by examining their effects in participants including students and members of the general public joining a fitness centre with little or no previous experience of physical activity and using centre attendance as an objective proxy measure of physical activity participation. We expected to find main effects of the mental simulation and implementation intention interventions on physical activity participation post intervention controlling for baseline values on physical activity. We also expected to find an interaction effect of the mental simulation and implementation intention interventions such that participants receiving both intervention would exhibit the highest levels of physical activity participation relative to each condition alone and a control condition receiving neither.

## **STUDY 1**

Adopting a three-group cluster-randomised design, we aimed to examine the effects of a mental simulation and implementation intention intervention on physical activity

behaviour in a sample of students relative to an implementation intention only intervention and a measurement-only control group. The intervention conditions and measures of behavioural and psychological variables were administered at baseline (T1) with one-week (T2)<sup>1</sup> and four-week (T3) behavioural follow-up occasions. We expected that the participants who formed a mental simulation alongside an implementation intention (mental simulation plus implementation intention group) would report higher levels of physical activity at one and four weeks post-intervention than participants who formed an implementation intention (implementation intention group) alone and participants who received neither of the intervention components (control group).

## **Materials and methods**

### **Participants**

Participants were undergraduate students from Grenoble Alpes University (N = 92, females = 79, males = 13;  $M_{\text{age}} = 24.4$  years, SD = 6.44) recruited on a voluntary basis by advertising the study to students eligible to participate before their classes. Students were considered ineligible to participate if they were aged less than 18 years or had reduced mobility or a disability which prevented them from participating in physical activity.

### **Design and procedure**

At baseline, all participants completed consent forms followed by a baseline questionnaire containing self-report measures of demographic details (age, BMI, smoking status, number of alcoholic drinks consumed per occasion and frequency of alcohol

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<sup>1</sup>We adopted a one-week follow-up in order to conduct a test of the concurrent validity of our self-report measure of physical activity using accelerometers worn by a subsample of the participants. However, we were not able to retrieve the data from the accelerometers due to equipment failure.

consumption) (Dollinger & Malmquist, 2009; Hagger & Montasem, 2009), theory of planned behaviour variables (attitude, subjective norms, perceived behavioural control and intention) (Ajzen, 1991) and past physical activity behaviour (Conner & Armitage, 1998). Participants allocated to the implementation intention group were then prompted to form an implementation intention with respect to physical activity presented as a pen-and-paper exercise. Participants allocated to the mental simulation plus implementation intention group formed a mental simulation, again as a pen-and-paper exercise, prior to forming an implementation intention. Participants from the two experimental groups then completed manipulation check measures of mental simulation and/or implementation intentions according to their allocated group (see ANNEXE V). Participants allocated to the control group completed the measures but did not receive any intervention. One and four weeks after baseline, participants completed follow-up self-report measures of theory of planned behaviour variables, and physical activity behaviour. Three teachers from the Grenoble Alpes University were contacted to give them information about the study and ask for their authorisation to recruit students from their classes. We chose to randomise the sample by clusters determined by university class using a random numbers table in order to reduce the likelihood of data contamination through participants allocated to different conditions conferring. Regarding the sequence generation, no allocation concealment was made. Patients were blinded to group allocation, but the experimenters administering the study materials were not. Data were collected from March to May 2015 and we stopped collecting the data when sufficient numbers of participants were included to achieve adequate statistical power.

### **Informed consent**

At baseline, participants read an information sheet describing the study and outlining their rights and benefits, and the potential risks of participation. They then signed a written

informed consent form which was detached from the questionnaire thereafter to maintain participant anonymity. At the three data collection occasions, participants formed a unique identifier comprising the first two letters of their mother's name, father's name, and their birth month and day. Questionnaires were matched across data collection points using participants' unique identifier. Prior to data collection ethical approval was obtained from the institutional review board of the University of Grenoble.

### **Implementation intention intervention**

Participants allocated to the implementation intention condition and to the mental simulation plus implementation intention condition were asked to form implementation intentions with respect to regular physical activity for the forthcoming month. An 'if-then' format was used to link the situation (preceded by the prompt "if") with the goal-oriented behaviour (preceded by the prompt "then") (Gollwitzer, 1993). Participants were presented with the following script, which was followed by a series of prompts including the day and hour the participant planned to exercise, the type of exercise, and the place where they planned to exercise accompanied by a series of blank lines so that they could write down their responses:

"A lot of people have the intention to be more physically active, but they forget or do not find the time to do it. Some studies have shown that if you form a plan specifying when, where and how you will do your physical activity, you will be more likely to remember to do it and find the time to do it. Thus, it would be useful to spend a few minutes to think about the times when you will participate to a physical activity in the next month. Try to think about the best time for you to exercise, and do not share your answers with your colleague."

### **Mental simulation intervention**

Participants in the mental simulation plus implementation intention condition were prompted to carry out a mental simulation exercise prior to the formation of an implementation intention. Our mental simulation manipulation was identical to that used by Pham and Taylor (1999) adapted for physical activity and focused on process mental simulation. Participants were presented with the following written message, which was followed by a series of blank lines on the page for participants to write down their response: “In this exercise, you will be asked to visualize yourself doing physical activity to increase your regular participation in physical activity. As of today, and for the forthcoming month, imagine how you would do physical exercise regularly. It is very important that you actually ‘see’ yourself doing physical activity and have that picture in your mind. Please write on the lines below how you imagine you will achieve your goal of doing regular physical activity, in the following month.”

## **Measures**

### **Theory of planned behaviour variables**

We measured the variables related to the theory of planned behaviour (Ajzen, 1991) adapted to refer to regular participation in physical activity. Intention to engage in physical activity was measured using four items (e.g., “I intend to do physical activity regularly in the forthcoming month”). Attitudes toward physical activity were measured using five items (e.g., “For me doing physical activity regularly in the forthcoming month is harmful/beneficial”). Subjective norms (e.g., “Most people who are important to me think that I should/I should not do physical activity regularly”) and the probability the participant would enact the behaviour (e.g., “It is expected of me that I do physical activity regularly in the forthcoming month”) were measured using four items each. Perceived behavioural control

as function of the perceived difficulty (e.g. “For me doing physical activity regularly in the forthcoming month would be impossible/possible”) and ability (e.g. “If I wanted to, I could practice physical activity regularly in the forthcoming month”) to engage in the behaviour were measured using two items each, the total score for each was computed with the mean of the two items. All the responses were made on seven-point Likert scales, with the exception of the attitudes scale which was measured on seven-point bi-polar semantic differential scales.

### **Physical activity behaviour**

The International Physical Activity Questionnaire – Short Form (IPAQ-7; Craig et al., 2003) was used to measure self-reported physical activity. Participants indicated the number of minutes, hours or days during which they did physical activity over the previous seven last days at three levels of intensity: vigorous activity, moderate physical activity, and walking. Each of level of intensity was accompanied by a detailed description so that participants were familiar with the types of activity that fell into each category. The measure yields a total physical activity score expressed in Metabolic Equivalent Task per minute (METs/min), an indicator of energy expenditure as a function of physical activity intensity.

### **Manipulation checks**

Participants in the intervention groups also completed manipulation check measures (Hagger, Lonsdale, & Chatzisarantis, 2012) to measure the extent to which they adhered to the instructions for the mental simulation (e.g., “To what extent have you figured out exactly how you might do physical activity regularly over the next month”) and implementation intention (e.g., “To what extent do you have a plan for when, where, and how you might do

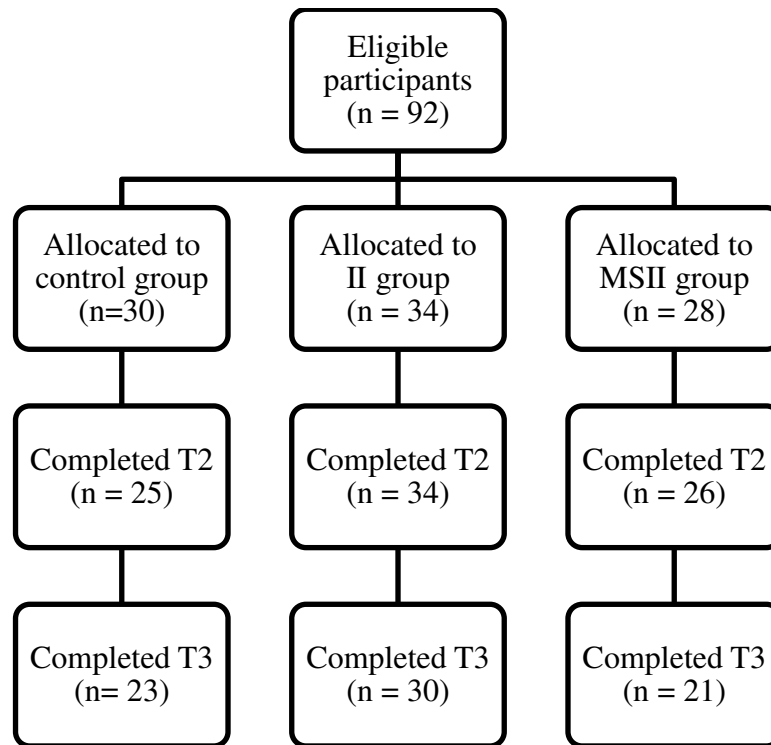


regular physical activity in the following month”) exercises on 7-point Likert scales (from 1 “I have no idea” to 7 “I have figured out exactly”).

## **Results**

### **Participants**

Ninety-two students agreed to participate and completed study measures questionnaires at T1 (females = 79, males = 13;  $M_{\text{age}} = 24.4$  years,  $SD = 6.44$ ). Seven participants (five in the control group and two in the mental simulation plus implementation intention group; 7.61% of the initial sample) dropped out of the study at T2 and 11 participants (two in the control group, four in the implementation intention group and five in the mental simulation plus implementation intention group; 9.47% of the initial sample) dropped out of the study at T3 (Fig. 1). Of the recruited participants, five dropped out of the study at T2 only (three in the control group and two in the mental simulation plus implementation intention group), 15 dropped out at T3 only (five in the control group, three in the implementation intention group and seven in the mental simulation plus implementation intention group) and two dropped out at both T2 and T3 (all in the control group). Thus 64 participants (58.88% of retention rate) completed the study at the two- and four-week follow-up occasions (females = 59, males = 10;  $M_{\text{age}} = 25.19$  years,  $SD = 5.44$ ).



*Note.* II: Implementation intention; MS: Mental simulation.

**FIGURE 1.** Flow chart of participants from time 1 to time 3 of the 4-week follow-up (study 1).

### Missing data

Preliminary analyses of the raw data from the questionnaire measures at follow-up revealed that 7.12% of the data values were missing due to failures to respond. Little’s MCAR test revealed that values were missing completely at random ( $\chi^2 = 163.352$ ,  $df = 175$ ,  $p = .726$ ). Missing data were imputed using multiple imputation in SPSS v. 20 using the fully conditional specification imputation method with 10 iterations and a linear regression model for scaled variables (SPSS Inc).

### Attrition checks

Chi-square tests and MANOVAs were used to test for differences on study variables due to attrition across the time points. Differences on categorical variable (i.e., gender) were

tested using a chi-square analysis with the level of the variable of interest (male vs. female) cross-tabulated with attrition (dropped out of study after T1 vs. remained in study at T3). Differences on continuous demographic (age, BMI, alcohol consumption) and psychological (theory of planned behaviour, self-efficacy) and behavioural (physical activity) variables were tested using MANOVAs with the study variables as multiple dependent variables and attrition as the independent variable. Participants who completed the study did not differ significantly from the participants who dropped out on gender ( $\chi^2 (1, N = 92) = 0.03, p = .863, \eta^2_p = .018$ ) and on demographic, psychological and behavioural variables (Wilks'  $\Lambda = 0.87, F (9, 75) = 1.25, p = .277, \eta^2_p = .131$ ).

### **Randomisation checks**

Sample demographic and psychological data are presented in Table 1. Randomisation checks were conducted using chi-square tests and a MANOVA. There was no significant multivariate effect for intervention condition on the demographic, psychological and behavioural variables at baseline, but the effect only narrowly fell short of conventional levels of statistical significance (Wilks'  $\Lambda = .69, F (18, 148) = 1.66, p = .052, \eta^2_p = .168$ ). When we looked at the between-participants effects, the three groups differed significantly on the physical activity measure at baseline ( $F (2, 82) = 3.80, p = .026, \eta^2_p = .085$ ). In addition, there were fewer smokers in the mental simulation plus implementation intention group (3 smokers) than in the implementation intention group (15 smokers) and in the control group (14 smokers;  $\chi^2 (2, N = 91) = 10.94, p = .027, \eta^2_p = .245$ ). There were also more men in the mental simulation plus implementation intention group (8 males) compared to the implementation intention (3 males) and control (2 males) groups ( $\chi^2 (2, N = 92) = 6.98, p = .031, \eta^2_p = .275$ ).

**TABLE 1.**

Self-reported sample characteristics of Study 1 (n = 92).

	<b>Control group (n = 30)</b>	<b>Implementation intention group (n = 34)</b>	<b>Mental simulation plus implementation intention group (n = 28)</b>
Age (years)			
Mean (SD)	24.75 (6.04)	23.21 (5.03)	25.87 (8.63)
Gender			
Women	28 (35.4%)	31 (39.2%)	20 (25.3%)
Men	2 (15.4%)	3 (23.1%)	8 (61.5%)
BMI			
Mean (SD)	21.49 (2.30)	21.94 (2.65)	21.33 (3.54)
Smoking status			
Smoker	14 (43.8%)	15 (46.9%)	3 (9.4%)
Non smoker	15 (28.8%)	17 (32.7%)	20 (38.5%)
Former smoker	1 (14.3%)	2 (28.6%)	4 (57.1%)
Number of alcoholic drinks per week			
Mean (SD)	2.68 (1.22)	3.09 (1.40)	2.26 (1.54)
Frequency of alcohol consumption			
Mean (SD)	2.14 (1.46)	1.74 (1.08)	1.78 (1.68)
Attitude			
Mean (SD) at T1	5.90 (0.79)	5.58 (1.53)	5.81 (1.17)
Mean (SD) at T2	5.87 (0.85)	5.79 (1.14)	6.03 (1.01)
Mean (SD) at T3	5.99 (0.95)	5.80 (1.24)	5.90 (1.47)
Subjective norms			
Mean (SD) at T1	4.85 (0.81)	4.38 (0.96)	4.78 (1.10)
Mean (SD) at T2	4.59 (0.89)	4.16 (1.18)	4.43 (1.32)

Mean (SD) at T3	4.61 (0.94)	4.14 (1.27)	4.24 (0.95)
Intention			
Mean (SD) at T1	4.92 (2.01)	5.35 (1.79)	4.70 (2.17)
Mean (SD) at T2	5.00 (1.77)	5.36 (1.66)	4.92 (1.93)
Mean (SD) at T3	5.04 (1.78)	5.00 (1.88)	4.91 (1.97)
Perceived behavioural control			
Mean (SD) at T1	4.88 (1.46)	4.63 (1.57)	4.52 (1.51)
Mean (SD) at T2	4.63 (1.40)	4.47 (1.68)	4.43 (1.63)
Mean (SD) at T3	4.58 (1.56)	4.20 (1.83)	4.80 (1.61)
MET-min per week			
Mean (SD) at T1	7.38 (1.18)	7.57 (0.85)	6.90 (1.52)
Mean (SD) at T2	7.49 (0.87)	7.37 (1.49)	7.21 (1.30)
Mean (SD) at T3	7.68 (0.86)	7.64 (0.98)	7.35 (1.17)

### Intervention effects

The primary physical activity outcome variable expressed in MET-min did not follow a normal distribution, so we computed a logarithmic transformation. We opted for a natural logarithmic transformation, because the data were calculated on a proportional basis and were easily interpretable (Gelman & Hill, 2007). Physical activity data for the intervention conditions are presented in Table 2.

Given the risk of contamination related to the cluster design and the three-wave design, we tested our hypotheses using a regression model with random effects using recursive maximum-likelihood estimates and using R version 3.1.1 with the “nlme” package (Lindstrom & Bates, 1988). We analysed the effect of the intervention by conducting a linear mixed effect model regression of the intervention conditions on physical activity measured at

T2 and T3 controlling for physical activity measured at T1. A dataset was created for the mixed model with the three groups (control group, implementation intention group and mental simulation and implementation intention group) as between-participants effects and time as a within-participants effect on the physical activity scores at each time-point. Model selection based on Akaike's information criterion selected a model with a random slope. The resulting effects indicate between-group comparisons Cohen's *d* effect size coefficients were computed using residual standard deviations (Rouder, Morey, Speckman, & Province, 2012). Results are presented in Table 2. Results revealed no significant between-group effects on aggregate values for physical activity measured in MET-min per week at T2 and T3, controlling for gender (as the groups were not equivalent on the males percentage) and physical activity at T1<sup>2</sup>. However, effect size statistics revealed medium effect sizes for the between-group comparisons, which suggests that we had insufficient statistical power to detect these effects.

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<sup>2</sup>The majority of participants scored at least 3 (on a 6-point scale) on the manipulation check variables for mental simulation and implementation intention manipulation checks suggesting that the majority had sufficiently engaged in the intervention. However, a small minority reported the lowest score (1) on the mental simulation (n = 2) and implementation intention (n = 4) manipulation check variables suggested that they had not engaged. However, excluding these participants from the main analyses did not alter the effects with no main effect of groups on physical activity in MET-min per week at T2 and T3, taking into account physical activity at T1.

**TABLE 2.**

Results of linear mixed effect model of physical activity measured at T2 and T3 on interventions (Study 1).

	Mean difference for T2 and T3	Standard Deviations <sup>a</sup>	Cohen's <i>d</i> <sup>b</sup>	t-value	p-value
Fixed Effects					
MET-min implementation intention group vs. control group	-0.28	0.26	-0.38	-1.10	0.27
MET-min mental simulation plus implementation intention group vs. control group	0.07	0.27	0.10	0.25	.79
MET-min mental simulation plus implementation intention group vs. Implementation intention group	0.36	0.23	0.49	1.53	.13
Residual		0.73			
AIC	537.69	–		–	–
Log-likelihood	-260.85	–		–	–

*Note.* Linear mixed effect model based on 92 participants and 276 observations. AIC: Akaike Information Criterion.

<sup>a</sup>Standard deviations of effect sizes estimates.

<sup>b</sup>Cohen's *d* effect size coefficients were computed using residual standard deviations.

## Discussion

The purpose of the current study was to examine the effects of an intervention combining mental simulation and implementation intention strategies to promote physical activity at one- and four-week post-intervention follow-up. We conducted the intervention in a sample of undergraduate students adopting a three-group cluster-randomised design with classes allocated to an implementation intention group, a mental simulation plus implementation intention group, or a control group. Findings revealed no differences in physical activity participation at follow up between the implementation intention, implementation intention plus mental simulation, and control groups. While these data indicated that these intervention techniques were not effective in promoting physical activity

participation in this study and were inconsistent with the bulk of the research on implementation intention and mental simulation in research on health behaviour, the effect size data indicated that possible differences were present but the study was underpowered. It is, therefore, important to interpret current findings in the context of its limitations and acknowledge the importance of replication in larger, representative samples.

The current study had some limitations. The lack of provision of a goal intention in advance of completing the implementation intention exercise meant that the implementation intention exercise would have had very little relevance to those who did not have a goal of increasing their physical activity participation. The adoption of a cluster randomisation design may not have led to homogenous groups on key demographic and behavioural variables, although we controlled for potential variations on gender distribution, smoking status, and the number of alcoholic drinks per week to counteract differences across clusters. The reliance on a self-report measure of physical activity despite acceptable psychometric properties of the IPAQ-7 measure and good correlations with objective measures in previous research (Craig et al., 2003) was a potential source of error variance. However, the most prominent limitation was the small sample size and the medium-sized effect sizes seemed to indicate this despite the non-significant findings. As a consequence, the current effect deserves further replication in a sufficiently powered trial. A final limitation was the lack of a full-factorial randomised controlled design enabling us to study the main effects of each intervention component, mental simulation and implementation intentions, independent of the interaction effect. This is important if researchers are to decode the precise components responsible for affecting a change in physical activity behaviour, and whether the interactive effects are truly separate from the main effects of each component.



## STUDY 2

Study 2 added to the findings of Study 1 by adopting a full-factorial, fully-randomised between-participants design with a larger sample. Study 2 also had the advantage of recruiting participants who had signed up to attend a fitness centre and had not attended the centre previously, who were low active, and had no recent experience of physical activity behaviour. Two weeks after their enrolment to the fitness centre (time 1, T1), they were randomly allocated to mental simulation, implementation intention, mental simulation plus implementation intention group, or control groups. In addition, our target dependent variable was fitness centre attendance verified through participants' fitness centre records and used as a proxy measure of physical activity participation, with four-week (time 2, T2) and 19-week (time 3, T3, only for a subsample) behavioural follow-up occasions. We expected that participants who received the mental simulation and implementation intention manipulations together would exhibit higher fitness centre attendance at follow-up than participants receiving the mental simulation and implementation intention interventions alone. We also expected participants receiving either the mental simulation manipulation, implementation intention manipulation, or both, to have greater attendance at the centre than participants in the control group that received neither of the manipulations.

### Materials and methods

#### Participants

Participants ( $N = 184$ , females = 97, males = 87;  $M_{\text{age}} = 26.95$  years,  $SD = 9.59$ ) were recruited from two different locations and randomised to each intervention conditions within each location, on a voluntary basis. In the first sample, participants were recruited from the University of Essex fitness centre, which had both student and non-student attendees. In the

second sample, participants were recruited from a commercial fitness centre in the city of Stockport, United Kingdom, which comprised individuals from the general population. As the two studies adopted the same design and used the same materials and protocol, we opted to combine the samples. Although this decision violated randomisation for the overall sample, randomisation was retained within the samples (see Results section), and our decision to pool the samples was based on strict criteria to ensure there were no differences in the samples on key demographic factors. Inclusion criteria were identical to those of Study 1 except that participants aged under 18 years were also eligible for inclusion in the study as they had passed the fitness centre induction criteria.

### **Design and procedure**

A randomised controlled design was adopted with four groups: implementation intention only, mental simulation only, mental simulation plus implementation intention, and control groups. The design was identical in both samples. Statistical power analysis revealed that a sample size of 144 participants was required (power = .95, alpha = .05,  $d = .65$ ,  $f = .325$ ) for a two-way mixed-model ANOVA with time (with two levels: baseline (T1), 4 week follow-up (T2) or 19-week follow-up (T3)) as the within-participants factor and experimental condition (condition: implementation intention only, mental simulation only, mental simulation plus implementation intention group, control group) as the between-participants factor. The participants were asked to participate at T1 in the second week after their enrolment to the centres. They were randomly allocated to the mental simulation plus implementation intention group, the implementation intention group, the mental simulation group, or the control group within each sample.

At baseline, all participants completed measures of socio-demographic, past behaviour and theory of planned behaviour variables (i.e., attitude, intention, subjective

norms and perceived behavioural control). Consistent with the findings of Study 1, BMI, smoking status, alcohol consumption and self-control were excluded as these measures had no relation to the behavioural outcome and we wanted to reduce response burden on participants.

At T1, participants were allocated to the mental simulation plus implementation intention group, the implementation intention group, the mental simulation group or the control group using a random numbers table generated by the experimenter. No allocation concealment was made regarding the sequence generation. Patients were blinded to group allocation, but the experimenter administering the study materials was not. The participants were allocated to the implementation intention group were prompted to form implementation intentions and participants allocated to the mental simulation group were required to undertake a mental simulation exercise. Participants from the mental simulation and implementation intention group were required to undertake both exercises. Participants allocated to the control group completed the demographic, psychological and physical activity measures only. At T2, all participants completed follow-up measures of theory of planned behaviour variables. Participants from University of Essex campus fitness centre also completed these measures at T3 because we were unable to obtain further access to the participants from Stockport fitness centre at T3. Fitness centre attendance was measured at the three time points, two weeks after initial enrolment to the fitness centre (T1), at a six-week follow-up occasion (T2) for both samples, and at a 19 week follow-up (T3) for participants from University of Essex campus fitness centre. Participants were contacted via email with their email address and participant code stored in a database separate to the main data with data subsequently matched by a researcher who did not have access to the participants' data to retain participant anonymity. Data were collected between September

and April 2008. We stopped collecting the data when sufficient numbers of participants were recruited according to our power analysis.

### **Informed consent and anonymity**

Participants read an information sheet describing the study and outlining the rights, benefits, and potential risks of the study to participants before being enrolled in the study. They then signed a written informed consent form which was detached from the questionnaire thereafter in order to maintain participant anonymity. A unique identifier comprising the first two letters of participants' home post code, the first three letters of their mother's maiden name and their landline phone number was formed at each time point of the study. This study obtained the ethical approval from the University of Essex Department of Psychology Research Ethics Committee prior to data collection.

### **Intervention manipulations**

Before the mental simulation and implementation intention statements, the intervention groups read the following introductory passage:

“Please complete the following mental and/or visualisation exercises, they will only take about 5 minutes of your time. Please take care to complete each exercise in full and follow the instructions carefully, they will ultimately benefit you in future.”

In addition, participants were provided with WHO guidelines for physical activity at the beginning of the questionnaire using the following passage: “3 to 4 periods of exercise per week lasting no less than 30 minutes”. The intervention was a pen-and-paper exercise and participants were not assisted in performing the mental simulation and implementation intention exercises.

### **Implementation intention manipulation**

Participants allocated to the implementation intention condition or mental simulation plus implementation intention condition were prompted to form an implementation intention with respect to their fitness centre (gym) attendance. They were presented the following script which was followed by a series of blank lines to write down their plan:

“You are more likely to carry out your intention to use the gym regularly if you make a decision about where and when you will do so. Decide now when and how you will use the gym over the following weeks. You may find it useful go to the gym just before or just after something else that you do regularly, such as lectures. Please write in below when and how you will use the gym in the next six weeks (e.g. ‘I will do the ‘Fat Burning’ class on every evening after my lecture’).”

### **Mental simulation intervention**

Participants in the mental simulation condition and mental simulation plus implementation intention condition performed the mental simulation exercise. We used the same manipulation as Pham and Taylor (1999) adapted to physical activity with some minor modification to encourage individuals to engage in the visualisation exercises and focusing on the outcomes. They were presented with the following text introducing the exercise:

“Think about the exercise related goal that you have just decided on. Visualise yourself having achieved that goal. You have put a lot of effort into the achievement of your task and you have finally accomplished it. Imagine the effort you have made. See yourself standing at the point of success from where you look back on the work you did to get there. Imagine how your life is different since you started exercising regularly. Visualise the changes that resulted from the accomplishment of this goal. How does it feel to have started a new lifestyle that is good for you? Picture your life as it is now. Concentrate the on the feelings that you have

when you do something that is really good for you. Visualise the satisfaction you feel at having achieved your goal. Picture the pride you feel, the confidence you feel in yourself, knowing you were successful. Try to feel the satisfaction you have with this accomplishment. Feel how proud and confident you are. Think about your daily routine. What does your day look like, now that exercising is a firm part of it? Imagine a typical day and see yourself engaging in your new exercise routine. See yourself standing at the point of success. Picture yourself thinking back to when you started working on your goal. How do you feel having successfully accomplished what you wanted? Concentrate on the energy that your healthier lifestyle contributes to your life. How does it feel to have more energy, more confidence, and to know that you successfully started a new healthier lifestyle?"

## **Measures**

### **Theory of planned behaviour variables**

Measures of the theory of planned behaviour constructs were similar to those used in Study 1 with the exception that they made reference to fitness centre (gym) attendance. Intention to engage in physical activity was measured using three items (e.g., "I intend to use the gym 3-4 days a week over the next six weeks"). Attitudes towards physical activity were measured using six items (e.g., "For me, using the gym 3-4 days a week over the next six weeks is harmful/beneficial"). Subjective norms (e.g., "Most people who are important to me would want me to use the gym 3-4 days a week over the next six weeks") and the likelihood the participant would enact the behaviour (e.g., "Most people close to me expect me to use the gym 3-4 days a week over the next six weeks") were measured using four items. Our measure of perceived behavioural control comprised six items relating to perceived control (e.g., "How much personal control do you have in using the gym 3-4 days a

week over the next six weeks?") and ability (e.g., "I believe I have the ability to use the gym 3-4 days a week over the next six weeks") with respect to engaging in the behaviour. All the responses were made on six-point Likert scales, with the exception of the attitude scale which was measured on six-point bi-polar semantic differential scales.

### **Past behaviour**

Self-reported past physical activity behaviour was measured using a single item ("How often in the past have you used a gym?") with responses provided on a six-point Likert scale ranging from 1 (never) to 6 (always). This single item measure is derived from Godin et al.'s leisure-time exercise questionnaire and has been used in previous studies (Pihu, Hein, Koka, & Hagger, 2008).

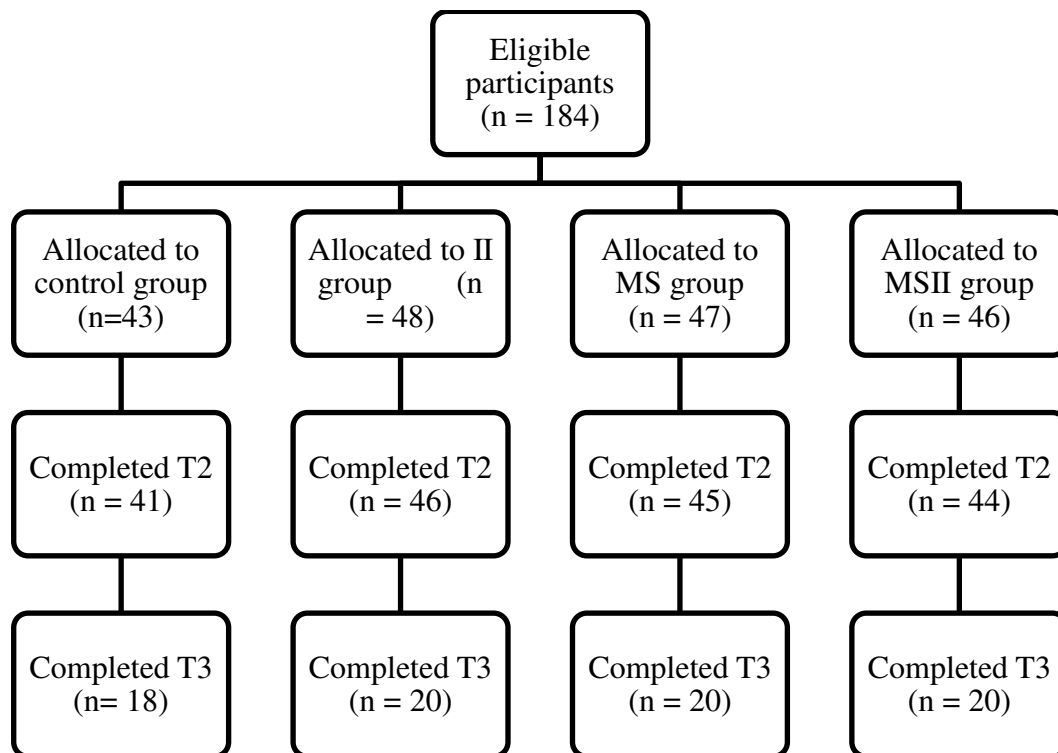
### **Fitness centre attendance**

We measured participants' frequency of attendance at the fitness centre at a six-week follow-up time point post-intervention (T2) as well as a 19-week follow-up time point (T3) for the University of Essex participants. Attendees were issued with a unique coded pass card that they were required to swipe on an electronic card reader on each occasion they attended the fitness centre. Attendance data for each participant was automatically logged and stored electronically. Participating fitness centres provided the researchers with an anonymised list of participants' attendance records using the separate list of codes and participant names provided by researchers. This ensured that study data was never matched with participant names to retain anonymity. Participants consented to having their fitness centre attendance data provided to the research team prior to signing their consent form.

## **Results**

## Participants

One hundred and eighty-four participants completed the questionnaires at T1 (females = 87, males = 97;  $M_{age} = 26.95$  years,  $SD = 9.59$ ). Eight participants (2 participants in each group; 7.61% of the initial sample) dropped out of the study at T2 leaving 178 participants (94.57% of response rate) remaining in the study at six-week follow-up (females = 93, males = 83;  $M_{age} = 27.15$  years,  $SD = 9.72$ ). At T3, seventy-eight participants (42.39% of the initial sample) from the sample from the University of Essex campus fitness centre were contacted to complete the 19-week follow-up measures (females = 48, males = 20;  $M_{age} = 21.81$  years,  $SD = 3.93$ ; Fig 2).



*Note.* II: Implementation intention; MS: Mental simulation.

**FIGURE 2.** Flow chart of participants from time 1 to time 3 of the 19-week follow-up (study 2).



## **Preliminary analyses**

### **Missing data**

Preliminary analyses revealed that 5.44% of the data values were missing at follow-up due to response failures and Little's MCAR test revealed that values were not missing completely at random ( $\chi^2 = 113.68$ ,  $df = 21$ ,  $p < .001$ ). Missing data were imputed using multiple imputation using the same parameters as Study 1.

### **Attrition checks**

A chi-square analysis revealed that participants who completed the study did not differ significantly from participants who dropped out on gender ( $\chi^2 (1, N = 184) = 0.03$ ,  $p = .875$ ,  $\eta^2_p = .012$ ). A MANOVA was used to test the differences on continuous demographic (i.e., age), psychological (theory of planned behaviour), and behavioural (physical activity) variables by attrition rate. The MANOVA revealed an overall statistically significant multivariate effect for attrition (Wilks'  $\Lambda = 0.929$ ,  $F (6, 177) = 2.24$ ,  $p = .042$ ,  $\eta^2_p = .071$ ). Univariate tests showed that participants who completed the study had a higher fitness centre attendance at baseline ( $F (1, 182) = 8.14$ ,  $p = .005$ ,  $\eta^2_p = .043$ ) and a higher perceived behavioural control ( $F (1, 182) = 10.14$ ,  $p = .002$ ,  $\eta^2_p = .053$ ) compared to participants who dropped out. As a consequence, we controlled for these variables in the main analyses.

### **Randomisation checks**

Sample demographic and psychological data are presented in Table 3. Randomisation checks, conducted using chi-square tests and a MANOVA, showed no differences across intervention conditions on gender distribution ( $\chi^2 (3, N = 184) = 3.92$ ,  $p = .270$ ,  $\eta^2_p = .146$ ) and demographic, psychological and behavioural variables (Wilks'  $\Lambda = 0.92$ ,  $F (18, 495) = 0.79$ ,  $p = .719$ ,  $\eta^2_p = .026$ ; Table 3), for the overall sample. With reference to the first sample,

there were also no differences in conditions on gender ( $\chi^2 (3, N = 76) = 1.72, p = .633, \eta^2_p = .150$ ) and the demographic, psychological and behavioural variables (Wilks'  $\Lambda = 0.71, F (21, 190) = 1.15, p = .300, \eta^2_p = .108$ ). In the second sample, no differences in condition were found on the demographic, psychological and behavioural variables (Wilks'  $\Lambda = 0.75, F (21, 281) = 1.39, p = .119, \eta^2_p = .090$ ). However, there were significantly fewer males in the mental simulation group (10 males) than in the control (15 males), implementation intention (20 males), and mental simulation plus implementation intention groups (18 males;  $\chi^2 (3, N = 108) = 8.37, p = .039, \eta^2_p = .278$ ). These data provided good indication that there were no variations across samples from the two locations due to randomisation, and given the identical study design, we pooled data from both locations.

**TABLE 3.**

Sample characteristics in Study 2 (n = 184).

	<b>Control group (n = 43)</b>	<b>Implementation intention group (n = 48)</b>	<b>Mental simulation group (n = 47)</b>	<b>Mental simulation and implementation intention group (n = 46)</b>
Age (years)				
Mean (SD)	27.74 (7.88)	27.13 (10.66)	26.26 (9.93)	26.72 (9.77)
Gender				
Women	22 (22.7%)	21 (21.6%)	30 (30.9%)	24 (24.7%)
Men	21 (24.1%)	27 (31%)	17 (19.5%)	22 (25.3%)
Attitude				
Mean (SD) at T1	4.74 (0.74)	4.69 (0.66)	4.68 (0.66)	4.71 (0.81)
Mean (SD) at T2	4.78 (0.69)	4.81 (0.52)	4.74 (0.66)	4.77 (0.75)
Subjective norms				
Mean (SD) at T1	4.50 (0.82)	4.25 (1.01)	4.32 (0.88)	4.42 (0.79)
Mean (SD) at T2	4.35 (0.94)	4.24 (0.87)	4.53 (0.84)	4.45 (0.71)
Intention				
Mean (SD) at T1	4.44 (1.12)	4.16 (1.01)	4.34 (0.74)	4.41 (0.95)
Mean (SD) at T2	4.58 (1.14)	4.21 (0.98)	4.58 (1.08)	4.34 (0.92)
Perceived behavioural control				
Mean (SD) at T1	4.46 (0.79)	4.46 (0.76)	4.41 (0.63)	4.45 (0.72)
Mean (SD) at T2	4.51 (0.68)	4.49 (0.77)	4.49 (0.71)	4.52 (0.69)

### Intervention effects<sup>3</sup>

A 2 (mental simulation: present vs. absent) x 2 (implementation intention: present vs. absent) ANCOVA was conducted on the dependent variable of fitness centre attendance at T2 controlling for fitness centre attendance at T1. Estimated marginal means for gym attendance at T2 for the mental simulation and implementation intention ( $M = 10.15$ ,  $SE = 0.44$ ,  $95\% CI = 9.29, 11.02$ ), mental simulation ( $M = 10.63$ ,  $SE = 0.44$ ,  $95\% CI = 9.77, 11.49$ ), implementation intention ( $M = 10.49$ ,  $SE = 0.43$ ,  $95\% CI = 9.63, 11.34$ ), and the control ( $M = 10.44$ ,  $SE = 0.46$ ,  $95\% CI = 9.54, 11.34$ ) intervention groups suggested few differences. This was corroborated by our analyses. We found no statistically significant main effects of mental simulation ( $F(3, 180) = 0.02$ ,  $p = .877$ ,  $\eta^2_p = .000$ ) and implementation intention ( $F(3, 180) = 0.24$ ,  $p = .626$ ,  $\eta^2_p = .001$ ), or a significant time x group interaction effect ( $F(3, 180) = 0.36$ ,  $p = .549$ ,  $\eta^2_p = .002$ ), on fitness centre attendance. We also conducted an analysis for the subsample that completed the 19-week follow-up measure at T3. A 2 x 2 ANCOVA with fitness centre attendance at T1 as the covariate revealed no significant main effects of mental simulation ( $F(3, 72) = 0.41$ ,  $p = .524$ ,  $\eta^2_p = .006$ ) and implementation intention ( $F(3, 72) = 0.03$ ,  $p = .868$ ,  $\eta^2_p = .000$ ), or a significant time x group interaction effect, on fitness centre attendance ( $F(3, 72) = 0.06$ ,  $p = .816$ ,  $\eta^2_p = .001$ ).

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<sup>3</sup>Similar to Study 1, we tested whether the mental simulation manipulation had an effect on the motivation by examining the effects of the intervention effects on intention. A univariate ANCOVA with mental simulation as fixed factor (present vs. absent) was conducted on the dependant variable of intention at T2 controlling for intention at T1. Yet, the analyses revealed no significant time x group interaction effect ( $F(1, 182) = 0.02$ ,  $p = .902$ ,  $\eta^2_p = .000$ ) on intention.

**TABLE 4.**

Results of the linear mixed model of the effects of the intervention on physical activity in Study 2.

Outcome measures	Control group (n = 43) Mean (SD)	Implementation intention group (n = 48) Mean (SD)	Mental simulation group (n = 47) Mean (SD)	Mental simulation plus implementation intention group (n = 46) Mean (SD)	$F_{\text{mental simulation} \times \text{implementation intention}}$	Effect size (Implementation intention vs. control) <sup>c</sup>		Effect size (Mental simulation vs. control) <sup>c</sup>	
						<i>d</i>	95% CI <sup>b</sup>	<i>d</i>	95% CI <sup>b</sup>
Fitness centre attendance (T1)	7.33 (4.93)	6.23 (4.37)	7.47 (5.01)	7.30 (5.62)					
Fitness centre attendance (T2)	10.77 (7.04)	9.40 (5.91)	11.15 (7.48)	10.46 (7.96)	0.36	0.04	-0.37 ; 0.45	0.03	-0.38 ; 0.45
Fitness centre attendance (T3) <sup>a</sup>	19.42 (12.18)	16.22 (11.16)	19.45 (11.89)	16.92 (10.70)	0.06	0.10	-0.52; 0.72	0.05	-0.57; 0.67

T1 = Time 1; T2 = Time 2; T3 = Time 3.

<sup>a</sup>Sample size for all groups, n = 20.<sup>b</sup>95%CI = 95% confidence interval of the effect size.<sup>c</sup> Effect sizes for the between-participants effects for T2 and T3.

## **Discussion**

The aim of this study was to test the unique and interactive effects of an intervention comprising motivational and volitional components on fitness centre attendance. In contrast to Study 1, the intervention adopted mental simulation to target motivation and implementation intention to target volitional components and recruited a community sample from a commercial fitness centre in an appropriately-powered, full-factorial, randomized-controlled design. Results revealed no main effects for either of the implementation intention or mental simulation intervention, or their interaction, on fitness centre attendance participation at six weeks post intervention. We observed identical results for the 19-week follow-up for the University of Essex fitness centre participants. These results provide further evidence against the efficacy of mental simulations and implementation intentions, and a combination of the two, in changing physical activity behaviour. Current data were based on a large sample size and used appropriate means to manipulate the intervention components consistent with the underlying theory and methods adopted in the original mental simulation (Pham & Taylor, 1999) and implementation intention (Gollwitzer, 1999; Orbell & Sheeran, 1998) studies. The study also adopted fitness centre attendance an objective indicator of the physical activity behaviour. In addition, we adopted a factorial design to compare the efficacy of each intervention component separately.

## **General discussion**

The aim of the present research was to test the unique and combined effects of two theory-based motivational and volitional components to promote physical activity behaviour: mental simulations and implementation intentions. The studies adopted experimental designs to examine the unique and interactive effects of these intervention components on self-reported physical activity (Study 1) and attendance at a fitness centre (Study 2). Results of

both studies indicated no statistically significant effects of the mental simulation and implementation intention interventions on physical activity behaviour. As a consequence, we had to reject our primary hypothesis that the motivational (mental simulation) and volitional (implementation intention) components would lead to increased physical activity behaviour relative to each of the components alone. We also rejected our hypothesis that each of the intervention components would have main effects on behaviour with greater physical activity participation for participants receiving either of the intervention conditions relative to participants in the control group. We were not able to conduct mediation analyses with the self-efficacy and planning measures as mediating variables as there were no effects on the main outcomes in both studies, contrary to expectations. However, it is important to put these findings into perspective with respect to the limitations of the studies. Study 1, in particular, was conducted on a small sample and effect size statistics appear to indicate medium-sized effects of the interventions, but the study was not sufficiently powered to detect effects of this size.

Current findings are inconsistent with trends in the literature if we compare our results with findings from studies that have investigated the unique and combined effects of mental simulation and implementation intention on health behaviour. Meta-analyses of interventions examining effects of implementation intention on health behaviours have shown small-to-large effect sizes (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011; Bélanger-Gravel et al., 2013; Gollwitzer & Sheeran, 2006), but with substantive unresolved heterogeneity and a number of individual studies with similar designs have found null effects (Huang, 2012; Jackson et al., 2005; Jackson et al., 2006; Jessop et al., 2014; Scholz et al., 2013; Skar et al., 2011). Similarly, research examining the effects of mental simulations has largely supported effects of the intervention, again, some studies report null findings. The combination of motivational and volitional components was supposed to facilitate the enactment of the

behaviour through maximising motivation and facilitating implementation (Hagger & Chatzisarantis, 2014; Milne et al., 2002). In Study 1 of the current study, it is possible that the intervention effects may have been effective and that the study had been inadequately powered. However, this possibility was not corroborated by the results identified in Study 2. It is important to note that intervention studies combining both techniques have not always supported this pattern of effects. For example, Hagger et al. (2012b) found a significant effect of implementation intention on alcohol consumption but no effect for mental simulation or interaction effect of mental simulation and implementation intention, while Hagger et al. (2012a) demonstrated that mental simulation was significantly more effective for the same behaviour with no effect for implementation intentions or the interaction.

It is important to note that the methods adopted in both of the current studies included variations to the conventional operationalization of the intervention manipulations. For example, we adopted slightly different versions of the mental simulation and implementation intention exercises across the studies. An 'if-then' format was used in Study 1 while a global format (a 'what, when, where' plan) was adopted in Study 2. Some researchers (Chapman et al., 2009; Hagger & Luszczynska, 2014) have advocated using the 'if-then' format in implementation intention to facilitate an explicit link between encountered cue in the situation and the behaviour (Gollwitzer & Sheeran, 2006). However, there is, as yet, no definitive consensus on the appropriate format to adopt (Hagger, Luszczynska, et al., 2016) and few researchers have compared the moderating effect of plan format (e.g., 'if-then' format vs. the global format) on the effect of implementation intentions on health-related behaviours (Chapman et al., 2009; Pakpour et al., 2016). Despite these variations, there was no indication of a moderating effect of format in the current studies, as we found consistently null effects regardless of implementation intention format. As a consequence, we do not think that our findings can be dismissed on the basis of methodological variation.



Another factor that may have influenced current findings was the operationalization of the mental simulation manipulation. Two different mental simulation manipulations were used across the studies: a process mental simulation manipulation was used in Study 1 while an outcome mental simulation was used in Study 2. One possible explanation of the current findings is that neither of the simulation techniques was effective in promoting greater motivation. In previous studies, process simulations have been generally found to be more effective than the outcome simulations (Pham & Taylor, 1999). The greater efficacy of process simulations may have been due to the promoting greater self-efficacy through self-modeling and more positive attitudes towards the behaviour through increasing knowledge of the regulation skills required. Outcome mental simulations on the other hand may reflect ‘idealized’ outcome states which are ‘fantasy’-based and may be disruptive when presented alongside planning techniques like implementation intentions. Outcome simulations, for example, may distract from participants’ attention from the goal rather than to the behaviour and the appropriate cues. However, while this may explain why the outcome simulations were not effective in the current study, it does not provide an explanation of the poor effectiveness of the process simulation alongside the implementation intentions in Study 1. One possibility is that because the mental simulation techniques, both process and outcome, were self-directed, the imagery did not focus on behaviourally-relevant actions and cues that would lead to more effective behavioural engagement. There are other imagery-based techniques such as mental contrasting (Adriaanse et al., 2010; Oettingen, Wittchen, & Gollwitzer, 2013; Stadler, Oettingen, & Gollwitzer, 2009), which may help to implement the goal by bolstering motivation without distracting the attention to other goals (Knäuper, Roseman, Johnson, & Krantz, 2009). Mental contrasting focuses on the reinforcement of the volitional phase of the Model of Action Phases and tap into personally-relevant barriers rather than focusing on outcomes which may not be realistic or efficacious. Certainly further

interventions may consider including ‘personally-tailored visualization’ manipulations that focus the actor’s attention on the specific action (i.e., doing physical activity) and relevant cues to action.

### **Limitations and suggested solutions**

A key limitation of the current study was the relatively small sample sizes, particularly in Study 1. This is especially if the effect size for the predicted effect is expected to be on the small side. This is an issue which has been noted in other studies on implementation intentions. Focusing on implementation intentions, previous meta-analyses in physical activity, and across health behaviours more generally, have reported highly variable effect sizes ranging from small to large (Adriaanse et al., 2011; Bélanger-Gravel et al., 2013; Gollwitzer & Sheeran, 2006). Such variability points to the likely presence of moderator variables. This presents a problem when deciding which effect size should be used in statistical power analyses for new interventions and replications of implementation intention studies. There is, therefore, a real need to adopt standardized designs for the manipulation of intervention techniques like implementation intentions and mental simulations and conduct a systematic evaluation of the effect as a function of candidate moderators (Hagger, Luszczynska, et al., 2016; Prestwich, Sheeran, Webb, & Gollwitzer, 2015). This is consistent with research in other areas of psychology advocating the adoption of standardized designs and large-scale, highly-powered replications of intervention effects to allay problems associated with small samples and lack of statistical power (Earp and Trafimow, 2015, Hagger and Chatzisarantis, 2016).

A further limitation of the current research which may have influenced the findings is the definition of the physical activity provided for the participants and failure to prompt a goal intention. No formal definition of the regular physical activity was provided to participants. In Study 1, our self-report measure of physical activity, the IPAQ, provided a

description of each level of intensity of physical activity but it was not defined prior to completing the manipulations. Further, participants in Study 1 were not provided with a specific goal intention to participate in more physical activity than they did before the trial. In Study 2, the WHO physical activity recommendations were introduced alongside mental simulation and implementation intention manipulations. Providing a specific definition may have served as a prompt for participants to form a goal to reduce physical activity when responding to the intervention manipulations. Nevertheless, a specific goal intention was not prompted, which may have stymied the effectiveness of the intervention.

Although we used a self-report measure of physical activity with good psychometric properties in Study 1 (Craig et al., 2003) and fitness centre attendance as an objective proxy measure of physical activity in Study 2, both measures have limitations. Even though self-report measures have good concurrent validity with objective measures of physical activity, there is still the possibility of response bias. Fitness centre attendance is also problematic as it only accounts for frequency of attendance and not the type, duration or intensity of the activities performed once there. These measures may, therefore, have led to bias in the reporting of behaviour. The inclusion of a self-report measure of physical activity in Study 2 alongside the fitness centre attendance measures would have provided additional indication of the types of physical activity behaviour participants engaged in during their fitness centre attendances. Replication of the current paradigm with ‘gold standard’ objective measures of physical activity like heart rate monitors and accelerometers would be required to unequivocally support the current null findings.

It is noteworthy that the sample size in Study 1 was small. Further, even though the sample size was much larger in Study 2, powering the study to detect a small effect size, such as that found in Bélanger-Gravel et al.’s research (2013), would have required a much larger sample. But, powering the study to find such a small effect size would mean to focus on an

effect that would be of little practical significance. Interestingly, adhering to such an estimate would mean identification of a sample size that would exceed the largest sample size in the sample of studies included in Bélanger-Gravel et al.'s meta-analysis. Meaning that all studies testing for planning intervention effects in physical activity are underpowered. In reality, it seems that the true effect size derived from the current study was even smaller than this estimate. This means that the likelihood of finding a statistically significant effect size would require a very large sample size. This example, therefore, illustrates the imperative of an appropriate sample size, but also illustrates that, in some cases, a very small effect size would make it unfeasible to attain the required sample size. However, such studies would perhaps have limited value because they would be attempting to find an effect which has little or no practical significance.

## **Conclusion**

Current findings do not support the effectiveness of the individual or combined use of mental simulations and implementation intention techniques to promote physical activity behaviour. The studies had numerous strengths including factorial designs and close match of manipulations and stimuli with those adopted in previous studies, particularly studies that indicate the defining features of both manipulation types. There are, of course, limitations, including minor deviations from other implementation intention and mental simulation studies, variation across the two studies in the type of mental simulation and implementation intention formats adopted, and in the relatively small sample of Study 1. Notwithstanding these limitations, the current findings provide indication that these intervention techniques may not be as effective as expected or reported in previous meta-analyses. We feel that the deviations from protocol are relatively minor and our manipulations closely mirror the suggested features of each intervention component. We would, therefore, be surprised if

making minor alterations to the components would overturn the null effects. However, we cannot, of course, unequivocally rule out that possibility, and we therefore look to further replications that refine our methods to provide further replication tests of these effects to confirm or reject our null findings.

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### **Supplemental files**

Consort statement checklist is available as supplemental files (see ANNEXE VI).

### **Conflict of interest**

The authors declare that the research was conducted in the absence of any commercial or financial relationships *and there is no conflict of interest.*

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S'orientant vers la population clinique et les comportements liés à la maladie, nous avons ensuite testé l'efficacité d'une intervention basée sur le planning afin de promouvoir l'adhésion médicamenteuse dans les maladies cardio-vasculaires. Nous nous sommes, cette fois, centrés uniquement sur la phase volitionnelle, en la renforçant par le biais de deux types d'interventions : l'implémentation d'intention, se focalisant sur les barrières liées à l'oubli de prise de traitement, et le coping planning, aidant à mettre en place des stratégies personnelles pour faire face aux problèmes de prise de traitement comme le médecin le prescrit. Un essai randomisé contrôlé auprès de patients présentant un diagnostic de maladies cardiovasculaires n'a pas montré d'effet significatif de l'intervention, excepté chez un profil particulier de patients, ayant les croyances les moins élevées concernant la nécessité de prendre leur traitement. Ces résultats questionnent une nouvelle fois le caractère nécessaire de l'intention dans l'efficacité des interventions d'implémentation d'intentions.

**PARTIE III : A Randomized Controlled Trial to Test the Effectiveness of  
Planning Strategies to Improve Medication Adherence in Patients with  
Cardiovascular Disease**

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## ABSTRACT

**Background:** Low levels of adherence to medication prescribed to treat and manage chronic disease may lead to maladaptive health outcomes. Theory-based, easy-to-administer interventions that promote patients' effective self-regulation of their medication-taking behaviour are needed if adherence is to be maximised. We tested the effectiveness of an intervention adopting planning techniques to promote medication adherence. **Methods:** Outpatients with cardiovascular disease (N=71) were allocated to either an experimental condition, in which participants were asked to form implementation intentions and coping plans related to their treatment, or to a no-planning control condition, in which participants received no treatment. Patients also completed self-report measures of medication adherence, self-efficacy, and beliefs in medication necessity and concerns. Measures were administered at baseline and at 6-week follow-up. **Results:** Results revealed no overall main effect for the intervention on medication adherence. Post hoc moderator analyses revealed that the intervention was effective in patients with lower necessity beliefs compared to those with higher necessity beliefs. **Conclusion:** While current findings have promise in demonstrating the conditional effects of planning interventions, there is a need to replicate these findings by manipulating planning and beliefs independently and testing their direct and interactive effects on medication adherence.

**Keywords:** Medication adherence, implementation intention, coping planning, cardiovascular disease, behaviour change intervention

## INTRODUCTION

Health outcomes in chronic disease are highly dependent on treatment adherence (DiMatteo, Giordani, Lepper, & Croghan, 2002). Research has demonstrated that medication adherence in non-institutionalized patients with chronic diseases has been estimated at only 50% (DiMatteo, 2004). In the context of cardiovascular disease (CVD), which causes 17.3 million deaths every year worldwide (WHO, 2011), medication adherence is essential to minimise illness progression and poor medication adherence problems increases the risk of mortality and the number of subsequent hospitalizations (Ho et al., 2008).

Interventions that increase the capacity of outpatients with chronic disease to effectively manage their treatment, that is, to better *self-regulate* their medication-taking behaviour, are needed (O'Brien et al., 2015; Wallace, Brown, & Hilton, 2014). Health professionals have turned to behavioural scientists and social psychologists to provide an evidence base for interventions based on psychological theory that are effective in promoting better self-regulation of health behaviour. Prominent among these theories are theories of motivation that identify individuals' intentions as a key predictor of behaviour (Heckhausen & Gollwitzer, 1987; Schwarzer, 1992). However, research has demonstrated that a large population of individuals has strong intentions to engage in health behaviour but fail to do so (Sheeran, 2002). These 'inclined abstainers' (Orbell & Sheeran, 1998) or 'unsuccessful intenders' (Rhodes & de Bruijn, 2013) have difficulty in converting their good intentions into actual behaviour. Furnishing intentions with plans, known as implementation intentions, to enact those intentions has been shown to be an effective strategy in improving relations between intentions and behaviour (Gollwitzer & Sheeran, 2006). Self-regulation strategies like implementation intentions may help in countering the gap between intention to take medication and actual medication adherence. Implementation intentions are a mental act linking an anticipated critical situation or cue and an effective goal-directed response

(Gollwitzer, 1993). The plans are hypothesized to affect better enactment of intended behaviour by assisting recall of the intended behaviour and facilitating efficient enactment of the behaviour on presentation of the cue. Recent meta-analyses have demonstrated that implementation intentions are effective in improving behavioural adherence to health-related behaviours like physical activity (Bélanger-Gravel, Godin, & Amireault, 2013), healthy diet (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011), and attendance to screening programmes (Cooke & French, 2008).

Numerous studies have demonstrated that implementation intentions are effective in promoting adherence to medication in epileptic (Brown, Sheeran, & Reuber, 2009), coronary artery disease (Lourenco et al., 2014), and hypertensive patients (O'Carroll, Chambers, Dennis, Sudlow, & Johnston, 2014). In contrast, another study (Jackson et al., 2006) did not find any effect of implementation intentions in improving adherence to antibiotic medication. However, one factor that might have mitigated the effectiveness of the intervention in Jackson et al.'s study (2006) was that they did not adopt an 'if-then' format for their implementation intention. The 'if-then' clearly designates the link between the cue encountered in the situation and the behaviour (e.g., "If situation x arises, then I will do behaviour y"; Gollwitzer & Sheeran, 2006), and is strongly advocated in implementation intention research (Chapman, Armitage, & Norman, 2009; Hagger & Luszczynska, 2014).

Alongside implementation intentions, coping planning is another behavioural planning technique that has been developed to overcome barriers to anticipate situations that may prevent individuals from engaging in the desired behaviour (Schwarzer, 2008; Sniehotta, Schwarzer, Scholz, & Schüz, 2005). Forming a coping plan helps individuals arrive at novel ways to manage health behaviour by heightening situational and response cues for the new, desired behaviour and assist in replacing cues to the habitual, unintended behaviour. In the context of taking CVD medication, salient barriers are mostly related to treatment and vary

among patients as a function of disease type and severity. Generally, patients are prescribed antianginals, statins, anticoagulants, or antiplatelet drugs. Thus, the barriers usually relate to the iatrogenic (e.g., liver disease, kidney failure, diabetes) and side (e.g., memory lapses) effects related to the patients' medication especially statins and antianginal drugs. Randomised controlled trials have shown efficacy of the combination of action planning with barrier management, a strategy closely linked with coping planning, in promoting medication adherence in patients with coronary heart disease (Lourenco et al., 2014).

Recent conceptual reviews on the effectiveness of planning interventions in health research indicated the importance of testing for potential moderators of planning effects (Hagger & Luszczynska, 2014; Hagger et al., 2016). Behavioural and self-efficacy beliefs have been proposed as candidate moderators. Focusing on behavioural beliefs, there is research indicating that attitudes regarding the target behaviour, or accompanying conditions or illnesses, may determine whether or not implementation intentions will be effective. For example, Brown et al. (2009) demonstrated that forming an implementation intention resulted in better medication adherence among epileptic patients with low concerns about their condition but not among those with high concerns. Although concerns about illness do not directly equate to concerns about medication, this research illustrates how beliefs about the condition which have strong relevance to the behaviour in question, that is, medication adherence, have the potential to affect the efficacy of plans. Brown et al.'s (2009) findings are consistent with research that has suggested that planning interventions are effective for individuals with self-regulatory problems (e.g. Brandstätter, Lengfelder, & Gollwitzer, 2001; Webb & Sheeran, 2004). The likely mechanism behind the moderating effects of such beliefs is that individuals with low concerns may not be sufficiently attentive to key cues to enact and may, therefore, suffer from regulatory problems and benefit more from planning

strategies that promote better attention to salient cues and more automatic links between the cue and action.

Another potential moderator of planning intervention effectiveness is self-efficacy (Schwarzer, 1992). Research has demonstrated that enhancing self-efficacy increases the effectiveness of an implementation intention intervention on health behaviour (Kellar & Abraham, 2005). Given the strong links between self-efficacy, motivation and intentions to engage in health behaviours (Gollwitzer & Sheeran, 2006; Schwarzer, 1992; Sheeran, 2002), this work is consistent with the contention that implementation intentions are effective for individuals that are motivated to engage in the behaviour. Consistent with the model of action phases (Heckhausen & Gollwitzer, 1987), motivation is a prerequisite for volitional strategies like planning to have an effect, therefore, it would be expected that self-efficacy beliefs, which are closely aligned with motivation, will moderate the effectiveness of plans on behaviour. Thus, beliefs regarding the illness, behaviour, and self-efficacy, may determine whether implementation intentions are effective (Wray, Waters, Radley-Smith, & Sensky, 2006). Accounting for the effects of these moderators is important as the main effect of implementation intentions in the absence of such beliefs or self-efficacy may be null and, therefore, mask the true nature of the effect of planning interventions on behaviour.

### **The Present Study**

Given research that has shown the effectiveness of both implementation intentions and coping planning in promoting adherence in health-related behaviours, the aim of the present study was to examine the effectiveness of a combined intervention adopting both techniques in promoting medication adherence in patients with CVD. Specifically, the study adopted a 2 (intervention condition: control group vs. implementation intention and coping planning group) x 2 (time: baseline (T1) vs. post-intervention follow-up (T2)) randomized controlled



design with medication adherence measured at T1 and follow-up post-intervention measures collected at T2, 6 weeks later. We expected the research to make an original contribution to the literature by testing the effectiveness of a theory-based planning intervention which combined two types of planning based on psychological theory on a behaviour and will have important ramifications for practice in managing illness in CVD patients. We also expected the findings to have the potential to extrapolate in other settings where the promotion of medication adherence is important and compliance is sub-optimal. In terms of specific hypotheses, we expected that participants from the intervention group would exhibit higher medication adherence scores, measured on two self-report measures of medication adherence, the Morisky Medication Adherence Scale and the Visual Analogue Scale, at T2 while controlling for medication adherence at T1, compared to the control group. We also included additional measures of intentions, medication beliefs, and self-efficacy. These variables may be important when it comes to identifying the potential mechanisms for the effects of the planning interventions. For example, the effects of implementation intentions are not expected to result in changes in intentions, only behaviour, because such planning interventions are proposed to act in a ‘post-decisional’ manner (Heckhausen & Gollwitzer, 1987). However, intention strength, beliefs such as beliefs about illness (Wray et al., 2006), and Bandura’s self-efficacy construct, defined as individuals perceived personal capacity to engage in a given behaviour (Kellar & Abraham, 2005), have been proposed as possible moderators of planning interventions. We have included these measures to enable us to conduct exploratory post hoc tests of these constructs as moderators of the planning intervention on behaviour.

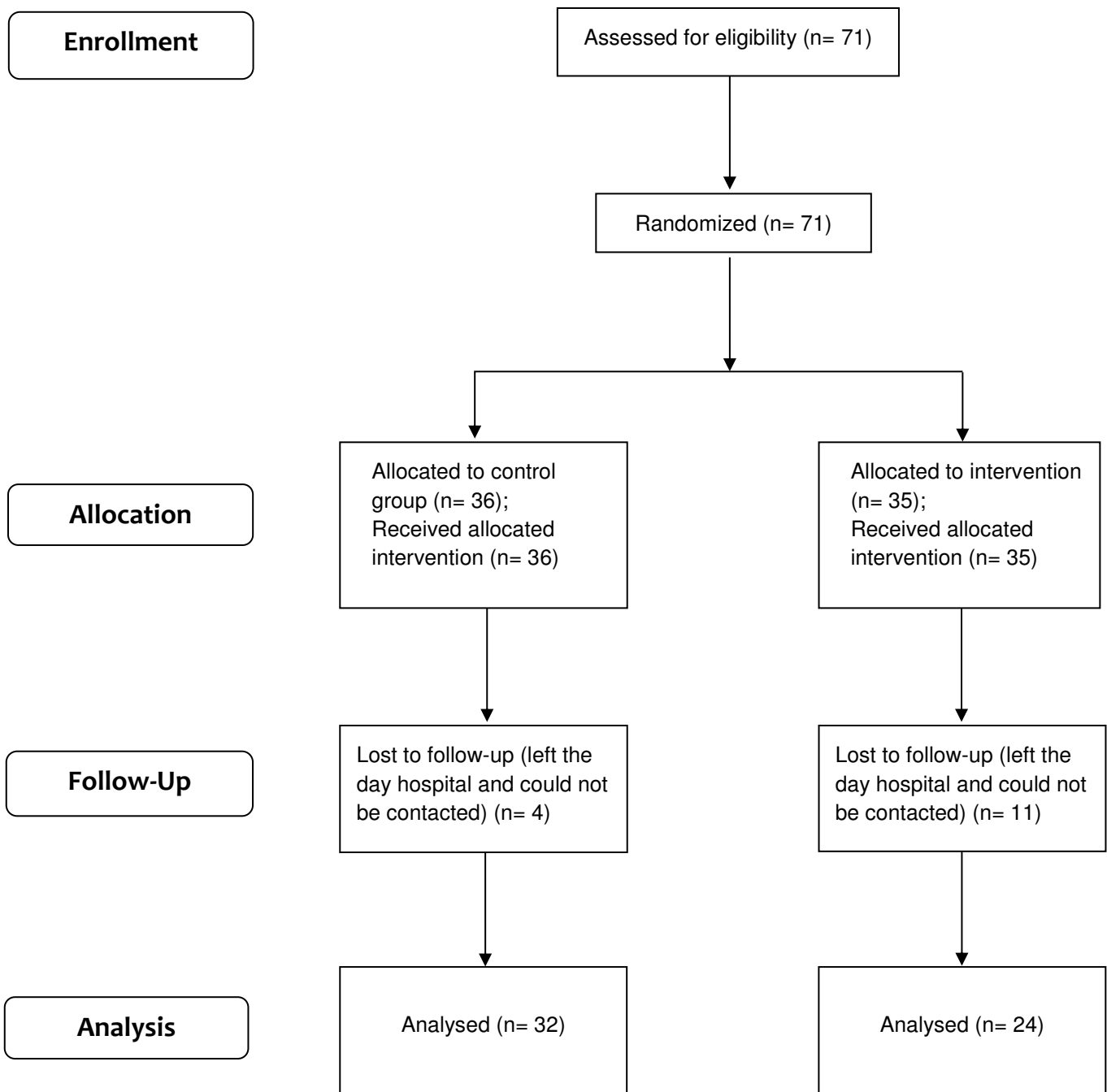
## **METHOD**

## Participants and procedure

The present study adopted a randomised controlled design. We estimated our sample size at 54 participants minimum (Gollwitzer & Sheeran, 2006; power = .80, alpha = .05,  $d = .59$ ) for a 2 x 2 ANOVA (Faul, Erdfelder, Lang, & Buchner, 2007). Patients were recruited from a hospital outpatient cardiac rehabilitation clinic. The clinic provided rehabilitation programs for patients with different types of CVD after treatment for serious cardiac events (e.g. myocardial infarction, heart failure, heart surgery). Patients attended the clinic for six weeks, which represented the follow-up duration, for between two and three half-days per week, depending on the patient's condition. During the half-day treatment sessions in the clinic, patients participated in prescribed exercise sessions supervised a physiotherapist (exercise bicycle, light gymnastics). Patients had attended regular appointments with the consultant in charge of their care throughout their clinic attendance, including one immediately before they arrived at the cardiac rehabilitation centre and one before they left, to draw up a complete report on their program of care. All the patients participated in patient education sessions on tobacco consumption, stress and cardiovascular disease.

Patients were eligible to participate in the current study if they were older than 18 years, have had a recent major cardiac event, and have been referred to the clinic for the first time. Participants were mostly men (80.3%) with an average age of 59.54 ( $SD = 11.31$ ) years (see Table 1), 78.9% were married, 25.4% had completed primary, secondary or high school education, and 74.6% completed post-school vocational training or attended university. Most patients were prescribed statins to reduce cholesterol levels, vasodilators or Beta blockers to manage angina pectoris symptoms, or anticoagulants or antiplatelet drugs to prevent myocardial infarction.

Data collection at Time 1 (T1) took place when patients arrived for their first session at the clinic and data collection at Time 2 (T2) took place when patients completed their final session six-weeks later. Participants did not receive any remuneration for the study. At T1, patients were told that the study was about “medication intake in patients with cardiovascular disease”. Eligible patients (N = 71) were randomly allocated to the implementation intention and coping planning group or control group using a random numbers table generated by the experimenter (Figure 1). No allocation concealment was made regarding the sequence generation. No patient declined to participate in the study. Patients were blinded to group allocation, but the experimenter administering the study materials was not. Patients were asked to complete the paper and pencil questionnaires individually in a quiet room. If the questionnaire was unclear for the patients, the experimenter was on hand to answer questions. At T1, patients in both groups completed study baseline measures including current self-reported medication adherence, socio-demographic data, and scales measuring self-efficacy and beliefs about medicines, which took approximately 10 minutes to complete. Patients allocated to the implementation intention plus coping planning group were then required to engage in the exercises that contained the implementation intention and coping planning manipulations, which took 10 additional minutes to complete. At T2, patients in both groups completed follow-up study measures identical to those administered at T1. Patients were debriefed and thanked for their participation. Data were collected from May to December 2014 and we stopped the trial when we had collected data from sufficient numbers of participants in the study to achieve adequate statistical power.



**Figure 1.** Flow chart of participants from time 1 to time 2 of the 6-week follow-up.

## **Informed consent and anonymity**

Prior to data collection, patients read a study information sheet, which they were able to take home with them, and signed an informed consent form (see ANNEXE VII). The information sheet provided details of the study, expectations of participation, and participants' rights, benefits, and potential risks of participation. We detached the informed consent from the questionnaire in order to maintain participant anonymity. At T1 and T2, participants formed a unique identifier comprising the first two letters of their mother's name, father's name, and their month and date of birth. This was used instead of names to match participants' data across T1 and T2. Ethical approval for the study was obtained from the institutional review board of the CERNI (Comite d'Ethiques pour les Recherches Non Interventionnelles, Pôle Grenoble Cognition, France) prior to data collection.

## **Measures**

**The 8-item Morisky Medication Adherence Scale (MMAS-8).** Medication adherence was measured using the French version of the MMAS-8 (Korb-Savoldelli et al., 2012), including eight items with scores ranging from 0 to 8. Higher scores represented better adherence. We used the MMAS-8 score in three ways: the total score, the unintentional non-adherence score and the intentional non-adherence score (Toll, McKee, Martin, Jatlow, & O'Malley, 2007). Items referring to the forgetting to take medication comprised the unintentional non-adherence scale (e.g. "Do you sometimes forget to take your medication?"). Items referring to barriers to medication adherence made up the intentional medication non-adherence scale (e.g. "When you feel like your treatment is under control, do you sometimes stop taking your medicine?"). Participants responded on a binary scale with "yes" (1) or "no" (0) anchors for seven of the items with one item reverse scored and on a 5-point Likert scale for one item ("never or rarely" (1), "from time to time" (0.75),

“sometimes” (0.50), “frequently” (0.25), “all the time” (0)). Scores on these subscales ranged between 0 and 3, with higher scores representing better adherence.

**Visual Analogue scale (VAS) for medication adherence.** The single-item visual analogue rating scale (VAS) was used to measure medication adherence. We chose to add another measure of medication adherence because the VAS has been shown to be strongly correlated with objective measures of medication adherence (Kalichman et al., 2009). We modified the scale to refer to medication adherence in general: “On a scale from 0 to 100 (0 means that you never take your treatment, and 100 that you always take it, at the prescribed hour and dose), place a cross where you estimate you are.”

**Beliefs about Medicines Questionnaire (BMQ).** Beliefs about medication were measured using five items from the French version of the BMQ (Fall, Gauchet, Izaute, Horne, & Chakroun, 2014). We used the five-item version because it has demonstrated good psychometric properties and reduces response burden on participants (Mann, Ponienman, Leventhal, & Halm, 2009). Three items were related to the concerns about treatment scale (BMQ-C; e.g. “Having to take medicines worries me”) and two items were linked with the perception of the treatment as a necessity scale (BMQ-N; e.g. “Without my medicines I would be very ill”). Responses were given on a five-point Likert scale (from 1, “strongly disagree”, to 5, “strongly disagree”).

**Self-efficacy scale.** Finally, a single item was used to measure perceived self-efficacy concerning treatment (Mann et al., 2009): “How confident are you in your ability to take your treatment as the doctor prescribes it?” We chose this validated single-item of self-efficacy to reduce response burden on participants given the considerable number of outcome measures. Participants specified their level of agreement on a five-point Likert scale (from 1, “strongly disagree”, to 5, “strongly disagree”).

**Socio-demographic data and disease information.** Participants completed a brief socio-demographic questionnaire at baseline including type of CVD, date of diagnosis and initiation of treatment, associated disease(s), help with the management of the treatment (if the patient was given help with their treatment by a relative or a caregiver), use of an organization tool like a pillbox, and treatment history.

## **Intervention**

**Implementation Intention and Coping Planning Group.** Manipulations of implementation intention and coping planning components of the intervention were delivered via a printed pen-and-paper exercise. Participants in the implementation intention and coping planning group were first prompted to form implementation intentions by identifying the appropriate place and time to take their medication, and an action they did every day that served as a prompt or cue to take their medication. Similarly to Brown et al. (2009), participants specified plans for the morning, afternoon, and evening (e.g., “If it is 8 a.m., and I am in the bathroom, and I have finished brushing my teeth, then I will take my morning medication.”)

Participants were then prompted to form coping plans to anticipate and deal with potential barriers. Our method was similar to Armitage’s (2008) Volitional Help Sheet. An expert committee identified salient barriers relevant to cardiac rehabilitation context and these were reformulated to an ‘if-then’ format (e.g., “If I am out of my medicines on a Sunday morning, then I will identify a 24h pharmacy from the shop window of my usual pharmacy and take my medication as usual during the day”; Chapman et al., 2009; Lehmann et al., 2014). Participants were asked to tick the barriers they had encountered, and prompted to formulate their own ‘if-then’ plans. Salient barriers identified by the patients included memory problems caused by the statins (e.g., “If I have problems with my memory, then...”),

the number of medications used to manage iatrogenic effects (e.g., “If I have difficulties managing all the medicines I have, then...”), and the side effects caused by the statins and the antianginals (“If the side effects of my treatment have an impact of my daily routine, then...”).

**Control Group.** Participants in the control group only completed the informed consent, medication adherence self-report measures, BMQ and self-efficacy measures, socio-demographic data, and information about the disease and the treatment.

### **Data analysis**

Missing values were replaced using multiple imputation based on estimates obtained from maximum likelihood regression analysis. To avoid type 1 error due to multiple comparisons for the correlations, we adjusted the critical alpha-value using a Bonferroni correction. As there were six comparisons in our analysis, the critical alpha-value was set at .008 ( $.05/6 = .008$ ) for statistical significance, which means that none of the correlations was statistically significant according to this stringent criterion. We explored the potential for medication beliefs and self-efficacy to moderate the effects of the intervention on behaviour by running a series of moderated multiple regression analyses. In the analyses the main effect of the intervention as a dichotomous dummy-coded variable was included alongside interaction terms reflecting the effect of the intervention conditional on the two sets of beliefs.

## **RESULTS**

### **Preliminary analyses**



Fifteen participants (11 in the implementation intention and coping planning group and four in the control group, namely 21.13% of the initial sample) dropped out of the study prior to the six-week follow-up because they failed to attend the clinic and could not be subsequently contacted.

### **Attrition checks**

Participants who completed the study did not differ significantly from the participants who dropped out with respect to socio-demographic data, disease type and status, type of treatment, and the outcome variables ( $p > .05$ ; Table 1). However, participants from the experimental group were more likely to dropout than participants in the control group ( $p = .04$ ).

### **Randomisation checks**

Randomisation tests revealed that the intervention group and control group did not significantly differ on gender ( $\chi^2(1, N = 71) = 1.57, p = .211, \eta^2_p = .149$ ), age ( $t(69) = -0.85, p = .396, d = 0.202$ ), number of medicines ( $t(69) = 0.58, p = .563, d = 0.14$ ), unit doses per day ( $t(69) = 0.63, p = .534, d = 0.15$ ), medication adherence measured with the MMAS-8 ( $t(69) = 1.60, p = .114, d = 0.38$ ) and the VAS ( $t(69) = 0.98, p = .333, d = 0.23$ ), BMQ-C ( $t(69) = -0.89, p = .375, d = 0.21$ ) and BMQ-N ( $t(69) = 0.43, p = .673, d = 0.10$ ) scores, and self-efficacy ( $t(69) = 0.85, p = .400, d = 0.20$ ) measured at T1, meaning that randomisation was successful.

**TABLE 1.**

Self-reported Sample Characteristics at Baseline (N = 71).

Variable	Control group	Intervention group
Age in years <sup>a</sup>	60.67 (12.67)	58.37 (10.38)
Gender <sup>b</sup>		
Women	5 (13.9%)	9 (25.7%)
Men	31 (86.1%)	26 (74.3%)
Disease <sup>b</sup>		
Myocardial infarction, stent, ACS	33 (91.7%)	28 (80%)
Heart failure, cardiomyopathy	2 (5.6%)	6 (17.1%)
Aortic valve replacement, mitral valve repair	1 (2.8%)	1 (2.9%)
Number of medicines <sup>a</sup>	6.44 (2.25)	6.83 (3.25)
Unit doses per day <sup>a</sup>	7.08 (2.72)	7.63 (4.45)
Medication adherence <sup>a</sup>		
MMAS-8	7.08 (1.04)	7.43 (0.75)
MMAS-8 Intentional non-adherence	2.81 (0.40)	2.91 (0.28)
MMAS-8 Unintentional non-adherence	2.58 (0.58)	2.66 (0.59)
VAS	91.61 (7.68)	93.27 (6.61)

*Note.* <sup>a</sup>Values in parentheses are standard deviations; <sup>b</sup>Values in parentheses are proportion of the overall sample with the characteristic. ACS = Acute coronary syndrome; Unit doses per day = number of doses of medication taken per day; MMAS-8 = Morisky Medication Adherence Scale (8 items); VAS = Visual Analogue Scale for Medication Adherence.

### Descriptive statistics and correlations among study variables

Descriptive statistics including means, standard deviations, and Cronbach alpha internal consistency statistics, and zero-order intercorrelations among study variables are presented in Table 2. Cronbach alpha coefficients were satisfactory for the BMQ-N and BMQ-C scales. However, coefficients for the scale MMAS-8 scale fell below suggested cutoff values (.70), indicating problematic internal consistency for the scale. Problems with the internal consistency of the scale have been reported elsewhere, particularly in translated versions of the scale (Al-Qazaz et al., 2010; de Oliveira-Filho, Morisky, Neves, Costa, & de Lyra, 2014)

including the French version used here (Korb-Savoldelli et al., 2012). We calculated zero-order correlations between MMAS-8 (total score, intentional non-adherence score, unintentional non-adherence score) and VAS at T2, self-efficacy, BMQ-N and BMQ-C at T1, and planning intervention (a dichotomous dummy-coded variable with -1 assigned to the control group and +1 to the intervention group; see Table 2).

**TABLE 2.** Descriptive Statistics, Cronbach Alpha Reliability Coefficients, and Zero Order Correlation Coefficients Among Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. MMAS-8 T1	1													
2. MMAS-8 T2	.578**	1												
3. VAS T1	.325**	.262*	1											
4. VAS T2	.214	.262*	.439***	1										
5. BMQ-C T1	.030	.052	-.124	-.006	1									
6. BMQ-C T2	.010	-.070	-.052	-.045	.690***	1								
7. BMQ-N T1	.051	.197	-.015	-.030	.074	.163	1							
8. BMQ-N T2	.002	.156	-.010	-.075	.064	.223	.723***	1						
9. SE T1	.070	.051	.132	.152	.405***	-.313	.003**	-.062	1					
10. SE T2	-.045	.205	.030	.102	-.350**	-.372**	.210	.105	.443***	1				
11. Age	.039	-.031	.065	-.072	-.200	-.075	-.071	-.009	.078	.172	1			
12. N. medicines	.045	.170	.112	.134	-.083	.014	.117	.197	-.024	.040	.059	1		
13. Unit doses/day	.042	.142	.095	.131	-.072	.016	.113	.204	-.027	.008	.104	.959***	1	
14. Group <sup>a</sup>	.189	.210	.117	-.026	-.107	-.207	.051	.166	.101	.201	-.102	.070	.075	1
$\alpha$	.33	.59	–	–	.74.	.79	.74	.88	–	–	–	–	–	–
Mean	7.07	92.43	91.42	8.44	7.79	7.59	7.81	3.82	4.03	59.54	6.63	7.35	–	–
SD	1.22	7.17	11.92	3.52	3.68	2.39	2.51	1.23	1.13	11.31	2.78	3.66	–	–

*Note.* <sup>a</sup>Dummy coded variable representing the intervention condition with participants allocated to the implementation intention and coping planning intervention coded as +1 and participants allocated to the control condition coded as -1. MMAS-8 = Morisky Medication Adherence Scale (8 items); VAS = Visual Analogue Scale for Medication Adherence; BMQ-C = Beliefs in Medicines Questionnaire, “Concerns” dimension; BMQ-N = Beliefs in Medicines Questionnaire, “Necessity” dimension; SE = Self-Efficacy.

## Intervention effects<sup>4</sup>

We tested the effects of the implementation intention and coping planning intervention on medication adherence using a multivariate ANOVA with condition (intervention group vs. control group) as the independent variable and MMAS-8 at T2 and VAS at T2 as dependent variables, controlling for medication adherence measures from T1 (MMAS-8 and VAS scores). Means and standard deviations for medication adherence measured at T2 are presented in Table 3. Based on the estimated marginal means, the mean difference at T2 between the control group and the intervention group was -.24 for the MMAS-8 (95% CI, -.73-.25;  $\eta^2_p = .014$ ) and 2.21 for the VAS measure of medication adherence (95% CI, -3.04-7.45;  $\eta^2_p = .010$ ).

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<sup>4</sup>We also tested the effects of the implementation intention and coping planning intervention on medication adherence using a multivariate ANOVA with condition (intervention group vs. control group) as the independent variable and difference scores between MMAS-8 at T2 and T1 and VAS at T2 and at T1 as dependent variables, which did not change the pattern of results. Based on the estimated marginal means, the mean difference at T2 between the control group and the intervention group was -.16 for the MMAS-8 (95% CI, -.65-.32;  $\eta^2_p = .007$ ) and 2.28 for the VAS measure of medication adherence (95% CI, -2.88-7.44;  $\eta^2_p = .011$ ).

**TABLE 3.**

Estimated Marginal Means for the Medication Adherence Scores for the Intervention and Control Groups at T2 (6-week follow-up).

Outcome measures at T2	Intervention group				Effect size		
	Control (n = 36)		Intervention <sup>a</sup> (n = 35)		Mean Difference	95% CI	
	<i>M</i>	SD	<i>M</i>	SD			
MMAS-8	6.95	0.17	7.19	0.17	-0.24	-0.73	0.25
VAS	92.50	1.83	90.30	1.85	2.21	-3.04	7.45

*Note.* <sup>a</sup>Implementation intention and coping planning intervention. T1 = Time 1; T2 = Time 2; MMAS-8 = 8-item Morisky Medication Adherence Scale; VAS = Visual analogue scale for medication adherence; CI = Confidence Interval

## Post hoc Tests for Moderators

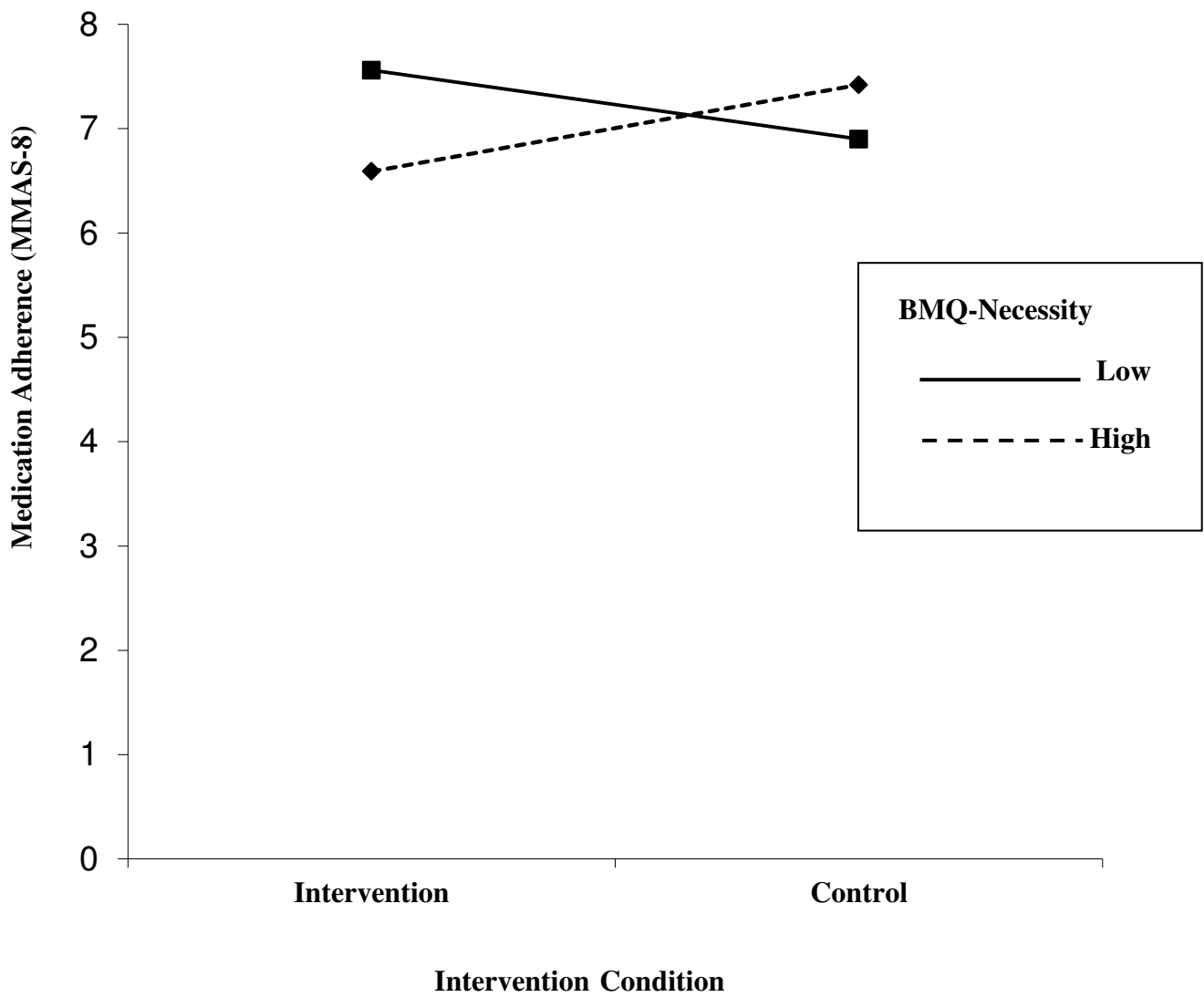
Given the null effects for the main effect of the intervention, we proceeded to conduct post hoc follow-up analyses in order to gain insight into why our intervention failed to support our predictions. We measured a number of covariates such as age, gender number of diseases suffered by participants, number of medications taken by participants and duration of treatment. However, none of those covariates was associated with medication adherence. For this reason these covariates were not included in the analysis. The regression analyses were conducted on each independent variable separately. As before, because conducting multiple analyses increases type I error rates, we set the alpha level of our statistical tests to  $p < .017$  for maximum stringency and to control for type I error rates. This new alpha level was estimated by dividing the conventional alpha level ( $p < .05$ ) by the number of statistical tests conducted ( $n = 3$ : a MANOVA plus two regression analyses). In all regression analyses, we obtained bias-corrected confidence intervals by replicating the analysis 10,000 times using a bootstrapping re-sampling method.

The first regression analysis examined the effects of the planning intervention as a dichotomous, dummy coded variable on medication adherence measured by the MMAS-8 at T2 with the necessity (BMQ-N) and concerns (BMQ-C) dimensions of the beliefs in medicines questionnaire as moderators. In the first step of the analysis, the main effects of the intervention group and standardized BMQ-C and BMQ-N scores at T1 were entered into the regression equation with medication adherence at T1 included as a covariate. This was followed by second and third steps in which interaction terms represented by the product of the intervention group variable with BMQ-N and BMQ-C scores at T1, respectively, were entered into the equation. Results of the analysis are provided in Table 4. The equation in the first step was statistically significant and accounted for 33% of the variance in MMAS-8 scores. In this step the only significant predictor was MMAS-8 scores at T1 with no main

effect for the intervention condition or the beliefs variables consistent with the ANOVA results. The addition of the interaction term for planning intervention and BMQ-C scores at T1 in step 2 did not result in a statistically significant step change in the prediction of MMAS-8 scores at T2 or interaction effect and accounted for less than 1% change in variance explained in MMAS-8 scores at T2. The equation in step 3 revealed a statistically significant step change in the prediction of MMAS-8 scores at T2 which accounted for an additional 9% of the variance of MMAS-8 scores. In this step there were statistically significant effects for MMAS-8 scores at T1 and the interaction term comprising intervention condition and BMQ-N scores at T2. The Durbin-Watson test revealed independence of the error terms with a value of 1.75.

To probe the interaction effect found in step 3 of the analysis, we conducted a follow-up simple slopes analysis for the effect of the planning intervention on MMAS-8 scores at T2 for one standard deviation above and below the mean for BMQ-N at T1 (Figure 2). Simple slopes analysis showed that the planning intervention resulted in better medication adherence when patients' BMQ-N scores at T1 were lower ( $\beta = .49$ ,  $SE = .17$ ,  $t(70) = 2.82.73$ ,  $p = .006$ ) than when BMQ-N scores at T1 were higher ( $\beta = -.28$ ,  $SE = .17$ ,  $t(70) = -1.75$ ,  $p = .085$ ).





**FIGURE 2.** Simple slopes analysis of self-reported medication adherence (MMAS-8) as a function of group and beliefs in medicines necessity (BMQ-N).

*Note.* MMAS-8 = Morisky Medication Adherence Scale; BMQ-N = Beliefs in Medicines Questionnaire, “Necessity” dimension.

The second analysis examined the effects of the planning intervention on medication adherence with self-efficacy as a moderator. Medication adherence at T1, intervention group and standardized self-efficacy scores were entered as main effects in step 1 of the regression equation. An interaction term represented by the product of the intervention group variable with self-efficacy scores at T1 was entered into the equation in step 2. Consistent with the previous analysis, the first model resulted in a statistically significant equation ( $F(3, 67) = 11.71, p < .001$ ) and, again, MMAS-8 score at T1 was the only statistically significant predictor ( $\beta = .56, SE = .13, t(70) = 5.53, p < .001$ ). Entering the interaction term in step 2 did not result in a statistically significant increment in variance explained ( $F_{\text{change}}(1, 66) = 2.13, p = .149$ ) or a significant interaction effect ( $\beta = .48, SE = .10, t(70) = 1.46, p = .149$ ).

**TABLE 4.**

Prediction of Medication Adherence at T2.

Step and predictor	$\beta$	95% CI		$R^2_{adj}$	$\Delta F$			
		LB	UB					
Step 1:								
MMAS-8 T1	.67*	.39	.88	.33	9.77*			
Group	.12	-.11	.34					
BMQ-N T1	.08	-.05	.22					
BMQ-C T1	.01	-.05	.08					
Step 2:								
MMAS-8 T1	.69*	.44	.89	.34	1.23			
Group	.12	-.11	.33					
BMQ-N T1	.08	-.05	.20					
BMQ-C T1	.02	-.04	.08					
Group x BMQ-C T1	-.14	-.44	.13					
Step 3:								
MMAS-8 T1	.67*	.40	.88	.42	10.75*			
Group								
BMQ-N T1						.12	-.09	.31
BMQ-C T1						.07	-.05	.17
Group x BMQ-C T1						.01	-.05	.06
Group x BMQ-N T1						-.11	-.35	.14
Group x BMQ-N T1	-.37*	-.65	-.04					

*Note.* MMAS-8 = Morisky Medication Adherence Scale; BMQ-C = Beliefs in Medicines Questionnaire, “Concerns” dimension; BMQ-N = Beliefs in Medicines Questionnaire, “Necessity” dimension.  $\beta$  = Standardized beta coefficient; CI = Biased-corrected confidence interval of the standardized beta;  $R^2_{adj}$  = Adjusted squared multiple correlation that indicates variance explained in the dependent variable;  $\Delta F$  = incremental  $F$ -value for the regression model.

\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

## DISCUSSION

The aim of the current study was to examine the effectiveness of an intervention combining implementation intention and coping planning in improving medication adherence among patients with CVD. Findings revealed no statistically significant effect of the intervention condition on medication adherence. We also conducted post hoc analyses

examining the effect of two candidate moderators of the planning intervention, namely, beliefs about medicines and self-efficacy, on medication adherence. Analyses of the interaction effects revealed that patients with lower beliefs in the necessity of medication exhibited higher self-reported medication adherence scores as a result of the planning intervention, a finding which was contrary to expectations. We found no other interaction effects.

The null findings for our planning intervention is contrary to the weight of the evidence that has tended to support effects of planning interventions on health behaviour, including the relatively few studies that have applied these effect on medication adherence (Brown et al., 2009; Farmer et al., 2012; Jackson et al., 2006; Liu & Park, 2004; Lourenco et al., 2014; O'Carroll et al., 2014; Pakpour et al., 2015). That said, there is research which has found null effects for implementation intentions and other planning interventions (Jackson et al., 2005; Jackson et al., 2006; Jessop, Sparks, Buckland, Harris, & Churchill, 2014; Scholz, Ochsner, & Luszczynska, 2013; Skar, Sniehotta, Molloy, Prestwich, & Araujo-Soares, 2011). Reconciling these conflicting effects presents considerable challenges to researchers attempting to identify the true effect of planning interventions in health behaviour. Solutions have been sought through an examination of the quality of the studies and other methodological issues including statistical power and sample representativeness. The current research was sufficiently powered to find relatively large effects for the planning interventions, although, of course, the effect size was, according to the current evidence, much smaller than predicted rendering the study underpowered. However, given the effect size reported in the current study, it seems that an extremely large sample would have been needed to detect a statistically significant effect. This suggests that the effect size may be a trivial one and indicates that planning interventions have no practical significance in terms of promoting medication adherence. Of course, a single null finding does not render the effects

of planning interventions redundant, but along with other null findings, it does warrant closer scrutiny to explain the effect. Inevitably, the search for such explanations focus on the conditions that magnify or diminish planning intervention effects, that is, what moderator variables are in operation. In the current study, we were able to conduct post hoc analyses examining the potential for medication beliefs and self-efficacy to moderate the effects of the planning intervention. While these analyses were not planned a priori and should, as a consequence, be treated with caution, they at least provide some initial indication of potential moderators.

Focusing on our post hoc moderator analyses, we assumed that patients who perceived their treatment as a necessity would have higher intentions to take their medication consistent with the motivational phase of Heckhausen and Gollwitzer's (1987) model and would be more likely to enact their intention when provided with a plan to do so. We found the opposite pattern of results. As we controlled for the baseline medication adherence at T1, this cannot be attributed to a ceiling effect in the intervention group. Furthermore, it is noteworthy that the mean necessity belief scores in the implementation intention and coping planning group were quite high ( $M = 7.71$  out of a maximum possible score of 10) so even low scores on this dimension were not excessively low and were above the mid-point on the scale. One possible explanation could be that the patients who had very high necessity beliefs about their treatment may have already initiated other strategies to take their medication before the intervention. In contrast, receiving the planning intervention may have led the patients with comparatively lower medication necessity beliefs to enact their behaviour in a more automated fashion by the implementation intention exercise (Brandstätter et al., 2001; Sheeran, Webb, & Gollwitzer, 2005; Webb & Sheeran, 2004).

The interactive effects of planning interventions and beliefs on medication adherence in the current study may mirror some of the findings for motivation and planning found in

previous studies. There is no clear consensus on the necessity of high motivation to promote behavioural engagement in the presence of planning and there are quite few studies that have shown that low or moderate levels of motivation lead to stronger effects for planning, especially implementation intentions. For example, some authors (Chatzisarantis, Hagger, & Wang, 2010) showed that when people form implementation intentions, intrinsic motivation does not have to be high to promote behavioural engagement. Moreover, Brandstätter et al. (2001; Study 2) showed the efficacy of an implementation intention to initiate goal-directed behaviour in patients with schizophrenia, i.e. people who had fluctuations in action control. Finally, as implementation intention may lead individuals to initiate the behaviour automatically without any conscious input (Brandstätter et al., 2001; Sheeran et al., 2005; Webb & Sheeran, 2004), we could assume that the motivational component does not play an important role in its enactment. Thus, planning interventions can be effective at modest levels of motivation and may help people who are less committed to the behaviour.

### **Limitations and Future Directions**

While the current study may provide some preliminary data to inform research and practice on potential moderating effects of planning interventions, it is important to note some important limitations and their implications. Most prominent among these, is the relatively low statistical power of the current study. The inclusion of measures of candidate moderators alongside the intervention may have increased the risk of type 1 error. Furthermore, our a priori estimation of sample size did not include calculations for the effects of covariates, multiple outcomes, and moderators, which will have decreased the statistical power of the study. It is important to recognise that research examining the potential moderating effects of social cognitive and belief-based factors in planning interventions has been relatively sparse, and the few studies that have been conducted on this topic are also limited in scope and design (Hagger & Luszczynska, 2014). For example, trials that have

tested the direct and moderator effects of planning interventions on health behaviour have tended to be on relatively small samples, recruited at convenience or from homogenous groups, and they have, as a consequence, tended to be underpowered (e.g. Arbour & Ginis, 2004; Brawley, Arbour-Nicitopoulos, & Martin Ginis, 2013; Latimer, Ginis, & Arbour, 2006; Murray, Rodgers, & Fraser, 2009). The sparseness of the research and the limitations of the current study and those that have been conducted previously present considerable problems in identifying the true effects of moderators of planning interventions on health behaviour. These issues should serve as a catalyst for future high-quality research testing the moderators of implementation intentions on health behaviour. For example, larger sample sizes and a focus on fewer measures would increase the power of the findings and permit more reliable data from which to draw conclusions. Future research should, therefore, consider replicating the current findings but adopt design features to ensure that tests are fit-for-purpose including testing for moderation using experimental manipulations of moderator variables rather than merely measuring moderators and examining conditional effects, powering a priori for the moderator effects, and conducting the tests in a similar or identical illness context used in the current study. Researchers should also focus on sound conceptual and theoretical propositions to develop hypotheses regarding the mechanisms that underpin moderator effects.

Another limitation of the current study is that we did not use a control group on which we controlled for the degree of information processing that the participants engaged in relative to the experimental group. Research using these kinds of interventions typically present an alternative neutral task to participants in order to control for any reactivity effects due to information processing or load e.g. the ‘mere fact’ of writing. This may be an important consideration for future research designs. A final limitation was our use of a self-report measure of medication adherence. Even though the MMAS-8 has demonstrated good psychometric integrity in initial development with strong correlations with objective

measures of medication adherence (Morisky, Green, & Levine, 1986), problems have been reported with its internal consistency in translated versions. This was also the case in the French translation of the scale with the internal consistency falling below cutoff values in previous research (Korb-Savoldelli et al., 2012) as well as the current study. Correlations of the MMAS-8 with our other measure of medication adherence, the VAS, were significant but modest. Results should, therefore, be interpreted in the context of problems with the reliability of the scales. Furthermore, as with all self-report behavioural measures, the possibility of reporting bias is a real one and a potential source of error variance in our behavioural measure. Future studies should measure medication adherence using objective behavioural measures like electronic pill-monitoring bottles (Park, Howie-Esquivel, & Dracup, 2015).

## **CONCLUSION**

We expected the current study to make an original contribution to the promotion of better medication adherence in patients with CVD using two theory-based psychological planning techniques and adopting a randomized controlled design. However, we found no main effect of the planning intervention combining implementation intentions and coping planning on medication adherence. Nevertheless, we did find that the planning intervention increased medication adherence among patients who did not have high beliefs in medication necessity before the intervention, which was unexpected and opens up new perspectives on the importance of beliefs in moderating the effects of planning interventions. Our findings highlight the importance of considering belief-based moderators of the effectiveness of planning interventions and without its inclusion we may have concluded that there was no



effect of the planning intervention. Results also raise the question as to whether a specific profile of patients, namely those with low, but not zero, beliefs in medication necessity, benefits from the planning intervention. Testing the effect of moderators like beliefs or motives is likely to have increased importance as researchers try to identify the conditions in which planning interventions are most effective in facilitating participation in health behaviour and try to resolve some of the inconsistencies in the observed effects of these interventions on health behaviour.

### **Supplemental files**

Consort statement, Tidier checklists (questionnaires administered to the participants and the SPSS data files are available as supplemental files (see <https://osf.io/3vjcf/>; and ANNEXE VIII and IX).

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Les résultats de l'essai randomisé contrôlé auprès de patients présentant une maladie cardio-vasculaire ne nous ont pas permis de mettre en évidence une différence significative de l'intervention pour promouvoir l'adhésion médicamenteuse. Avec une suspicion d'effet plafond de l'adhésion médicamenteuse auto-rapportée, cette étude renvoie une fois de plus à la difficulté liée à la mesure de l'adhésion médicamenteuse. A ce jour, il n'existe pas de gold standard pour mesurer la prise de traitement, mais malgré tout, des solutions alternatives et des prises en charge spécifiques peuvent être développées. C'est dans cette optique que nous avons souhaité construire et valider un outil destiné à identifier les barrières et les leviers à l'adhésion médicamenteuse chez les patients présentant une maladie chronique, afin de pouvoir identifier les facteurs liés au défaut d'adhésion et proposer par la suite une prise en charge individualisée en fonction des problématiques de chaque patient.

**PARTIE IV : QUILAM : Développement d'un Questionnaire d'Identification des Leviers pour accompagner l'Adhésion du patient à son traitement Médicamenteux dans les maladies chroniques (Diabète de type 2, Insuffisance Cardiaque, Broncho-Pneumopathie Chronique Obstructive)**

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## RESUME

**Introduction :** Le défaut d'adhésion médicamenteuse constitue un problème de santé publique majeur (Elliott, 2009). De plus, l'adhésion médicamenteuse est un facteur de pronostic chez les patients ayant une maladie chronique. Développer un questionnaire pour identifier les barrières et les leviers à l'adhésion médicamenteuse est donc nécessaire pour pouvoir proposer un accompagnement adapté aux problématiques de chaque patient.

**Méthode :** Dans un premier temps, des entretiens semi-structurés ont été menés auprès de patients présentant un diabète de type II, une broncho-pneumopathie chronique obstructive et/ou une insuffisance cardiaque et auprès de leurs soignants. Dans un second temps, nous avons réalisé une revue de la littérature concernant les échelles de mesures d'adhésion médicamenteuse. Dans un troisième temps, un comité d'experts s'est réuni pour sélectionner les items les plus pertinents pour la mesure d'adhésion médicamenteuse. Dans un quatrième et dernier temps, une passation a été effectuée auprès de 116 patients présentant au moins une des trois pathologies.

**Résultats :** 194 items ont été sélectionnés suite à l'analyse thématique des entretiens et la revue de la littérature. Puis, le comité d'expert a permis de réduire l'échelle à 62 items. Suite, à la passation de l'échelle, une analyse factorielle exploratoire a été réalisée (Rotation Oblimin). L'échelle QUILAM comportait donc 14 items et 4 dimensions : les croyances générales, les croyances spécifiques, la gestion du traitement, et la relation soignant/système de soins.

**Discussion :** L'échelle a montré des propriétés psychométriques satisfaisantes. La cinquième étape consiste à valider le questionnaire (contre critères cliniques) auprès de 330 patients, à l'aide d'une analyse factorielle confirmatoire. Au cours de la sixième et dernière étape, une évaluation de la sensibilité de l'échelle sera effectuée dans le cadre d'une intervention basée sur le planning en ciblant les comportements d'adhésion médicamenteuse.



## INTRODUCTION

### **L'adhésion médicamenteuse : définitions**

L'adhésion médicamenteuse reste un concept complexe comme en témoigne la coexistence de termes proches tels que l'observance, la compliance ou l'adhérence, ayant été tour à tour utilisés au fil des années. La compliance au traitement a été le premier terme à avoir été introduit, se définissant comme « l'importance avec laquelle les comportements d'un individu (en termes de prise de médicaments, de suivi de régime ou de changements de mode de vie) coïncident avec les conseils médicaux ou de santé » (Haynes, Taylor, & Sackett, 1979). Certains chercheurs en psychologie de la santé définissent la compliance comme un comportement adopté par le patient vis-à-vis de son traitement médicamenteux, effectué en accord avec les recommandations du médecin (Tarquinio, Fischer, & Barracho, 2002). Elle provient du verbe « to comply » en anglais, qui signifie « se soumettre », sous-tendant une idée de soumission à la demande du médecin (Gauchet, 2005). Il y a donc un sous-entendu d'inégalité voire d'infériorité du patient face au médecin, qui détient, seul, le pouvoir et la connaissance du soin.

Fort du caractère péjoratif de ce terme, un second plus neutre est apparu dans les années 90, il s'agit de l'observance. Elle se définit comme « la capacité à prendre correctement son traitement tel qu'il est prescrit par le médecin » (Salicru, 1997). Morris & Schultz (1992) ajoutent à cette définition l'aspect lié aux règles hygiéno-diététiques, où le patient ne suit pas simplement les recommandations du médecin mais également les règles liées à l'alimentation et à l'activité physique. La définition de Gordis (1979), quant à elle, rompait avec le caractère qualitatif des autres définitions de l'observance, puisque sa définition se basait sur une comparaison mathématique. D'après lui, l'observance était la relation entre le nombre de médicaments ingérés par le patient et le nombre de médicaments

prescrits pour une période donnée. Elle a été fixée au seuil de 75/80%, si bien qu'un patient était considéré comme observant s'il prenait au moins 75/80% des médicaments prescrits par le médecin. Le seuil s'élevait à 95% pour les patients ayant un diagnostic de VIH.

L'adhésion médicamenteuse a été définie comme « une appropriation réfléchie, de la part du patient, de la prise en charge de sa maladie et de ses traitements, associée à la volonté de persister, dans la mise en pratique d'un comportement prescrit » (Baudrant-Boga, Lehmann, & Allenet, 2012). L'adhésion thérapeutique concernait à la fois les comportements d'adhésion au traitement, mais également les comportements liés à l'hygiène de vie, comme l'alimentation ou l'activité physique. Cette définition faisait référence au « degré d'acceptation du patient vis-à-vis de sa thérapeutique » (Baudrant-Boga et al., 2012). A la différence de l'observance et de la compliance, l'adhésion médicamenteuse implique une idée de motivation, d'implication personnelle dans la prise en charge « pour assumer et vivre avec les traitements dans le milieu affectif, amical et professionnel » (Gauchet, 2005).

On remarque que les termes ont peu à peu évolué en parallèle avec les représentations liées au rapport médecin/patient qui s'est équilibré, le patient ayant pris une place plus importante dans la prise en charge de sa maladie et étant actif voire proactif face à son traitement. Au fil des décennies, une responsabilité plus grande lui a été conférée, il devient plus « expert », avec notamment l'apparition des patients-experts (DiMatteo, 2004). Il détient une plus grande connaissance de la maladie, ce qui lui permet de prendre des décisions de manière plus éclairée pour son traitement par exemple. Par ailleurs, tous ces termes semblent renvoyer au même comportement. Or, les définitions sont extrêmement différentes. Ce qu'on appelle actuellement l'adhésion médicamenteuse fait référence à un terme difficile à saisir, parfois nébuleux, complexe à comprendre et donc à définir. En témoignent les nombreux signifiants renvoyant à ce concept, étant tour à tour un comportement, une attitude (« appropriation réfléchie » ou « degré d'acceptation »), ou encore une mesure

comparative (« un rapport entre le nombre de médicaments prescrits et ingérés »). Cela démontre un manque de consensus quant à ce concept.

### **Défaut d'adhésion médicamenteuse : conséquences cliniques et économiques**

Le défaut d'adhésion médicamenteuse constitue un problème de santé publique majeur (Elliott, 2009) ainsi qu'un problème économique pour les systèmes de soins (National Collaborating Centre for Primary Care, 2009). D'après l'OMS (Organisation Mondiale de la Santé), la recherche aurait moins intérêt, d'un point de vue de la santé, à se focaliser sur le développement de nouveaux médicaments qu'à mettre en œuvre les moyens pour promouvoir l'observance médicamenteuse (WHO, 2003). De manière générale la non-adhésion a été estimée à 24.8%, et dans les maladies chroniques, elle s'élèverait à 50% (DiMatteo, 2004). La non-adhésion dans les maladies coronariennes augmente le risque de refaire un infarctus, d'évènements cardiovasculaires et de mortalité (Ho et al., 2008). Elle augmente également le risque d'hospitalisations, pour lesquelles 10 à 40% seraient liées à un évènement cardiaque. Dans le diabète de type II, prendre son traitement en accord avec les recommandations du médecin entrainerait de meilleurs pronostics d'évolution de la maladie (UK Prospective Diabetes Study Group, 1998). Quant à la BPCO, le nombre d'hospitalisations et le risque de mortalité diminuent chez les patients présentant une adhésion médicamenteuse plus élevée, ce qui a également pour conséquences d'augmenter la qualité de vie (van Boven, Stuurman-Bieze, Hiddink, Postma, & Vegter, 2014).

Les pronostics des patients ayant une maladie chronique dépendent en grande partie de leur comportement d'adhésion médicamenteuse (DiMatteo, Giordani, Lepper, & Croghan, 2002). Cela augmente le risque d'une mauvaise assimilation du principe actif du traitement, empêchant son efficacité et donc une évolution positive de l'état de santé du patient (Tarquinio et al., 2002). Un dommage collatéral à ce comportement peut être l'apparition

d'effets indésirables ou effets secondaires. Cela risque d'entraîner un cercle vicieux où le patient associe cet état à la prise de traitement, le démotivant d'autant plus à le prendre comme le médecin le prescrit. Dans les maladies cardiovasculaires, les problèmes d'adhésion médicamenteuse augmentent le risque de refaire un infarctus, le risque d'avoir d'autres décompensations cardiovasculaires, le nombre d'hospitalisations et augmentent également de 50 à 80% le risque de mortalité (Bitton, Choudhry, Matlin, Swanton, & Shrank, 2013; Ho et al., 2008). Elle a malgré tout tendance à s'améliorer depuis quelques années grâce à l'efficacité des soins médicaux et le fait que les patients s'impliquent davantage dans la prise en charge de leur maladie (DiMatteo, 2004).

### **Facteurs de non-adhésion médicamenteuse**

Le défaut d'adhésion médicamenteuse peut être lié à différents facteurs. On distingue la non-adhésion intentionnelle et la non-adhésion non intentionnelle (Toll, McKee, Martin, Jatlow, & O'Malley, 2007). La non-adhésion non intentionnelle fait généralement référence à problèmes liés à la mémoire (i.e. les oublis), la cognition (e.g. la compréhension du traitement et de la maladie), l'information (i.e. le manque d'information sur le traitement), les obstacles pratiques tels que la dextérité (e.g. la difficulté à ouvrir la boîte de médicaments). Concernant la non-adhésion intentionnelle, nous pouvons regrouper le manque de motivation, les croyances (e.g. la croyance de non efficacité du traitement), les émotions (e.g. la peur d'avoir des effets secondaires), et les cognitions.

Les leviers seront différents en fonction du type de non-adhésion médicamenteuse. Il sera généralement moins complexe d'agir sur la non-adhésion non intentionnelle car les obstacles sont d'ordre plus "pratiques". Par exemple, dans le cas d'oublis fréquents, un des leviers pourrait être l'utilisation d'une alarme pour ne pas oublier son traitement. Des interventions basées sur l'action planning ou l'implémentation d'intention ont également

montré une efficacité (e.g. I. Brown, Sheeran, & Reuber, 2009). Dans cette stratégie d'autorégulation basée sur le planning, il est demandé au patient d'associer une heure de la journée avec un lieu et une activité quotidienne qu'il est censé faire au moment de la prise de médicaments (e.g. « S'il est 7h du matin, que je suis dans la cuisine et que je prépare mon petit déjeuner, alors je prends mon traitement du matin » ; Gollwitzer, 1990). L'association mnésique des signaux aidera ainsi à initier le comportement de manière automatique (Brandstatter, Lengfelder, & Gollwitzer, 2001; Sheeran, Webb, & Gollwitzer, 2005; Webb & Sheeran, 2004). Quant à la non-adhésion intentionnelle, elle reste un challenge pour la prise en charge. En outre, elle peut s'ajouter à des facteurs liés à la non-adhésion non intentionnelle. Par exemple, un patient qui ne sera pas motivé à prendre son traitement (i.e. facteur de non-adhésion intentionnelle) peut avoir d'autant plus tendance à l'oublier (i.e. facteur de non-adhésion non intentionnelle). Dans ce cas, il s'agira de proposer au patient des interventions basées sur le changement de comportement et/ou des prises en charge de type entretiens motivationnels pour travailler sur l'ambivalence vis-à-vis des comportements de santé du patient (Rollnick, Heather, & Bell, 1992).

D'après Horne (2006), l'adhésion médicamenteuse est « une action rationnelle par rapport aux croyances du patient, aux circonstances, à ses priorités, ses préférences et ses expériences, même si ces perceptions et ces actions peuvent être différentes des attentes médicales et de leur rationalité ». Malgré le fait que le défaut d'adhésion ne parait pas adapté d'un point de vue extérieur et d'un point de vue médical, il l'est du point de vue du patient, dans le sens où il est le résultat logique du contexte dans lequel il est, de ses croyances *hic et nunc* mais aussi de son expérience passée.

### **L'éducation thérapeutique dans l'adhésion médicamenteuse**

D'après un rapport du Ministère de la Santé (Saout, Charbonnel, & Bertrand, 2008), l'éducation thérapeutique concerne le « processus de renforcement des capacités du malade et/ou de son entourage à prendre en charge l'affection qui le touche, sur la base d'actions intégrées au projet de soin ». Il est également question de l'autonomie du patient puisque son but est de « [le] rendre plus autonome par l'appropriation de savoirs et de compétences afin qu'il devienne l'acteur de son changement de comportement, à l'occasion d'événements majeurs de la prise en charge (initiation du traitement, modification du traitement, événements intercurrents,...) mais aussi plus généralement tout au long du projet de soins, avec l'objectif de disposer d'une qualité de vie acceptable pour lui. » Il s'agit donc d'aborder la maladie et le traitement en l'expliquant de manière accessible aux tout-venants. Typiquement, dans une séance d'éducation thérapeutique auprès de patients présentant des maladies cardiaques, le médecin montre un schéma du cœur et décrit les mécanismes survenant chez un patient en bonne santé mais aussi au cours de la pathologie coronarienne. Les patients peuvent ainsi localiser l'endroit de leur problème cardiaque (au niveau de la valve, d'une artère, etc.), ce qui leur permet de faire le lien entre la théorie et leur expérience personnelle. Ensuite, le médecin décrit les différents soins médicaux et interventions mis en place, comme la prescription d'anticoagulants (AVK), la pose d'un stent ou d'une valve en décrivant le processus de manière schématique. Puis, les facteurs de risque des maladies sont détaillés en spécifiant sur lesquels il est possible d'avoir une action. Il est en effet important de reconnaître ces risques afin de pouvoir agir dessus dans l'objectif de les prévenir.

### **Mesures de l'adhésion médicamenteuse**

L'adhésion médicamenteuse constitue donc un terme difficile à définir du fait de son inconstance intrinsèque, comportant une dimension dynamique et non figée (Baudrant-Boga et al., 2012). Le patient évolue au cours du temps, tout au long de sa prise de traitement, et

chaque patient se comporte différemment. L'adhésion médicamenteuse présente des différences intrapersonnelles et interpersonnelles, qui dépendront notamment de la maladie, du traitement *per se*, des facteurs démographiques et socio-économiques, du système de soins, et encore plus largement, de son entourage, et du patient lui-même, de ses croyances, son expérience et ses connaissances. C'est pourquoi, l'adhésion médicamenteuse est un comportement qui reste difficile à mesurer.

#### *Mesures directes et indirectes de l'adhésion*

Allenet et al. (2013) ont référencé deux catégories de mesures objectives de l'adhésion médicamenteuse, à savoir les méthodes directes et les méthodes indirectes. Les mesures directes de l'adhésion consistent à prendre en compte les marqueurs cliniques et biologiques. Ils renvoient généralement à la présence de substances prescrites dans les urines et dans le sang. Quant aux méthodes indirectes, elles font référence aux questionnaires, aux entretiens semi-directifs, aux comportements des patients mesurés par le biais des registres médicaux (renouvellement d'ordonnances, prises de rendez-vous médicaux) ou encore au rapport entre les doses prescrites et les doses restantes. Ce dernier peut être mesuré grâce à des systèmes spécifiques tels que les piluliers électroniques (e.g. les MEMS<sup>®</sup>, Medication Events Monitoring System) ou grâce au discours auto-rapporté des patients (e.g. les questionnaires).

Malgré le caractère subjectif ou distal des mesures indirectes, les mesures directes ont des inconvénients. En effet, tous les organismes ne réagissent pas de la même manière aux traitements médicamenteux, ce qui peut faire varier les résultats. Un patient peut aussi être adhérent sans que le seuil d'analyse n'ait détecté la présence du médicament dans le sang ou les urines. Dans le cas des maladies cardiaques, les marqueurs biologiques (poids, taux de sel avec le régime hyposodé) ne sont pas toujours fiables. Dans les greffes, certains

immunosuppresseurs (les FK506) sont révélés dans le sang dans les 5 jours suivant la prise, ayant pour conséquence le fait que certains patients ne sont pas identifiés comme à défaut d'adhésion, à tort. Quant aux mesures indirectes, les mesures que l'on a tendance à qualifier de plus « objectives » (e.g. les piluliers électroniques) présentent aussi des biais. Les piluliers électroniques permettent d'enregistrer le nombre d'ouvertures et de fermetures de la boîte où est placé le traitement (en précisant l'heure et la date), ce qui donne un indice de fréquence et de régularité des prises. Cependant, les piluliers électroniques enregistrent uniquement les actes d'ouverture et de fermeture de la boîte et non les prises effectives du traitement. Il peut arriver que les patients se contentent d'ouvrir et de fermer le boîtier sans prendre le traitement, de manière intentionnelle ou non. Certains piluliers électroniques indiquent également la quantité restante de médicaments dans la boîte. Ce type de piluliers peut avoir une utilité interventionnelle mais ne peut être utilisé dans le cadre d'études uniquement observationnelles puisque si le patient a un feedback sur sa prise de traitement, il risque de modifier son comportement en conséquence, sans que cela ne soit lié à l'intervention en elle-même.

#### *Echelles auto rapportées de l'adhésion médicamenteuse*

De nombreuses échelles auto rapportées mesurant l'adhésion médicamenteuse ont été validées à ce jour. L'échelle Morisky (Morisky, Green, & Levine, 1986) reste la plus utilisée que ce soit dans les études ou dans la pratique courante. Elle existe en version courte de 4 items, et a été validée contre critères cliniques dans un certain nombre de pathologies, notamment chez des patients ayant un diagnostic d'hypertension artérielle, VIH, maladie de Crohn ou maladie inflammatoire chronique de l'intestin, trouble psychiatrique, diabète, hypercholestérolémie, hyperthyroïdie, greffe rénale, ou encore de tuberculose (Garfield, Clifford, Eliasson, Barber, & Willson, 2011). Elle existe également en version longue de 8



items, ayant été validée chez les patients présentant une hypertension (Korb-Savoldelli et al., 2012). Cependant, certaines études ont montré qu'elle avait été validée avec une faible cohérence interne (Al-Qazaz et al., 2010; de Oliveira-Filho, Morisky, Neves, Costa, & de Lyra, 2014; Korb-Savoldelli et al., 2012).

Hahn et al. (2008) ont développé et validé un questionnaire ayant pour objectif d'agir sur les barrières à l'adhésion mais également sur la communication. Le questionnaire a été validé entre autres auprès de patients ayant un diagnostic de diabète, d'asthme ou de dépression. Les items ont été construits sur la base de la revue de la littérature mais également à l'aide de focus-groupes et de réunions de comité d'experts. L'échelle présentait des propriétés psychométriques satisfaisantes avec un Alpha de Cronbach s'élevant à 0.77. Onze facteurs ont été identifiés conduisant à un champ potentiel de 11 leviers à l'adhésion médicamenteuse pour un total de 20 items. Ces facteurs regroupaient les attitudes positives et les croyances relatives à la prise de traitement, les connaissances et l'atteinte d'objectifs liés à la santé, les croyances négatives face au traitement médicamenteux, l'humeur dépressive, les oublis quotidiens, les problèmes de cognition et de mémoire, les barrières physiques à la prise de traitement, les barrières financières, l'inefficacité perçue du traitement ou les effets secondaires, l'aide et le soutien de l'entourage, puis les relations et la communication avec l'équipe soignante.

Malgré un intérêt pratique de l'outil, l'importance du nombre de barrières identifiées constitue une première de ses limites, compliquant la prise en charge subséquente. Nous avons pensé qu'il était possible de réduire le nombre de barrières à l'adhésion, notamment en se basant sur les cinq dimensions de l'OMS (WHO, 2003). Une version courte de l'échelle ASK-20 existe néanmoins, il s'agit de l'ASK-12. Cependant, cette version se centre seulement sur le comportement, les croyances et les barrières physiques à la prise de traitement. Elle occulte les dimensions d'aide et de soutien de l'entourage, les oublis de

traitement, les relations et la communication avec l'équipe soignante ou encore les barrières financières. Un deuxième inconvénient à cet outil est l'absence d'explications concernant les interventions pratiques pour chacune des barrières identifiées. Malgré la perspective d'associer un levier à chaque barrière en fonction des patients, l'ASK-20, n'a à ce jour, pas proposé d'interventions éducatives ou thérapeutiques associées aux dimensions pouvant poser problèmes chez les patients. De plus, il n'y a pas eu de validation contre critères cliniques pour cette échelle. Aucun indice ne permet donc de savoir si un patient ayant un score peu élevé, sera à risque de défaut d'adhésion médicamenteuse, avec une probabilité plus grande de faire une décompensation et d'être hospitalisé dans les mois à venir. Enfin, l'ASK-20 a été financé par un industriel du médicament et est donc breveté, ce qui limite son utilisation. D'un point de vue théorique, l'ASK-20 semblait être un outil prometteur présentant de bonnes propriétés psychométriques et permettant une évaluation plus qualitative de l'adhésion médicamenteuse, ce qui en faisait son originalité et son point fort au niveau clinique. Cependant, d'un point de vue pratique, il reste limité par l'utilisation sous brevet, le manque d'apport interventionnel pour chaque barrière identifiée, la validation psychométrique et non clinique, et le nombre important de barrière. Il reste difficile d'apporter une prise en charge simple et adaptée à chaque patient.

### **Apports de QUILAM**

L'intérêt de QUILAM est de pouvoir utiliser un questionnaire dans un but de routine clinique permettant d'identifier les patients à risque et/ou en défaut d'adhésion médicamenteuse. Il s'agissait donc de développer un questionnaire relativement court, auto-administré et générique, s'adaptant à diverses pathologies chroniques. Ce questionnaire avait pour objectif de balayer les différents aspects liés au défaut d'adhésion médicamenteuse afin d'apporter un suivi personnalisé et adapté aux dimensions identifiées comme problématiques

chez le patient. A la différence des autres échelles existantes, l'accent est mis sur l'aspect qualitatif de l'adhésion plutôt que quantitatif, à l'aide des barrières identifiées.

## **PHASE I : Développement du questionnaire**

### **METHODOLOGIE**

#### *1. Entretiens semi-structurés*

Le développement d'un questionnaire nécessite également un apport qualitatif, afin de pouvoir compléter la dimension quantitative dans le cas où elle ne serait pas exhaustive. Des entretiens semi-structurés ont donc été menés (AL) auprès de 30 patients ainsi que 5 de leurs soignants. Les patients présentaient au moins une des trois pathologies cibles, soit un diabète de type II, une broncho-pneumopathie chronique obstructive (BPCO) et/ou une insuffisance cardiaque. Les entretiens étaient enregistrés et retranscrits pour pouvoir être analysés thématiquement par la suite. D'abord, l'investigateur (AL) présentait l'objectif de ces entretiens :

« Afin d'améliorer l'accompagnement, le suivi et la prise en charge thérapeutique des patients, un travail de recherche est actuellement effectuée par la pharmacie du CHU de Grenoble et des hôpitaux civils de Lyon en collaboration avec le Centre d'Investigation Clinique – Inserm et les services de pneumologie ; cardiologie, diabétologie et rééducation cardiaque.

L'objectif de cet entretien est de mieux vous connaître et de parler des difficultés que vous pouvez rencontrer par rapport à votre maladie et à votre traitement médicamenteux.

Si vous acceptez, cela consiste en un entretien d'une trentaine de minutes. Un enregistrement audio de cet entretien sera réalisé si vous êtes d'accord afin de faciliter son analyse. »

Ensuite, l'investigateur abordait différents points liés au traitement, à savoir :

- « Pouvez-vous me parler de votre insuffisance cardiaque / diabète / BPCO ? »
- « Avez-vous d'autres problèmes de santé ? »
- « Actuellement, qu'est-ce qui vous préoccupe le plus concernant votre maladie ? »
- « Quelles sont les situations qui vous posent problème dans votre quotidien ? »
- « En dehors de l'hôpital, quelles sont les personnes du monde médical en qui vous avez confiance pour poser des questions sur votre maladie et votre traitement? (Votre médecin traitant / Vos médecins spécialistes / Vos infirmier(e)s / Vos kinésithérapeutes / Vos diététicien(ne)s / Vos pharmacien(ne)s / Aucune / Autre(s)) »
- « Quelles sont vos autres sources d'information? (Associations de patients / Autres patients / Livres et magazines / Internet / Aucune / Autre(s)) »
- « Que pensez-vous de vos traitements ? (Quelles sont leurs contraintes ? leurs bénéfices ?) »
- « Actuellement, qu'est-ce qui vous préoccupe le plus concernant votre traitement? »
- « Comment faites-vous à la maison pour prendre vos médicaments ? »
- « Qu'est-ce qui est aidant pour vous dans la prise de votre traitement à la maison ? »
- « Quelles sont les difficultés que vous rencontrez au quotidien avec : la gestion de la prise du traitement tous les jours / les horaires de prises du traitement / les effets gênants / les interactions avec d'autres médicaments ou des aliments / votre

approvisionnement en médicaments / la gestion de vos stocks de médicaments / la peur de l'oubli / la conduite à tenir en cas d'oubli / autres difficultés »

- « Vous sentez-vous entouré(e) par rapport à votre maladie ? »
- « Si oui, quelle est l'implication de votre entourage dans la gestion de votre maladie et/ou de vos traitements ? »
- « Que pensez-vous de votre relation avec vos soignants de l'hôpital ? Vos soignants de ville ? »
- « Quel est l'impact de votre maladie et de votre traitement dans votre vie ? (Vie familiale – Vie Sociale – Vie professionnelle - Loisirs) »
- « Comment faites-vous au quotidien pour prendre soin de vous par rapport à votre maladie ? »
- « Qu'est-ce que vous souhaiteriez que l'on aborde d'autre ensemble (par rapport à votre prise en charge) ? »

Enfin, l'investigateur demandait au patient s'il souhaitait aborder un autre point, puis le remerciait.

## 2. *L'analyse thématique*

Une analyse thématique des entretiens semi-structurés a été effectuée pour compléter les thématiques abordées dans les échelles de mesures d'adhésion médicamenteuse issues de la revue de la littérature. Elle permettait de compléter le questionnaire dans le cas où les items issus de la littérature ne balayaient pas toutes les thématiques, afin d'ajouter une dimension pratique et qualitative au développement du questionnaire.

L'analyse thématique consistait à classer les verbatim des entretiens en fonction des cinq dimensions de l'OMS (WHO, 2003), à savoir la maladie, le traitement médicamenteux,

les facteurs démographiques et socio-économiques, le patient et/ou l'entourage et le système de soin. La dimension « Maladie » était divisée en six catégories : troubles cognitifs, visuels, de la personnalité, symptômes, addictions (drogues, alcool, tabac), les états dépressifs et le stress, conséquences de la maladie, et les pathologies associées/antécédents. La dimension « Traitement médicamenteux » comportait 7 catégories, soit : la complexité du traitement, le temps quotidien dédié au traitement, les modalités d'administration (la galénique) et la manière de prendre le traitement, la durée du traitement, les techniques de prise (e.g. pour ne pas oublier le traitement), les gestions des ordonnances et le stock, et les effets secondaires et interactions. La dimension « Facteurs démographiques et socioéconomiques » comportait six catégories, à savoir : les ressources matérielles (revenu, travail, pauvreté), les données démographiques (âge, stabilité familiale, mariage, partenariat), la précarité sociale (e.g. sans domicile, statut d'immigré), l'appartenance ethnique et l'appartenance culturelle. La dimension « Patient et/ou entourage » était divisée en onze catégories : les savoirs théoriques (les connaissances et la compréhension de la maladie), les savoirs pratiques et les compétences d'auto-soin, les expériences antérieures (vécu de la maladie), les représentations liées à la maladie et aux médicaments (la santé et la maladie, les représentations liées aux médicaments, les représentations liées aux règles hygiéno-diététiques), les émotions (les sentiments de peur, d'anxiété, de craintes, de souffrance, de honte, de culpabilité, d'échec personnel, de stigmatisation sociale), les ressources (externes et liées à l'environnement, internes liées à l'estime de soi et image de soi, le sens donné à sa maladie et son traitement, le locus de contrôle, le sentiment d'efficacité personnel, la motivation et le stade de changement de comportement), les contraintes physiques et sociales causées par la maladie, l'entourage, la qualité de vie, l'organisation du quotidien, et les actions optimisant la santé. Enfin, la dernière dimension concernait « le Système de soins » et était subdivisée en quatre catégories : les compétences relationnelles, les compétences médicales, l'apport

d'informations et de connaissances (les émotions, le soutien perçu) et l'organisation des soins. Le double codage des verbatim en fonction des catégories a été effectué par deux personnes (AL et CM).

### *3. Revue de la littérature*

Une recherche bibliographique a été réalisée (AL et CM) sur les bases de données PubMed et PsycInfo pour identifier les échelles auto rapportées mesurant l'adhésion médicamenteuse.

#### a. Critères d'inclusion

Les critères d'inclusion dans la revue étaient les articles validant une échelle de mesure de l'adhésion médicamenteuse dans une pathologie chronique. L'échelle devait avoir été validée dans au moins deux pathologies chroniques.

Une recherche manuelle à partir des références citées dans les articles inclus a été également effectuée pour compléter la recherche bibliographique.

#### b. Base de données PubMed

Une première recherche a été effectuée sur PubMed. Le code suivant a été utilisé pour la recherche dans la base de donnée : ("medication adherence" OR compliance OR adherence OR observan\* OR adhesion OR concordance OR capacitance) AND (measur\* OR \*assess\* OR self-report\*). Les critères de recherche suivants ont été cochés : « Validation study » pour le type d'articles, « Humans » pour la population, « English » et « French » pour la langue.

Une seconde recherche a été effectuée sur PubMed afin d'identifier les revues de la littérature concernant les échelles auto-rapportées mesurant l'adhésion médicamenteuse.

Nous avons utilisé le code suivant dans la base de données : ("medication adherence" OR compliance OR adherence OR observan\* OR adhesion OR concordance OR capacitance) AND (measur\* OR \*assess\* OR self-report\*) AND (validat\*). Et nous avons sélectionné les options : « meta-analysis », « clinical trials » et « review » pour le type d'articles, « Humans » pour la population, « English » et « French » pour la langue.

#### c. Base de données PsycInfo

Une recherche a également été effectuée sur PsycInfo. Le code suivant a été utilisé pour la recherche dans la base de donnée : ("medication adherence" OR compliance OR adherence OR observan\* OR adhesion OR concordance OR capacitance) AND (measur\* OR \*assess\* OR self-report\*). Les critères de recherche suivants ont été cochés : « toutes les revues » pour le type de source ; « treatment compliance » et « compliance » pour le sujet et le descriptif majeur ; « medical treatment of physical illness », « clinical psychopharmacology » et « test and testing » pour la classification ; « English » et « French » pour les langues ; et « Humans » pour la population.

#### 4. Sélection d'items par le comité d'expert

Troisièmement, un comité d'expert, regroupant trois pharmaciens (AL, BA, MR) et deux chercheurs en psychologie (AG et CM), s'est réuni pour sélectionner les items non pertinents pour l'échelle. Il a d'abord été demandé au comité d'expert de présélectionner, en individuel et de manière anonyme, les items les plus pertinents parmi les 194 items. Les consignes consistaient à choisir 60 items au total, de façon à ce que chaque dimension et chaque thème puissent être représentés par un item. Les choix des experts ont ensuite été mis en commun. Seuls les items ayant été présélectionnés par au moins 3 des 5 professionnels de santé étaient retenus dans l'échelle.



## **RESULTATS**

### **Analyse thématique des entretiens**

Le classement des verbatim dans les différentes catégories de l’OMS recoupaient les catégories retrouvées dans les échelles issues de la littérature. Les cinq catégories étaient abordées dans les trois pathologies à savoir dans la maladie, le traitement médicamenteux, les facteurs démographiques et socio-économiques, le patient et/ou l’entourage et le système de soin. D’autres thématiques sont cependant apparues. L’importance des changements de mode de vie (alimentation et activité physique) et la contrainte de la prise de glycémie chez les diabétiques de types 2 étaient des dimensions qui n’avaient pas été abordées dans les items des échelles issues de la littérature mais qui ont été relevées plusieurs fois par les patients lors des entretiens.

### **Revue de la littérature**

La première recherche effectuée sur PubMed a abouti à 1322 résultats. Cependant, 1307 articles ont été rejetés après lecture du résumé et du titre, car ils ne concernaient pas de validation de questionnaire, de pathologies chroniques génériques (mais une pathologie spécifique), l’adhérence, ou faisaient référence à l’adhérence aux psychotropes (validés chez les patients psychotiques), ou étaient déjà intégrés dans le questionnaire QUILAM. 15 articles ont été inclus après lecture du titre, du résumé et de l’article.

Pour la seconde recherche effectuée sur PubMed destinée à identifier les revues de la littérature concernant les échelles auto-rapportées mesurant l’adhésion médicamenteuse, un total de 886 résultats a été issu de cette recherche. Seuls 2 articles ont été retenus (Garfield et al., 2011; Nguyen, La Caze, & Cottrell, 2014). Les autres articles ne concernaient pas une revue de la littérature sur des questionnaires mesurant l’adhésion médicamenteuse validés

dans des pathologies chroniques génériques (mais dans une pathologie spécifique) ou concernaient l'adhésion aux psychotropes (validés chez les patients psychotiques).

Concernant la base de données PsycInfo, la recherche a abouti à un total de 1416 résultats. Cependant, 1415 articles ont été rejetés après lecture du résumé et du titre, car ils étaient en doublons avec la recherche sur PubMed ou ne concernaient pas une validation de questionnaire mesurant l'adhésion médicamenteuse auprès de patients ayant des pathologies chroniques génériques (mais une pathologie spécifique), ou faisaient référence à l'adhésion aux psychotropes (validés chez les patients psychotiques). Un article a été inclus après lecture du titre, du résumé et des articles.

Seize articles validant des mesures d'adhésion médicamenteuse ont été inclus après lecture du résumé et de l'article pour les recherches effectuées sur PsycInfo et PubMed. Ces échelles comportaient 180 items au total (voir ANNEXE X). La recherche manuelle a permis d'identifier quatre articles supplémentaires, comportant 14 items au total, faisant référence à une échelle de mesure de l'adhésion médicamenteuse validée dans au moins deux maladies chroniques.

### **Comité d'expert**

Le comité d'expert a pu sélectionner 62 items au total. Trente-deux items ont donc été rejetés, n'étant pas jugés pertinents pour l'échelle QUILAM. Les principaux motifs de rejets étaient le manque de pertinence clinique dans le cadre des pathologies sélectionnées, l'ambiguïté et la redondance des items.

### **PHASE II : Réduction du questionnaire**

## **METHODOLOGIE**

### **Processus de recrutement des patients**

Une soumission du protocole a été effectuée auprès du CECIC (Comité d’Ethique des Centres d’Investigation Clinique de l’Inter Région Rhône Alpes Auvergne). Les patients étaient recrutés avant ou après les consultations (au cabinet médical ou à domicile) avec leur médecin traitant ou hospitalisés au CHU de Grenoble. Les expérimentateurs (AL, BA, et CM) et des internes en pharmacie (GVG, MP, BR, MM, DD) ont recruté les patients dans différents pôles du CHU de Grenoble : dans le service de réadaptation cardiaque (hôpital de jour), dans le service de pneumologie et dans le pôle de diabétologie (hôpital de jour). Les patients ont participé à l’étude de manière volontaire et n’étaient pas rémunérés.

### **Critères d’inclusion**

Les patients devaient être majeurs et présenter au moins une des pathologies suivantes : un diabète de type II, une BPCO, ou une insuffisance cardiaque. Les personnes protégées (ce qui correspond aux personnes visées dans les articles L1121-5 à L1121-8 du Contrat de Sécurisation Professionnelle) ne pouvaient être incluses dans le protocole, soit : les femmes enceintes ou parturientes, les mères qui allaitent, les personnes privées de liberté par décision judiciaire ou administrative, les personnes faisant l’objet d’une mesure de protection légale, et les personnes ne parlant pas français.

### **Information et consentement**

Les participants des deux groupes devaient lire une notice d’information (qu’ils conservaient) et signer un formulaire de consentement (étant par la suite détachée du feuillet de questionnaire, afin de garder ces questionnaires anonymes). Ces deux documents

précisaient le projet, les attentes par rapport aux patients, leurs droits, puis les bénéfices et les risques de l'étude. Les patients pouvaient à tout moment refuser le traitement de leurs données.

## **Mesures**

### *Données sociodémographiques et information sur la maladie*

A la fin du feuillet de questionnaires, les participants devaient préciser certaines informations sociodémographiques telles que le sexe, la date de naissance, le niveau d'éducation (primaire, collège, lycée ou supérieur), la catégorie socio-professionnelle (agriculteur, artisan-commerçant, cadre, profession intermédiaire, employé, ouvrier, retraité, sans activité), la situation familiale (marié(e), pacsé(e) ou en concubinage, célibataire, séparé(e) ou divorcé(e), ou veuf(ve)) et la situation à domicile (vit seul ou non). En ce qui concerne la maladie et le traitement, les questions portaient sur la nature de la maladie, la date de diagnostic, une/(des) éventuelle(s) maladie(s) associé(s), la date d'initiation du traitement actuel, la gestion des médicaments (s'ils étaient aidés dans cette gestion, et si oui, par qui), l'organisation des médicaments (ce qu'ils utilisent pour s'organiser, comme un pilulier par exemple), et enfin s'ils prenaient des médicaments avant d'avoir eu connaissance de leur maladie cardiaque. Toutes ces informations pouvaient constituer des facteurs associés à l'adhésion médicamenteuse, d'où la nécessité d'en prendre connaissance.

### *Mesures de l'adhésion médicamenteuse*

La première mesure d'adhésion médicamenteuse de manière auto rapportée était l'échelle Morisky (Korb-Savoldelli et al., 2012). Elle comprenait 8 items, dont 7 où les participants répondaient par oui ou non (respectivement cotés 0 et 1, sauf pour l'item 5 pour

lequel la cotation est inversée) et un dernier item où ils devaient répondre en fonction d'une échelle de fréquence en 5 points (« Jamais ou rarement » étant coté 1, « de temps à autre » coté 0.75, « parfois » coté 0.50, « fréquemment » coté 0.25 et « tout le temps » coté 0). Le score total à l'échelle variait entre 0 et 8. Un score inférieur à 6 représentait une adhésion faible, un score se situant entre 6 et étant inférieur à 8 renvoyait à une adhésion moyenne et un score de 8 représentait une adhésion forte. L'échelle Morisky reste une référence dans la littérature et dans la pratique, c'est pourquoi nous l'avons utilisée. Cependant, ses propriétés psychométriques sont seulement acceptables car la validité interne de sa version française présentait un alpha de Cronbach de 0.54, mais le test-prétest d'1 mois d'intervalle est plus élevé étant de 0.68 (Korb-Savoldelli et al., 2012). Par ailleurs, les résultats de cette version en 8 items n'ont pas été comparés à une mesure plus objective de l'adhésion médicamenteuse.

Enfin, une échelle visuelle analogique mesurant l'adhésion médicamenteuse permettait aux patients de situer leur prise de médicaments en fonction de la dose et de l'heure prescrites par le médecin. Nous avons utilisé une version adaptée de l'item unique mesurant l'adhésion médicamenteuse de Kalichman et al. (2009), en modifiant la phrase introduisant l'item et en ne nous limitant pas à mesurer l'adhésion au mois précédent. La version de Kalichman s'est avérée corrélérer très fortement avec les mesures objectives de l'adhésion médicamenteuse et bien plus fortement que les autres mesures auto rapportées, qui elles, surestimaient l'adhésion. Les patients plaçaient une croix sur une barre, en fonction de l'endroit où ils estiment situer leur prise de traitement. La barre allait de 0 à 100, le 0 représentant le fait de ne jamais prendre ses médicaments et le 100 représentant le fait de toujours les prendre aux heures et doses prescrites.

### **Procédé d'anonymisation**

Chaque sujet générait un code de passation permettant de relier ses données sans avoir son identité. Ainsi, à T1 et à T2, un code de passation leur était demandé, soit : les « 2 premières lettres : prénom de votre mère ; 2 premières lettres : prénom du père ; votre mois et département de naissance. Exemple : ME PE 04 38) : \_ \_ \_ \_ \_ \_ \_ \_ ». Avant le traitement des données, les formulaires de consentement étaient détachés des questionnaires, et nous gardions uniquement le code de passation afin d'identifier les patients.

## **RESULTATS**

Les analyses ont été effectuées sur le logiciel IBM SPSS Statistics 22. Une analyse factorielle exploratoire (EFA) a été effectuée pour réduire l'échelle QUILAM comportant 62 items. N'ayant pas d'a priori théorique concernant la structure du questionnaire, nous avons opté pour une analyse factorielle exploratoire pour réduire l'échelle (voir ANNEXE XI).

Concernant les options pour effectuer l'analyse, nous avons choisi une « structure initiale », « reconstituée » et les « indices KMO » pour la partie descriptive, une extraction avec « maximum de vraisemblance », une « structure factorielle sans rotation » et un « tracé d'effondrement », une rotation « Oblimin directe » et une « structure après rotation », en classant les variables par taille et en supprimant les faibles coefficients inférieurs à .30. Nous avons choisi la rotation Oblimin, un type de rotation oblique, car nous avons présumé que les facteurs pouvaient être corrélés entre eux (T. A. Brown, 2006). Les études en sciences humaines ont tendance à privilégier les rotations obliques dans les analyses factorielles car bien souvent les facteurs en rapport avec le comportement et les cognitions sont corrélés entre eux. Ici, les dimensions faisaient référence au comportement d'adhésion médicamenteuse. Il n'était pas exclu qu'un patient ayant un score élevé à une dimension présente également un score élevé à une autre dimension mesurant l'adhésion

médicamenteuse. De plus, si les facteurs s'avéraient en réalité non corrélés, la rotation Oblimin proposerait une solution très proche d'une rotation orthogonale. Nous avons ensuite retirés les items 1 à 1 en fonction de critères tels que la saturation sur plusieurs ou aucune dimension(s), ou la saturation faible sur une dimension ( $<.300$ ).

Pour la mesure de la qualité de l'échantillonnage, l'échelle réduite présentait un indice KMO (Kaiser – Mayer – Olkin) de .661, ce qui est acceptable. Elle se composait de 4 dimensions : les représentations générales des traitements (items 8, 18, 10, 34 ;  $\alpha = .685$ ), l'organisation du traitement ou non observance non intentionnelle (items 56, 53, 49 ;  $\alpha = .653$ ), les représentations spécifiques du traitement ou non observance intentionnelle (items 46, 16, 43 ;  $\alpha = .667$ ) et la relation patient / système de soins (items 55, 54, 17, 39 ;  $\alpha = .598$  ; voir ANNEXE XII).

### **PHASE III : Validation du questionnaire (en cours)**

#### **Objectifs**

L'objectif de cette troisième phase vise à valider le questionnaire QUILAM sur quatre dimensions principales. Premièrement, la faisabilité et l'acceptabilité du questionnaire seront évaluées en se basant sur la durée de remplissage du questionnaire mais aussi sur le pourcentage de données manquantes. Deuxièmement, cette étape de validation du questionnaire permettra de tester sa fiabilité, donc évaluer à quel point les participants auront tendance à répondre de la même manière s'ils sont interrogés 15 jours après la première passation (test-retest). Il y a aura donc un test-retest sur un sous-groupe de la population. Troisièmement, la validité de structure sera testée, afin d'apporter un indice de cohérence interne du questionnaire. Quatrièmement, la validité convergente sera testée, grâce à la

passation concomitante de QUILAM et d'autres questionnaires mesurant l'adhésion médicamenteuse. La corrélation entre les scores de QUILAM et les autres échelles indiquera cette validité de construction externe. Nous analyserons donc les corrélations au score de QUILAM avec les scores au questionnaire Morisky (Morisky et al., 1986), au SatMED Q® (Ruiz et al., 2008) et au BMQ (Horne, Weinman, & Hankins, 1999). Cette étape permettra également de tester sa validation prédictive en comparant le score des patients à QUILAM et la survenue d'évènements cliniques. Un sous-échantillon de patients sera suivi pendant un an afin d'estimer le nombre d'évènements cliniques et de décès des patients. Les groupes de patients seront définis par les quartiles du score composite du questionnaire (« QUILAM + » et groupe « QUILAM – »; cf. ci-dessous) comparés en fonction du nombre de survenue de ces évènements cliniques.

## **Procédure**

Les patients seront recrutés à l'hôpital ou lors d'une consultation avec le médecin traitant. L'investigateur proposera l'étude aux patients : une lettre d'information leur sera remise, il se chargera de faire lire et signer le consentement écrit, de vérifier si les critères d'inclusion sont remplis, puis il remplira le cahier d'observation papier. Puis les patients rempliront les questionnaires (l'échelle Morisky, le SatMED Q® et QUILAM). L'investigateur recueillera les données médicales (traitements médicamenteux et date de déclenchement de la pathologie chronique) et sociodémographiques (âge, sexe, niveau d'éducation, situation familiale, traitements médicamenteux) dans un dossier papier. Il se chargera ensuite de déclarer les évènements cliniques, correspondant à un recours au système de soins (consultation médicale, appel à un médecin, recours aux urgences), des hospitalisations ou un décès, tout au long de l'étude via l'eCRF (electronic Case Report Form), par l'intermédiaire du médecin. Enfin, les patients rempliront une nouvelle fois le



questionnaire QUILAM, puis le BMQ, le SatMED Q<sup>®</sup> et le questionnaire Morisky, 12 mois après (et également 15 jours après pour un sous-échantillon).

### **Analyses statistiques**

Une estimation de la taille d'échantillon minimum à recruter pour une puissance suffisante lors de la validation de l'échelle a été effectuée. Sachant que le nombre d'hospitalisations dans l'année dans le groupe QUILAM – a été estimé à 3 en moyenne, tandis qu'il est de 2 dans le groupe QUILAM + (avec un écart-type égal à 3) et qu'il ne suit pas une loi normale, le test des rangs de Mann-Whitney sera utilisé. La probabilité qu'une valeur du groupe QUILAM + soit inférieure au groupe QUILAM – a été estimée à 59.3%. La taille d'échantillon a été estimée à 152 personnes par groupe pour un alpha égal à 0.05 et une puissance de 0.80 (Faul, Erdfelder, Lang, & Buchner, 2007). Si l'on estime un taux de mortalité expérimentale à 8% des patients, environ 330 patients devront être recrutés (logiciel nQuery Advisor ; Noether, 1987).

Concernant l'interprétation des scores de QUILAM, il a été établi des critères de jugement liés aux barrières à l'adhésion médicamenteuse. Les patients seront classés en deux catégories, définies par les IQR (25<sup>ème</sup> et 75<sup>ème</sup> percentiles) du score composite du questionnaire. Un patient sera classé « QUILAM + » s'il est à risque de défaut d'adhésion médicamenteuse. Au sein de chaque dimension, un patient sera classé « QUILAM + » si le score est supérieur à 18 pour les 3 premières dimensions ou si le seuil est > 25 pour la dernière dimension. Un patient sera classé « QUILAM – » si le score est inférieur ou égal à 18 pour les 3 premières dimensions ou si le seuil est supérieur ou égal à 25 pour la dernière dimension. D'un point de vue global, un patient sera évalué à risque de défaut d'adhésion médicamenteuse ou « QUILAM + », s'il est classé positivement sur 3 ou 4 dimensions et « QUILAM – », s'il est classé positivement sur 0, 1 ou 2 dimensions.

Deux types de calculs de scores seront effectués pour un même patient. D'abord, un score total à l'échelle sera calculé à l'aide de la somme des scores à chacun des items. Les questions 1, 2, 3, 5, 6, 8, 9, 10, 11 et 14 seront inversées. Plus le score total est faible, plus le patient sera à risque de défaut d'adhésion médicamenteuse. Ensuite, un score par dimension sera calculé sur base de la somme des scores à chaque item au sein de chaque dimension. Les dimensions incluront les représentations générales des traitements (questions 1, 2, 5 et 6), l'organisation du traitement (questions 10, 11 et 14), les représentations spécifiques du traitement (questions 3, 8 et 9), et la relation patient / système de soins (questions 4, 7, 12 et 13). Pour traiter les valeurs manquantes, la moyenne des réponses du patient remplacera la valeur manquante, sauf si le patient a répondu à moins de la moitié des réponses, auquel cas, ses données seront exclues des analyses.

La validité prédictive sera évaluée en comparant le nombre d'évènements cliniques dans l'année chez le groupe QUILAM – et le groupe QUILAM +, à l'aide du test de Mann-Whitney, et d'un box plot pour l'interprétation graphique. Une corrélation de Bravais-Pearson (dans le cas des données paramétriques) et un Rho de Spearman (dans le cas des données non-paramétriques) seront utilisés pour tester le lien entre le score global de QUILAM et les scores aux échelles Morisky, SatMED Q® et BMQ.

Une Analyse Factorielle Confirmatoire sera effectuée pour la validité de construit et l'alpha de Cronbach permettra d'avoir un indice de cohérence interne du questionnaire. Le coefficient de corrélation intra-classe (ICC) et la représentation graphique de Bland-Altman (différence des scores en fonction de leur moyenne) permettront de tester la fiabilité de l'échelle.

**PHASE IV : Evaluation de la sensibilité de QUILAM lors d'une intervention (en projet)**

Après la phase de validation, une phase d'évaluation de la sensibilité du questionnaire par l'intermédiaire d'une intervention sera mise en place. Elle sera basée sur le planning, issu des théories de la cognition sociale, ayant montré une efficacité dans la promotion des comportements de santé (Gollwitzer & Sheeran, 2006) et spécifiquement dans l'adhésion médicamenteuse (I. Brown et al., 2009; Lourenco et al., 2014; O'Carroll, Chambers, Dennis, Sudlow, & Johnston, 2013). L'objectif étant de pouvoir répondre à cet écart entre l'intention de prendre son traitement comme le médecin le prescrit et la mise en place de ce comportement, par le biais de l'implémentation d'intention (Gollwitzer, 1999). Cette stratégie d'autorégulation est un « moyen de transposer l'intention en action en spécifiant quand, où et comment les comportements permettront d'atteindre le but visé » (Chapman, Armitage, & Norman, 2009). En d'autres termes, elle représente un acte mental qui relie une situation critique anticipée Y et une réponse efficace Z dirigée vers notre but. C'est ainsi qu'« en formant des implémentations d'intentions », les individus peuvent stratégiquement switcher d'un contrôle conscient et difficile de leurs comportements dirigés vers un but (...) à être automatiquement contrôlé par les indices situationnels sélectionnés » (Gollwitzer, 1999).

Nous souhaitons tester l'efficacité de l'implémentation d'intention pour augmenter l'adhésion médicamenteuse mesurée par le biais des MEMS<sup>®</sup> et de l'échelle auto-rapportée QUILAM. Nous nous attendons à ce que les patients du groupe expérimental rapportent une adhésion médicamenteuse plus élevée à T2 que le groupe contrôle. Si les mesures d'adhésion sont suffisamment sensibles et si l'intervention s'avère efficace, elles détecteront une différence significative d'adhésion médicamenteuse entre les deux groupes à T2.

### *Procédure*

En se basant sur une fonction aléatoire sur Excel, nous allons effectuer un essai contrôlé randomisé où des patients présentant un diagnostic de maladie chronique (diabète de

type 2, BPCO ou insuffisance cardiaque) seront aléatoirement répartis dans le groupe expérimental (formulant une implémentation d'intention et un coping planning) ou dans le groupe contrôle, ne recevant aucune intervention. Seuls les patients du groupe expérimental seront invités à formuler une implémentation d'intention et un coping planning concernant leur prise de traitement, tandis que les patients du groupe contrôle ne suivront aucune intervention. Ils devront également remplir les questionnaires sociodémographiques, des mesures liées à la théorie du comportement planifié (intention, attitude, et contrôle comportemental perçu) et des mesures d'adhésion médicamenteuse. Les patients du groupe contrôle devront simplement remplir les mesures sociodémographiques, psychologiques et comportementales.

### *Intervention*

A l'inverse du groupe contrôle, il sera demandé au groupe expérimental de formuler une implémentation d'intention et un coping planning. L'implémentation d'intention va permettre d'établir un lien entre les indices liés au temps et au lieu afin de permettre au patient de se rappeler de prendre ses médicaments. Cette stratégie permettra de cibler les barrières à l'adhésion médicamenteuse concernant l'oubli du traitement. Nous nous baserons sur le modèle du matériel de l'étude de Brown, Sheeran, & Reuber (2009) pour construire l'implémentation d'intention dans notre étude. Un exemple sera donné aux patients afin de les aider à compléter l'action planning, en précisant l'heure, le lieu et l'action quotidienne : « S'il est 8 heures, que je suis dans la salle de bain et que j'ai fini de me brosser les dents, alors je prends mes médicaments du matin. ». Le patient devra remplir des phylactères avec ces informations, pour le matin, le soir, et optionnellement pour le midi, s'il avait une prise le midi. Quant au coping planning, il permettra d'anticiper sur des situations pouvant potentiellement poser problème dans l'atteinte d'un but, ici, la prise du traitement comme le

médecin l'a prescrit. Nous nous appuyerons sur le matériel d'une étude d'Armitage (2008) ciblant l'arrêt de la consommation du tabac et l'anticipation des situations liées à l'envie d'en consommer. Nous construirons les items d'implémentation d'intention en constituant une liste de situations susceptibles de poser problème pour l'adhésion médicamenteuse (Questionnaire pour Identifier les Leviers à l'Adhésion Médicamenteuse ; Lehmann et al., 2014), présentant spécifiquement les barrières à l'adhésion au traitement. Un exemple-type est : « Si je suis en rupture de médicament le dimanche matin, alors j'identifie la pharmacie de garde affichée sur la vitrine de ma pharmacie habituelle et je vais chercher mes médicaments dans la journée ». L'intervention consistera donc pour le patient à cocher les barrières qui lui correspondent parmi les situations pouvant poser problème pour l'adhésion médicamenteuse, et à compléter la fin des phrases correspondantes en précisant ce qu'il ferait s'il devait se retrouver dans cette situation. Cela permettra au patient de trouver ses propres solutions aux barrières à l'adhésion et donc de se l'approprier.

### *Mesures*

L'adhésion médicamenteuse sera mesurée par le biais de plusieurs outils tels que le questionnaire auto-rapportée QUILAM (Questionnaire pour Identifier les Leviers à l'Adhésion Médicamenteuse) et des MEMS© (piluliers électroniques).

### *Design et estimation de la taille d'échantillon*

Le logiciel G-Power pourra être utilisé comme outil afin de connaître le nombre de participants nécessaires pour atteindre une puissance suffisante pour notre étude (Faul et al., 2007). La méta-analyse des interventions basées sur le planning dans les comportements de santé nous permettra d'évaluer la taille d'effet, afin de pouvoir estimer a priori la taille d'échantillon minimale nécessaire pour une puissance statistique suffisante. Cela permettra

également de pouvoir opérationnaliser le planning dans un but d'efficacité optimale de l'intervention, avec une nécessité ou non d'appliquer le format *si-alors* ou de proposer des boosters à l'intervention (e.g. implémentation d'intention répétée). Un design avec un plan factoriel complet serait idéal pour pouvoir tester l'efficacité de l'implémentation d'intention et du coping planning de manière isolée et combinée.

## DISCUSSION

Au départ, il nous a semblé important de nous baser sur les cinq dimensions de l'OMS pour construire l'échelle QUILAM, sachant qu'elles présentaient l'avantage de recouvrir toutes les situations liées à l'adhésion médicamenteuses et étaient très larges. Cependant, après avoir effectué l'analyse factorielle exploratoire, les cinq dimensions ne ressortaient pas en tant que facteurs dans la matrice factorielle. Cela renforçait donc notre décision du choix de l'analyse factorielle exploratoire et non confirmatoire, d'autant plus que les cinq dimensions de l'OMS sont des dimensions thématiques et ne sont pas basées sur un modèle théorique spécifique. Dans la version réduite de l'échelle, toutes les dimensions de l'OMS ne sont d'ailleurs pas représentées. En effet, nous ne retrouvons ni la dimension liée à la maladie, ni les facteurs démographiques et socio-économiques. Cependant, nous retrouvons les dimensions du système de soins, le traitement, et le patient et son entourage, cette dernière étant la plus largement représentée. Les facteurs qui semblent les plus reliés à l'adhésion médicamenteuse sont les croyances, sachant que la matrice factorielle a identifié deux facteurs y étant reliés, à savoir les représentations générales et les représentations spécifiques du traitement. L'organisation du traitement et le système de soins sont également représentés dans l'échelle. Ces dimensions constituent donc des leviers potentiels à l'adhésion

médicamenteuse susceptibles d'être "actionnés", par le biais d'interventions basées sur le changement de comportement (e.g. planning), sur les représentations liées au traitement (e.g. l'entretien motivationnel), impliquant un travail sur l'organisation ou encore sur la relation avec les soignants.

L'ambition de vouloir développer une échelle allant au-delà de la simple mesure quantitative d'adhésion médicamenteuse et prenant en compte la dimension qualitative des barrières à l'adhésion a davantage complexifié le processus méthodologique de réduction de l'échelle. Tout d'abord, fort d'un souci d'exhaustivité, nous avons identifié un nombre important de questionnaires mesurant l'adhésion médicamenteuse. Vingt échelles soit 194 items ont d'abord été inclus dans la première version. Comme le questionnaire aurait été trop lourd à la passation et l'analyse statistique n'aurait pas été possible avec autant d'items, nous avons opté pour la sélection d'items par le comité d'experts. Cela a permis de pouvoir conserver les items les plus pertinents pour la phase de réduction de l'échelle. Le tri des items n'a donc pas été réalisé à l'aide d'un outil statistique mais à l'aide d'un filtre humain en se basant sur des critères de recherche et de pratique clinique. En effet, le choix des items a été réalisé sur base de critères cliniques par des professionnels et des chercheurs dans le champ de la santé. Intégrer une méthodologie se basant sur l'expérience clinique, « du terrain », dans un objectif d'utilisation au cours d'une routine clinique, constitue un des points forts de cette échelle. En parallèle, l'analyse statistique permet d'appuyer sa validité. Cependant, un manque d'objectivité lors de la sélection de ces items pourrait être reproché. Les professionnels de la santé et les chercheurs se sont basés sur leur propre expérience relative à l'adhésion médicamenteuse, rapportée par les patients, et peuvent donc la rapporter avec des biais. La subjectivité du choix des items n'a d'ailleurs pas pu être contrebalancée par un nombre important d'experts dans le comité puisqu'au total il regroupait cinq personnes. De

plus, le comité d'experts a uniquement inclus des chercheurs et professionnels de la santé n'étant pas aveugle à l'objectif de l'étude, ce qui peut ajouter un biais supplémentaire.

Nous avons choisi d'utiliser l'échelle MMAS-8 (Korb-Savoldelli et al., 2012) pour la validation concurrente de QUILAM car il s'agit de l'échelle de référence dans les protocoles expérimentaux mais également dans la pratique clinique courante (Garfield et al., 2011). Bien qu'elle ait présenté une validation satisfaisante dans certaines études (Elixhauser, Eisen, Romeis, & Homan, 1990; Holzemer et al., 2006; Holzemer et al., 1999; Morisky et al., 1986), notamment à l'aide de mesures non auto-rapportées et plus objectives (Morisky et al., 1986), elle a montré de faibles propriétés psychométriques dans d'autres études (Pratt et al., 2001; Sewitch, Leffondré, & Dobkin, 2004; Shalansky, Levy, & Ignaszewski, 2004; Vik et al., 2005). Au cours de cette validation, il sera important de prendre en compte la dimension fluctuante de la cohérence interne de l'échelle MMAS-8. C'est pourquoi, mesurer l'adhésion médicamenteuse à l'aide de piluliers électroniques en complément des questionnaires auto-rapportés semble nécessaire. Il aurait pu être intéressant d'ajouter des mesures d'adhésion médicamenteuse par le biais de marqueurs biologiques. Cependant, cela reste très coûteux, et les marqueurs biologiques de l'adhésion pour le diabète de type II, la BPCO et l'insuffisance cardiaque ne sont pas suffisamment fiables et peuvent être aisément biaisés.

Malgré des propriétés psychométriques satisfaisantes de l'échelle QUILAM après réduction de l'échelle, de nombreuses étapes restent à effectuer. Il est important de noter qu'il a été particulièrement difficile de recruter des patients en nombre égal pour chacune des pathologies, ce qui a ralenti le processus de développement et de validation de l'échelle. Les phases à venir sont celles de la validation psychométrique du questionnaire (en cours) en évaluant son acceptabilité, sa fiabilité, sa cohérence interne et sa validité concurrente. Si l'échelle QUILAM indique de bonnes propriétés psychométriques, la phase de validation prédictive de l'adhésion médicamenteuse suite à une intervention basée sur le planning sera



mise en place auprès de patients présentant un diabète de type II, une BPCO ou une insuffisance cardiaque.

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## DISCUSSION GENERALE

La revue de la littérature a permis d'inclure 329 études présentant une mesure ou une évaluation de l'efficacité du planning. Comme nous avons des critères d'inclusion très larges, nous avons inclus un grand panel d'études différentes. Cela nous a permis d'inclure des études où le planning était soit mesuré soit manipulé, référant à une implémentation d'intention, un action planning ou un coping planning par exemple, empruntant le *format si-alors* ou non, référant à différentes théories, ou étant appliqués à différents comportements de santé. Les populations étudiantes, cliniques et générales étaient aussi représentées. L'intérêt était donc de pouvoir inclure des études ayant un profil différent afin de savoir quelles variables et opérationnalisations étaient les plus utilisées, afin de les tester en tant que modérateurs par la suite, au cours de la méta-analyse. L'analyse purement descriptive des variables issues des études incluses a montré que l'implémentation d'intention était utilisée en majorité dans les études, alors que ce type de planning fait référence au MAP (Gollwitzer, 1993; Heckhausen & Gollwitzer, 1987) qui est un modèle de cognition sociale n'ayant pas été spécifiquement appliqué en santé contrairement à l'HAPA (Schwarzer, 1992, 2008). Par ailleurs, bien que Gollwitzer ait préconisé l'utilisation du format *si-alors* (Gollwitzer, 2014), il reste en minorité dans les études, même récentes, sur l'implémentation d'intention. Nous avons également choisi de coder la congruence entre la terminologie utilisée pour qualifier le plan et la théorie. Nous avons pu constater que certaines études ne faisaient pas référence à la théorie en lien avec le type de plan utilisé. Par ailleurs toutes les études n'utilisaient pas des mesures de vérification de la formation des plans de manière systématique.

La prochaine étape de la revue sur le planning dans les comportements de santé sera de réaliser le double-codage de 10% de l'extraction des données et de 100% de l'évaluation des risques de biais des études (en cours). Ensuite, il s'agira de réaliser les analyses afin d'évaluer la taille d'effet du planning mesuré ou manipulé sur les comportements de santé. Il

sera également nécessaire d'effectuer une analyse en fonction des modérateurs pour savoir quelles variables et quelles conditions permettent d'augmenter ou diminuer l'effet du planning dans les comportements de santé. D'abord, nous verrons si l'effet varie en fonction de la méthodologie adoptée comme le type de design (corrélational vs. expérimental), le type de mesures de comportement de santé (échelles d'auto report vs. mesures physiologiques vs. mesures comportementales), la validation de la variable dépendante, la congruence entre la théorie auquel fait référence le plan et le plan, la rémunération des participants, le risque de biais de l'étude, le type de groupe contrôle (groupe control actif vs. groupe contrôle simple) et la présence de mesures pour vérifier la formation du plan. Ensuite, nous testerons l'effet dans différents contextes entre autres par l'intermédiaire du type de comportement de santé et de la population (générale vs. clinique vs. étudiante). Enfin, les caractéristiques relatives aux plans seront testées comme modérateurs, tels que le type de plan (e.g. action planning, implémentation d'intention, coping planning), le nombre de plans que les participants étaient amenés à former, le format adopté (plan en *si-alors* vs. format global), l'aide (i.e. si les participants étaient aidés dans la formation de leur(s) plan(s)), la présence de boosters et le délai de suivi.

D'après le MAP, avant de combler l'écart entre l'intention et le comportement, il est important de s'assurer que l'intention soit suffisamment présente pour que l'individu adopte un comportement. Cependant, les deux études testant l'efficacité d'une intervention combinant la simulation mentale (phase motivationnelle) et/ou l'implémentation d'intention (phase volitionnelle) pour augmenter l'activité physique n'ont pas montré de résultats significatifs allant dans le sens des hypothèses. La première étude n'a pas mis en évidence la capacité d'une intervention basée sur l'implémentation d'intention seule ou associée à la simulation mentale pour augmenter l'activité physique auto rapportée chez des étudiants. Malgré une méthodologie plus rigoureuse avec un essai randomisé contrôlé avec un plan

factoriel complet, l'utilisation de mesures plus objectives de l'activité physique (participation à la salle de sport) et un plus grand échantillon, permettant d'augmenter la puissance, la seconde étude présentée n'a pas montré un effet simple ou interactif de l'implémentation d'intention et de la simulation mentale. Ces données vont à l'encontre, d'une part, de la théorie postulant que la phase volitionnelle combinée à la phase motivationnelle va permettre d'aider à initier le comportement (Gollwitzer, 1993; Heckhausen & Gollwitzer, 1987), et d'autre part, de la littérature qui montre une efficacité difficilement contestable des interventions basées sur le planning (Bélanger-Gravel, Godin, & Amireault, 2013; Gollwitzer & Sheeran, 2006).

Les résultats de la première étude sur l'activité physique sont à interpréter sous l'angle de limites méthodologiques à l'étude. Tout d'abord, le design adopté ne permettait pas d'avoir une évaluation pure de l'implémentation d'intention, car nous n'avions pas de groupe suivant uniquement une imagerie mentale sans implémentation d'intention (i.e. un plan factoriel complet). Ensuite, il s'agissait d'un essai randomisé contrôlé par cluster, ce qui signifie que ce sont les classes d'étudiants qui étaient assignées aléatoirement aux conditions expérimentales. Cela a pu entraîner un risque de "contamination" des conditions, les participants pouvant échanger sur les questionnaires et en tirer des conclusions, ce qui pouvait biaiser l'étude. Ensuite, l'étude n'était pas réalisée en double aveugle puisque, bien que les participants n'avaient pas connaissance des objectifs de l'étude, les expérimentateurs aléatoirisant et distribuant les questionnaires avaient, eux, connaissance des hypothèses. Il y a donc un risque d'effet Pygmalion (Rosenthal, 1968). Par ailleurs, les étudiants étaient en troisième et quatrième année de psychologie, donc assez avancés dans leurs études de psychologie, il est possible que certains aient deviné l'objectif de l'étude. C'est pourquoi nous aurions dû intégrer des mesures de vérification tels que des items à la fin pour s'assurer que les participants n'aient pas découvert le but de l'étude. Par ailleurs, il est probable que



cette étude manque de puissance pour pouvoir faire émerger un effet de l'implémentation d'intention, s'il existe. D'autant plus que nous ne connaissons pas précisément la taille d'effet de l'implémentation d'intention sur l'activité physique mesurée par l'intermédiaire de l'IPAQ spécifiquement auprès d'étudiants, à 1 et 4 semaines de suivi. Ensuite, une mesure plus objective de l'activité physique avait été utilisée à l'aide d'accéléromètres pour 30% de l'échantillon (environ dix personnes par groupe), afin d'avoir une mesure de l'évolution de l'activité physique au cours de la première semaine post-intervention. Or, les accéléromètres ont présenté des données erronées que nous n'avons pu extraire. Nous n'avons donc pas eu accès à des mesures plus objectives de l'activité physique en complément de mesures auto-rapportées. Quant à la deuxième étude, elle reste plus difficilement critiquable dans le sens où elle adoptait un plan factoriel complet, permettant de tester l'effet simple et interactif de la simulation mentale et de l'implémentation d'intention. Avec un nombre de participants a priori suffisant et un essai randomisé contrôlé (contrairement à l'étude 1), cette étude présentait la puissance nécessaire pour faire ressortir un effet statistique de l'intervention combinant la simulation mentale et l'implémentation d'intention. Ensuite, la participation à la salle de sport constituait une mesure de l'activité physique plus fiable que l'auto-report dans le sens où elle est comportementale et était inscrite dans les registres informatiques de la salle de sport, bien que cela ne donne aucune information quant à la qualité de la pratique physique effectuée dans la salle et hors de la salle. En outre, des échantillons issus de deux lieux différents pour des interventions similaires ont été combinés dans cette étude, ce qui peut constituer une limite et qui comporte le risque de diminuer la puissance si l'on choisit de traiter les deux jeux de données de manière séparées, dans la logique où les deux échantillons n'ont pas reçu une intervention au même endroit.

L'essai randomisé contrôlé testant l'efficacité combinée de l'implémentation d'intention et du coping planning n'a pas pu mettre en évidence une efficacité de

l'intervention pour promouvoir l'adhésion médicamenteuse chez des patients présentant une maladie cardiovasculaire. Cependant, l'analyse de modération post-hoc a révélé une efficacité de l'intervention pour augmenter l'adhésion médicamenteuse chez les personnes qui ont de moins de croyances concernant la nécessité de prendre leur traitement. Ce résultat semble contradictoire par rapport à la littérature et la théorie postulant que l'implémentation d'intention serait plus efficace chez les personnes ayant une motivation sous-jacente pour prendre leur traitement (Gollwitzer, 1993; Heckhausen & Gollwitzer, 1987). D'autres études ont cependant nuancé cette affirmation ayant montré que l'implémentation d'intention pouvait également être efficace chez des individus ayant une motivation limitée à effectuer le comportement (e.g. Brandstätter, Lengfelder, & Gollwitzer, 2001; Chatzisarantis, Hagger, & Wang, 2010; Sheeran, Webb, & Gollwitzer, 2005; Webb & Sheeran, 2004). La littérature ne montre pas de consensus clair quant à l'importance de la phase motivationnelle précédant la phase volitionnelle. C'est pourquoi inclure l'intention en tant que modérateur dans la méta-analyse permettra de nous donner des pistes sur la nécessité d'ajouter une intervention ciblant la phase motivationnelle en plus des interventions basées sur le planning.

Combiner l'implémentation d'intention avec le coping planning permettait de cibler respectivement la non adhésion médicamenteuse liée à l'oubli et celle liée aux barrières d'ordre plus pratiques. Théoriquement, l'implémentation d'intention conviendrait donc davantage aux patients qui débutent un traitement alors que le coping planning serait plus adaptée aux patients qui ont déjà initié leur traitement mais rencontrent certaines difficultés. Il est en effet plus aisé d'anticiper sur des situations lorsqu'on les a déjà rencontrées, c'est pourquoi le coping planning est utilisé dans un cadre d'intervention à plus long cours (Sniehotka, Schwarzer, Scholz, & Schüz, 2005). Dans cette étude, nous avons des patients de profils différents, venant tout juste d'initier le traitement ou l'ayant depuis plusieurs mois, d'où l'intérêt d'avoir combiné ces deux stratégies. Or, si l'on souhaite augmenter la puissance

statistique de l'étude, il serait intéressant de constituer une condition dans laquelle les patients venant d'initier le traitement sont amenés à formuler des implémentations d'intentions en spécifiant les moments et lieux de prise, associés à une activité de la vie quotidienne (dans un format *si-alors*), puis une condition dans laquelle les patients prenant leur traitement depuis plus longtemps formuleraient un coping planning, au sein d'un plan factoriel complet. Cependant, ces résultats sont à interpréter avec précaution sachant que des mesures auto-rapportées de l'adhésion médicamenteuse ont été utilisées dans cette étude. D'abord l'adhésion médicamenteuse était particulièrement élevée dans l'échantillon de notre étude, ce qui contraste avec la littérature (DiMatteo, 2004). Il est possible qu'il existe un effet plafond lié à l'auto-report surestimant l'adhésion ou lié à une adhésion médicamenteuse particulièrement élevée chez ces patients. Utiliser des mesures plus objectives telles que des piluliers électroniques ou des marqueurs biologiques ou cliniques en complément des mesures auto-rapportées auraient permis de renforcer la fiabilité des résultats.

Enfin, l'échelle QUILAM a été développée afin de mesurer les barrières et les leviers à l'adhésion médicamenteuse chez les patients présentant une maladie chronique (diabète de type 2, une broncho-pneumopathie chronique obstructive et insuffisance cardiaque). L'analyse factorielle exploratoire effectuée sur les questionnaires remplis par 116 patients présentant un diabète de type 2, une broncho-pneumopathie chronique obstructive ou une insuffisance cardiaque a permis de dégager 4 grandes dimensions : les représentations générales des traitements (4 items), l'organisation du traitement (3 items), les représentations spécifiques du traitement (3 items), et la relation patient / système de soins (4 items). Au départ, nous nous étions basés sur les cinq dimensions de l'OMS permettant de recouvrir les facteurs généraux liés à l'adhésion médicamenteuse (OMS, 1948) . Il était important de pouvoir retrouver les dimensions liées à la maladie, au traitement, aux facteurs démographiques et socio-économiques, au patient et à son entourage et à la relation soignant /

système de soins. Au final, l'analyse factorielle exploratoire de QUILAM a identifié des dimensions principalement liées aux croyances, à la gestion du traitement et à la relation soignant/système de soins. Cependant, malgré le fait que les facteurs de l'OMS servaient de grille de base pour construire le questionnaire, nous n'avons pas retrouvé les facteurs de l'OMS dans l'analyse. Cela signifie que les autres items reliés à ces facteurs n'étaient pas suffisamment représentés pour expliquer la part de variance du score global au questionnaire, expliquant par ailleurs des alphas de Cronbach modérés pour chaque dimension, ce qui aurait pu justifier une réduction de l'échelle par le biais d'équations structurelles.

De plus, des traductions ont été effectuées par deux personnes bilingues, mais aucun dispositif de traduction de l'anglais au français puis du français à l'anglais par plusieurs personnes bilingues et un juge extérieur pour comparer et prendre une décision au sujet de chaque désaccord n'a été mis en place. Par ailleurs, un vrai Delphi aurait pu être organisé pour remplacer le comité d'experts qui, bien qu'ayant réuni des professionnels de la santé et des chercheurs issus du champ de la pharmacie et la psychologie, constituait les protagonistes de l'étude eux-mêmes, ce qui peut être critiquable d'un point de vue de l'impartialité. L'ensemble de ces décisions méthodologiques a été effectué afin de faire face à des obstacles d'ordres temporels et organisationnels, en jonglant entre les réalités économiques du terrain et la volonté de développer une échelle pouvant être utilisée par les soignants auprès de patients présentant des maladies chroniques. L'analyse factorielle confirmatoire auprès de 330 patients permettra de valider l'échelle auprès d'un échantillon plus large et de contrecarrer les difficultés méthodologiques rencontrées lors du développement de cette échelle.

### **Limites générales**

Dans trois des études présentes, nous n'avons pas constaté de résultats mettant en évidence l'efficacité des interventions basées sur le planning pour améliorer l'adhésion médicamenteuse chez des patients présentant une maladie cardio-vasculaire et pour promouvoir l'activité physique chez les étudiants. Or, les revues de la littérature sur le planning effectuées à ce jour dans ce domaine ont montré une efficacité difficile à remettre en question, avec de nombreuses études allant dans le sens d'une amélioration du comportement ainsi que des tailles d'effet plus ou moins importantes de ces interventions (Adriaanse, Vinkers, De Ridder, Hox, & De Wit, 2011; Bélanger-Gravel et al., 2013; Gollwitzer & Sheeran, 2006). Le calcul de la taille d'effet par le biais de la méta-analyse et la réalisation du funnel plot va permettre de nous éclairer sur un éventuel biais de publication inhérent à la revue. Il existe un biais connu lié à la publication privilégiant les études présentant des résultats montrant des effets significativement positifs (Franco, Malhotra, & Simonovits, 2014). Comme la revue de la littérature inclut très peu de littérature grise (e.g. études non publiées) et que, parallèlement, 3 des études que nous présentons ne mettent pas en évidence des effets de l'intervention, nous pouvons nous questionner sur le risque de surestimations des effets des interventions basées sur le planning. Bien que nous ayons contacté les auteurs phares de la littérature sur l'implémentation d'intention, l'action planning et le coping planning, le comité d'experts du workshop Synergy d'EHPS sur l'implémentation d'intention (European Health Psychology Society, Innsbruck, 2014; Hagger et al., 2016) et les membres d'EHPS, cela ne nous a permis d'inclure que 2 études. Les 5 autres études non publiées concernent les études des propres membres participant à la revue ou bien des connaissances de ces membres. Dans la revue de Gollwitzer et Sheeran (2006), on constate également que la majorité des études non publiées incluses dans la méta-analyse font référence à des études réalisées par les auteurs eux-mêmes, que nous n'avons pu inclure par ailleurs, n'ayant accès aux données malgré avoir contacté les auteurs. Cela oriente donc vers l'idée qu'il existe un

biais dans la sélection des études incluses dans les revues et qu'elles ne sont donc pas parfaitement systématiques. Par ailleurs, nous avons choisi les mots-clés « implementation intention\* », « action plan\* » et « coping plan\* ». Comme les bases de données ne sélectionnent les articles que sur la base du titre, du résumé et des mots-clés, certains articles ne mentionnant pas ces mots-clés (mais mentionnant simplement « planning » ou « plan » par exemple) n'ont pas été identifiés. Nous avons néanmoins réussi à en sélectionner certains en vérifiant chacun des articles publiés par les auteurs-phares. Cependant, il n'est pas exclu que nous ayons manqué certains articles d'auteurs moins connus dans le champ, ayant été peu cités et n'ayant pas utilisé - dans l'abstract, le titre ou les mots-clés de l'article - les mots-clés que nous avons saisi lors de la recherche bibliographique. La présence relative de ces biais et choix méthodologiques sera à garder à l'esprit lors de l'interprétation des résultats de la méta-analyse. Bien que nous ayons fait notre possible pour rendre cette revue la plus systématique et pour inclure toutes les études dans ce champ, il n'a pas été possible d'inclure toutes les études ayant été réalisées.

## **Perspectives**

Il serait intéressant de pouvoir coupler QUILAM, étant un outil visant à identifier les barrières à l'adhésion médicamenteuse, au coping planning, permettant de faire face et d'apporter des stratégies aux barrières liées à un comportement spécifique. L'une des ambitions de QUILAM est de pouvoir apporter une intervention personnalisée et ciblée en fonction de la problématique du patient. Il serait envisageable de pouvoir créer un outil annexe à QUILAM, qui combinerait l'échelle en elle-même, identifiant les barrières, et générant un coping planning proposé au patient. Nous pouvons imaginer des interventions afin de renforcer la phase motivationnelle, à l'aide de simulation mentale voire d'entretien motivationnel, et la phase volitionnelle, par le biais de l'implémentation d'intention ou de l'action planning comme aide à la mise en place de la prise de traitement. Il serait nécessaire

de tester ces interventions en s'assurant d'une puissance statistique suffisante a priori, d'un plan factoriel complet, mais aussi de mesures vérifiant que les participants ont effectivement réalisé et suivi chacune des interventions (e.g. en mesurant l'intention avant et après avoir administré l'intervention ciblant la phase motivationnelle).

Malgré une assomption théorique allant dans le sens de la nécessité d'un niveau relativement élevé de motivation et d'intention pour que les interventions basées sur le planning aident à initier le comportement (Gollwitzer, 1993; Heckhausen & Gollwitzer, 1987), les études semblent partagées sur ce sujet (Brandstätter et al., 2001; Chatzisarantis et al., 2010; Sheeran et al., 2005; Webb & Sheeran, 2004). La méta-analyse pourra permettre de tester la modulation de l'intention sur les interventions basées sur le planning. Cela permettra d'éclairer sur la nécessité et l'intérêt d'associer une intervention motivationnelle en complément d'une intervention ciblant la phase volitionnelle.

Au-delà des nombreux tests de modérateurs qui seront effectués, la méta-analyse permettra d'avoir une vision panoramique des études sur les interventions basées sur le planning, de faire la synthèse quantitative de ce qui a déjà été réalisé, et de pouvoir poser les grandes lignes des études futures afin de savoir vers quelle direction aller. L'extraction des données et la revue qualitative nous ont montré que les études n'explicitaient pas suffisamment la manière dont étaient opérationnalisés les plans, que ce soit dans les consignes données aux participants, dans le format demandé ou encore dans la manière dont ils étaient assistés pour les effectuer. Toutes ces variations expérimentales peuvent constituer des variables ayant un impact sur l'efficacité des interventions. Par ailleurs, les confusions terminologiques, les incongruences entre la théorie et les plans, l'absence de mesures pour vérifier la formation des plans (i.e. manipulation checks) apportent un risque de biais dans les études et plus largement dans la méta-analyse les incluant. C'est pourquoi les résultats seront à interpréter avec prudence. Dans les recherches à venir, il sera donc important d'être le plus

explicite possible concernant l'opérationnalisation du planning, de suivre des plans factoriels complets lorsque plusieurs interventions sont comparées, d'harmoniser les méthodologies adoptées, sur base d'échantillons présentant une puissance suffisamment élevée, dans un but de répliquer les études et de tester les modèles le plus fidèlement possible (Hagger, Gucciardi, & Chatzisarantis, 2016). S'astreindre à ses exigences permettra d'avoir des arguments suffisamment solides dans l'optique de valider les modèles pour, à plus long terme, prétendre à proposer des interventions ayant une efficacité pratique réelle et pertinente pour améliorer les comportements de santé dans le quotidien (Luszczynska, 2016).



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## **ANNEXES**

## PROSPERO International prospective register of systematic reviews

### Review title and timescale

**1** Review title

*A systematic review and meta-analysis of the effect of cue-to-act plans interventions on health-related behaviours*

**2** Original language title

For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

**3** Anticipated or actual start date

*01/03/2015*

**4** Anticipated completion date

*01/01/2017*

**5** Stage of review at time of this submission

Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet started

Review stage	Started	Completed
Preliminary searches	Yes	Yes
Piloting of the study selection process	Yes	Yes
Formal screening of search results against eligibility criteria	Yes	Yes
Data extraction	Yes	Yes
Risk of bias (quality) assessment	Yes	Yes
Data analysis	Yes	No

Provide any other relevant information about the stage of the review here.

### Review team details

**6** Named contact

The named contact acts as the guarantor for the accuracy of the information presented in the register record.

*Carine Meslot*

**7** Named contact email

Enter the electronic mail address of the named contact.

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**9** Named contact phone number

Enter the telephone number for the named contact, including international dialing code.

*+61434425526  
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**10** Organisational affiliation of the review

Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

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*Website addresses: <http://curtin.edu.au> & [www.healthbehaviourchange.com](http://www.healthbehaviourchange.com), <http://www-timc.imag.fr/?lang=en>, <http://www.lip.univ-savoie.fr/>*

**11** Review team members and their organisational affiliations

Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
<i>Title</i>	<i>First name</i>	<i>Last name</i>	<i>Organisation details</i>
<i>Dr</i>	<i>Aurelie</i>	<i>Gauchet</i>	<i>Grenoble-Alpes University, LIP/PC2S</i>
<i>Dr</i>	<i>Dominika</i>	<i>Kwasnicka</i>	<i>Curtin University and Central</i>
<i>Professor Benoit</i>		<i>Allenet</i>	<i>Queensland University</i>
<i>Professor Martin</i>		<i>Hagger</i>	<i>TIMC-IMAG, Grenoble-Alpes University</i>
			<i>Curtin University</i>

## 12 Funding sources/sponsors

Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

*Grenoble Innovation Recherche [grant number AGI13SHS04] and grant UPMF “IN-DOC” from Laboratoire Interuniversitaire de Psychologie: Personnalité, Cognition et Changement Social (LIP/PC2S; Université Pierre Mendès France, Grenoble, France)*

## 13 Conflicts of interest

List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

Are there any actual or potential conflicts of interest?

*There are no actual or potential conflicts of interest.*

## 14 Collaborators

Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

## Review methods

### 15 Review question(s)

State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

*What is the effectiveness of cue-to-act planning interventions on health-related behaviours?*

*What are the effects of mediators and moderators of the effects of cue-to-act planning interventions on behavior, namely which factors explain the effects of cue-to-act planning interventions on outcomes and which contexts or factors magnify or diminish the cue-to-act planning interventions on health behaviours?*

*Potential mediators include: attitude, subjective norms, intention, perceived behavioural control, self-efficacy, self-regulation, planning measures.*

*Potential moderators include: Unhealthy habits; past behaviour; type of goal intention; the theoretical approach referred to by the authors; sample age; sample gender; sample education level; sample ethnicity; sample type (e.g., general population, students, patients); incentive for study participation; study design (e.g., randomized controlled trial, cross-sectional study); study quality (risk of bias assessment); planning intervention type (e.g., implementation intention, action planning, coping planning); the instructions given to participants; planning intervention format (e.g., global format as what/where/when/how, if-then, both); planning intervention mode of delivery (e.g., written or read aloud); planning intervention mode of presentation (e.g., paper, online); type of administration (e.g., individual, collective, assisted or non-assisted); presence of boosters and their time intervals; number of plans; plan quality; additional intervention included alongside planning intervention; the length of the follow-up; assessment of plan fidelity.*

### 16 Searches

Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

*Databases: PsycInfo, PubMed, Web of Science, Scopus*

*Keywords: "action plan\*" OR "coping plan\*" OR "implementation intention\*" (code adapted to each database)*

*Title, Abstract and full-text, in English or French*

## 17 URL to search strategy

If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

I give permission for this file to be made publicly available

Yes

## 18 Condition or domain being studied

Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes. *The outcome measure must be relevant to health behaviour (e.g., alcohol consumption, tobacco use, physical activity, diet, medication adherence, etc.). It may be assessed via self-report (e.g., questionnaires), objective behavioural measure (e.g., accelerometers), physiological measure (e.g., carbon monoxide breath test), or other objective measure (e.g., attendance).*

## 19 Participants/population

Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

*Inclusion criteria: Human, all ages (i.e., adults, elderly and children)*

*Exclusion criteria: Studies involving participants with mental health problems, dementia, frontal lobe damage*

## 20 Intervention(s), exposure(s)

*Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed*

*Studies in which participants explicitly state, or are prompted to state, a cue-to-act plan (i.e., forming a plan explicitly linking a specific cue with future participation in a specific health behaviour) including, but not limited to, an implementation intention, namely, stating a plan that "furnishes the goal intention with an if-then plan specifying when, where, and how the person will instigate responses that promote goal realization" (Gollwitzer & Sheeran, 2006, p.70), that "commit[s] the person to executing an intended goal-directed behaviour once the specified situational context is encountered" (Gollwitzer, 1993, p. 152) or an action plan, that is, to state a plan including "specific situation parameters ('when', 'where') and a sequence of action ('how')" (Schwarzer, 2008, p. 9).*

## 21 Comparator(s)/control

Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

*Interventions based on cue-to-act plans will be compared to standard or active control or comparison groups in which the cue-to-act planning intervention is absent. If there are several control groups in the study, the control group which is most similar to the intervention condition (minus the cue-to-act planning intervention) will be chosen.*

## 22 Types of study to be included initially

Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

*We will include experimental or intervention studies (e.g., randomized controlled trials), quasi-experimental, and longitudinal, prospective and cross-sectional correlational studies. Studies which include quantitative data from which the effect of the implementation intention/action planning intervention/manipulation on health behaviours can be extracted (consistent with the definition provided below).*

## 23 Context

Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

*The health behaviour must be directly related to the planner's own health behaviour, i.e. the planner would need to refer to modifying their own behaviour in their plan rather than that of others. The measure of behaviour must also directly correspond to the planner's behaviour. For example, studies with adult participants who form plans, but the target behavioural assessment is that of their children, will be excluded.*

## 24 Primary outcome(s)

Give the most important outcomes.

Give information on timing and effect measures, as appropriate.

*The primary outcomes are measures of the health-related behaviour (e.g., alcohol consumption, tobacco use, physical activity, diet, medication adherence) referred to by the planner in their cue-to-act plan. The primary dependent variable may be measured using a self-report (e.g., questionnaires), behavioural measure (e.g., accelerometers), physiological measure (e.g., carbon monoxide breath test), or other objective behavioural measure (e.g., attendance to a clinic). Validation and other quality characteristics of outcome measures will be noted. If the study reports multiple measures of the primary dependent variable (e.g., across two or more time points), the final data point will be used. The health behaviour measure must be related to the behaviour specified by the planner in their cue-to-act plan (e.g., a self-reported measure of physical activity as an outcome measure would correspond with the formation of a cue-to-act plan of when, where and/or how to participate in physical activity).*

## 25 Secondary outcomes

List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

Give information on timing and effect measures, as appropriate.

*The secondary outcomes are potential mediators of the effects including theory-related variables such as attitudes, subjective norms, perceived behavioural control, intention, self-regulation, self-efficacy and planning.*

## 26 Data extraction, (selection and coding)

Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

*The principal investigator will screen all studies and extract the data. Three other researchers will each independently code 10% of the randomly selected studies and the extracted data. The first researcher will code 10% of the title and abstract screening (selection of the articles on the base of the title and abstract reading). The second researcher will code 10% of the full-text screening (selection of the articles on the base of the full-text reading). And the third researcher will code 10% of the data extraction. The outcome of the double coding will then be compared across coders. If there are discrepancies between the two researchers that cannot be solved via arbitration, then a third researcher will help to reach consensus. The data to be extracted are: the type of goal intention, the theoretical approach referred to by the authors, the dropout rate, the sample size, the age/gender/education/ethnicity of the sample, the type of sample (e.g., general population, students, patients), the remuneration offered to participants for participating (if any), the study design (e.g., randomized controlled trial, cross-sectional study), the number of groups, the choice of the experimental and control groups (and the reasons for the choice), the study quality check, the characteristics of the planning intervention (the type – implementation intention, action planning, coping planning; the statements given to the participants; the format of the plan – global format in what/where/when/how or if-then or both; the mode of delivery – written or read; the mode of presentation – paper or online; the type of administration – individual or collective, assisted or non-assisted; study boosters and their time intervals; the number of plans), the additional intervention (and for which group(s)), the length of the follow-up, the main outcome related to health behaviours (type of measure; mode of administration – questionnaire, behavioural measure, physiological measure, objective measure; the validation of the measure), whether or not an intention-to-treat analysis adopted, the data used to compute the effect size for studies that manipulated the cue-to-act plan (e.g., means and standard deviation of the main outcome measure for each group, F, t or Chi-square and the probability value (p)), and the zero-order Pearson correlation coefficient between the planning measure and the outcome measures (if applicable) such as measures of planning, past behaviour, unhealthy habits, self-efficacy, self-regulation, attitude, subjective norm, perceived behavioural control, intention, the planning manipulation check measures, the attrition/randomization/representativeness checks.*



## 27 Risk of bias (quality) assessment

State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

*Risk of bias assessment will be based on the Cochrane Collaboration's tool for assessing risk of bias (Higgins et al., 2011). One reviewer will assess 100% and another 10% of the quality of the sequence generation, the allocation concealment, the blinding of participants, the personnel and outcome assessors, the completeness of outcome data, the selective outcome reporting, and other sources of bias. Thus, a study can be assessed as low or high quality related to the risk of bias, or unclear if there is not enough information to assess study quality. The quality of the studies will be added as a moderator in the analysis.*

## 28 Strategy for data synthesis

Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

*The data will be aggregated at the study level and meta-analysed comparing effect sizes for the main effect of planning/implementation intentions intervention on the behavioural outcome. Moderator analysis will be conducted on key moderators identified a priori (e.g., time frame of follow up, format of intervention, intervention duration, study quality); moderators will be included in a regression of effect size on the set of moderators. Qualitative data (e.g., type of plan) will be recoded and summarised quantitatively.*

## 29 Analysis of subgroups or subsets

Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

*Several subgroup analyses have been planned for the review: potential subgroups will include the type of health behaviour and its valence (increasing health promoting behaviours or decreasing health risk behaviours), the theoretical approach referred to by the authors (e.g., model of action phases, HAPA), the type of sample (e.g., general population, patients, students), the type of plan (e.g., implementation intention, action planning, coping planning), the format of the plan (e.g., global format with what/where/when/how, if-then format), the mode of presentation (e.g., paper, online, face-to-face), the assistance, the utilization of booster(s) (and the duration), the length of the follow-up, the number of plan(s) and additional interventions used alongside the cue-to-act plans, and the quality of plans generated.*

## Review general information

### 30 Type of review

Select the type of review from the drop down list.  
*Intervention*

**31 Language**

Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.

*English*

Will a summary/abstract be made available in English?

*Yes*

**32 Country**

Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.

*France and Australia*

**33 Other registration details**

Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.

Not applicable.

**34 Reference and/or URL for published protocol**

Give the citation for the published protocol, if there is one.

Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

*Not applicable.*

I give permission for this file to be made publicly available

*Not applicable.*

**35 Dissemination plans**

Give brief details of plans for communicating essential messages from the review to the appropriate audiences.

Do you intend to publish the review on completion?

The review will be published on completion in a peer reviewed journal and presented at the relevant conferences.

**36 Keywords**

Give words or phrases that best describe the review. (One word per box, create a new box for each term)

Action planning, planning, implementation intentions, plans, coping planning, health behaviour

**37 Details of any existing review of the same topic by the same authors**

Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

Not applicable

**38** Current review status

Review status should be updated when the review is completed and when it is published.  
*Ongoing, data extraction and data analysis stage*

**39** Any additional information

Provide any further information the review team consider relevant to the registration of the review.

**40** Details of final report/publication(s)

This field should be left empty until details of the completed review are available.  
Give the full citation for the final report or publication of the systematic review.  
Give the URL where available.

**ANNEXE II.** Details of the research on the databases (PsycInfo, PubMed, Scopus and Web of Science; Partie I).

<b>PsycInfo</b>	<a href="http://search.ebscohost.com.sid2nomade-1.grenet.fr/login.aspx?direct=true&amp;db=psyh&amp;bquery=(%26quot%3baction+plan*%26quot%3b)+OR+(%26quot%3bcoping+plan*%26quot%3b)+OR+(%26quot%3bimplementation+intention*%26quot%3b)&amp;cli0=LA12&amp;clv0=English%7eFrench&amp;cli1=PO2&amp;clv1=Human%7eMale%7eFemale%7eInpatient%7eOutpatient&amp;lang=fr&amp;type=1&amp;site=ehost-live">http://search.ebscohost.com.sid2nomade-1.grenet.fr/login.aspx?direct=true&amp;db=psyh&amp;bquery=(%26quot%3baction+plan*%26quot%3b)+OR+(%26quot%3bcoping+plan*%26quot%3b)+OR+(%26quot%3bimplementation+intention*%26quot%3b)&amp;cli0=LA12&amp;clv0=English%7eFrench&amp;cli1=PO2&amp;clv1=Human%7eMale%7eFemale%7eInpatient%7eOutpatient&amp;lang=fr&amp;type=1&amp;site=ehost-live</a> [account: meslotc / password: enirac13]
Keywords	("action plan*") OR ("coping plan*") OR ("implementation intention*")
Criteria	Language: English, French ; Population: Human, Male, Female, Inpatient, Outpatient
<b>PubMed</b>	<a href="http://www.ncbi.nlm.nih.gov/pubmed/?term=%22action+plan*%22+OR+%22coping+plan*%22+OR+%22implementation+intention*%22">http://www.ncbi.nlm.nih.gov/pubmed/?term=%22action+plan*%22+OR+%22coping+plan*%22+OR+%22implementation+intention*%22</a>
Keywords	“action plan*” OR “coping plan*” OR “implementation intention*” Human
Criteria	Human; in English or French
<b>Web of Science</b>	<a href="http://apps.webofknowledge.com/summary.do?product=UA&amp;doc=1&amp;qid=7&amp;SID=R2vrz45FI7xHBdEa9Nb&amp;search_mode=AdvancedSearch&amp;update_back2search_link_param=yes">http://apps.webofknowledge.com/summary.do?product=UA&amp;doc=1&amp;qid=7&amp;SID=R2vrz45FI7xHBdEa9Nb&amp;search_mode=AdvancedSearch&amp;update_back2search_link_param=yes</a>
Keywords	TS=("action plan*" OR "coping plan*" OR "implementation intention*")
Criteria	TS=("action plan*" OR "coping plan*" OR "implementation intention*") Refined by: [excluding] Databases: ( MEDLINE ) AND RESEARCH DOMAINS: ( SCIENCE TECHNOLOGY OR SOCIAL SCIENCES ) AND [excluding] RESEARCH AREAS: ( ENVIRONMENTAL SCIENCES ECOLOGY OR URBAN STUDIES OR ENGINEERING OR FORESTRY OR MINING MINERAL PROCESSING OR FISHERIES OR METALLURGY METALLURGICAL ENGINEERING OR BUSINESS ECONOMICS OR SOCIAL ISSUES OR COMPUTER SCIENCE OR SOCIOLOGY OR METEOROLOGY ATMOSPHERIC SCIENCES OR LINGUISTICS OR INSTRUMENTS INSTRUMENTATION OR ENERGY FUELS OR WATER RESOURCES OR TELECOMMUNICATIONS OR MECHANICS OR GEOGRAPHY OR PHYSICS OR IMAGING SCIENCE PHOTOGRAPHIC TECHNOLOGY OR PUBLIC ADMINISTRATION OR FOOD SCIENCE TECHNOLOGY OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR MATHEMATICS OR THERMODYNAMICS OR GOVERNMENT LAW OR NUCLEAR SCIENCE TECHNOLOGY OR MARINE FRESHWATER BIOLOGY OR COMMUNICATION OR AGRICULTURE OR MEDICAL INFORMATICS OR ZOOLOGY OR ENTOMOLOGY OR VETERINARY SCIENCES OR MICROBIOLOGY OR GEOLOGY OR CHEMISTRY OR GENETICS HEREDITY OR BIODIVERSITY CONSERVATION OR PHYSICAL GEOGRAPHY OR AUTOMATION CONTROL SYSTEMS OR CONSTRUCTION BUILDING TECHNOLOGY OR PHYSICAL SCIENCES OTHER TOPICS OR SCIENCE TECHNOLOGY OTHER TOPICS OR INFORMATION SCIENCE LIBRARY SCIENCE OR ROBOTICS OR BIOTECHNOLOGY APPLIED MICROBIOLOGY OR ARCHITECTURE OR REMOTE SENSING OR

	<p>OPHTHALMOLOGY OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR AREA STUDIES OR SPECTROSCOPY OR INTERNATIONAL RELATIONS OR TRANSPORTATION OR MEDICAL LABORATORY TECHNOLOGY OR PLANT SCIENCES OR ACOUSTICS OR GEOCHEMISTRY GEOPHYSICS OR SOCIAL WORK OR CRIMINOLOGY PENOLOGY OR MATERIALS SCIENCE OR PHYSIOLOGY OR OPTICS OR BIOCHEMISTRY MOLECULAR BIOLOGY OR OCEANOGRAPHY ) AND LANGUAGES: ( ENGLISH OR FRENCH )</p> <p>Timespan: All years. Search language=Auto</p>
<b>Scopus</b>	<p><a href="http://www.scopus.com/search/form.uri?sort=plf-f&amp;src=s&amp;nlo=&amp;nlr=&amp;nls=&amp;sid=2FA20EE8A1705CCE9E6AD4C6613D04D8.aqHV0EoE4x1IF3hgVWgA%3a3250&amp;sot=a&amp;sdt=cl&amp;cluster=scolang%2c%22English%22%2ct%2c%22French%22%2ct%2b%2c%22scosubjabbr%2c%22ENGI%22%2cf%2c%22ENVI%22%2cf%2c%22COMP%22%2cf%2c%22EART%22%2cf%2c%22BUSI%22%2cf%2c%22ENER%22%2cf%2c%22PHYS%22%2cf%2c%22ARTS%22%2cf%2c%22ECON%22%2cf%2c%22MATH%22%2cf%2c%22VETE%22%2cf&amp;sl=78&amp;s=TITLE-ABS-KEY%28%22action+plan*%22+OR+%22coping+plan*%22+OR+%22implementation+intention*%22%29&amp;display=edit&amp;numOfFields=0&amp;edit=t&amp;partialQuery=&amp;origin=resultslst&amp;txGid=0">http://www.scopus.com/search/form.uri?sort=plf-f&amp;src=s&amp;nlo=&amp;nlr=&amp;nls=&amp;sid=2FA20EE8A1705CCE9E6AD4C6613D04D8.aqHV0EoE4x1IF3hgVWgA%3a3250&amp;sot=a&amp;sdt=cl&amp;cluster=scolang%2c%22English%22%2ct%2c%22French%22%2ct%2b%2c%22scosubjabbr%2c%22ENGI%22%2cf%2c%22ENVI%22%2cf%2c%22COMP%22%2cf%2c%22EART%22%2cf%2c%22BUSI%22%2cf%2c%22ENER%22%2cf%2c%22PHYS%22%2cf%2c%22ARTS%22%2cf%2c%22ECON%22%2cf%2c%22MATH%22%2cf%2c%22VETE%22%2cf&amp;sl=78&amp;s=TITLE-ABS-KEY%28%22action+plan*%22+OR+%22coping+plan*%22+OR+%22implementation+intention*%22%29&amp;display=edit&amp;numOfFields=0&amp;edit=t&amp;partialQuery=&amp;origin=resultslst&amp;txGid=0</a></p>
<b>Keywords</b>	<p>TITLE-ABS-KEY ( "action plan*" OR "coping plan*" OR "implementation intention*" ) "action plan*" OR "coping plan*" OR "implementation intention*" )</p>
<b>Criteria</b>	<p>TITLE-ABS-KEY("action plan*" OR "coping plan*" OR "implementation intention*" ) AND ( LIMIT-TO(LANGUAGE,"English" ) OR LIMIT-TO(LANGUAGE,"French" ) ) AND ( EXCLUDE(SUBJAREA,"ENGI" ) OR EXCLUDE(SUBJAREA,"ENVI" ) OR EXCLUDE(SUBJAREA,"COMP" ) OR EXCLUDE(SUBJAREA,"EART" ) OR EXCLUDE(SUBJAREA,"BUSI" ) OR EXCLUDE(SUBJAREA,"ENER" ) OR EXCLUDE(SUBJAREA,"PHYS" ) OR EXCLUDE(SUBJAREA,"ARTS" ) OR EXCLUDE(SUBJAREA,"ECON" ) OR EXCLUDE(SUBJAREA,"MATH" ) OR EXCLUDE(SUBJAREA,"VETE" ) )</p>

### ANNEXE III. Complete list of information retrieved from the studies (Partie I).

I.	Characteristics of the study
	<ul style="list-style-type: none"><li>• Author(s) name and article title</li><li>• Journal, year and reference</li><li>• Complementary article (reference of another article related to the study reporting the protocol or other results for example)</li><li>• Trial number</li></ul>
II.	Type of Behaviour
	<ul style="list-style-type: none"><li>• Type of behaviour (health-related behaviour vs. risky-related behaviour)</li><li>• Field of the health behaviour [PA: Physical Activity; D: Diet (healthy diet, organically produced food consumption, testing a bio-shop, multivitamine intake, carbohydrate-electrolyte solution drinking); S: Smoking; MA: Medication or Treatment Adherence; BTSE: Breast or Testicular Self-Examination; A: Alcohol Consumption; DH: Dental hygiene (e.g.: dental floss); C: Condom Use; DR: Driving; H: Hygiene behaviour (handwashing, food hygiene); PFE: Pelvic-Floor Exercise; ATT: Attendance; SU: Sunscreen Use; SC: Screening (cervical cancer screening, mammography); V: Vaccination; SWC: Safe Water Consumption; SL: Sleeping; DRG: Drugs consumption; FU: Facemask Use; SB: Seat belt use]</li><li>• Theoretical approach</li><li>• Congruence between the theoretical approach and the designation used for the cue-dependent plan</li></ul>
III.	Description of the sample
	<ul style="list-style-type: none"><li>• Number of participants at baseline or T1</li><li>• Number of participants at the last follow-up</li><li>• Attrition rate</li><li>• Age (mean and SD)</li><li>• Gender (number)</li><li>• Education (low, middle, high)</li><li>• Ethnicity (Caucasians vs. non Caucasians)</li><li>• Type of sample (general population, students, clinical population)</li><li>• Remuneration of the participants (yes/no)</li></ul>
IV.	Description of the study design
	<ul style="list-style-type: none"><li>• [RCT; CRCT: Cluster RCT; N: Non RCT; N*: RCT but cue-dependent plan non manipulated]</li><li>• [E: Experimental; QE: Quasi-experimental; C: Correlational; C*: Experimental design but cue-dependent plan non manipulated]</li><li>• [L: Longitudinal (and/or Pre-Post); NL: Non Longitudinal (and/or without Pre-Post)]</li><li>• Field study vs Laboratory study</li><li>• Groups: number and designation</li><li>• Instructions for the control condition</li><li>• Simple Control Group or Active Control Group [SCG: Simple Control Group; ACG: Active Control Group; SACG: Simple Control Group and Active Control</li></ul>

- Group]
  - Which EG(s) chosen
  - Reason
  - Which CG(s) chosen
  - Reason
  - Additional intervention for the EG
  - Same additional intervention for the CG?(Yes/No)
  
- V. Characteristics of the cue-dependent planning intervention
  - Type (according to the authors) [II: implementation intention; CP: coping planning; AP: action planning; "AND": when 2 terms used alternatively by the authors]
  - Number of plan(s) prompted to form
  - Statements
  - P: Prompted ( $\geq 2$  components); NP: non prompted ( $< 2$  components)
  - Form of Implementation intention or AP (if-then format vs. type of global format, e.g.: "what, where")
  - If-then format [Y: Yes; N: No]
  - Mode of delivery [W: written; R: read]
  - Mode of presentation [P: paper; C: computer or online]
  - Individual vs collective plan [I: individual; C: collective plan]
  - Assisted vs not assisted [A: assisted; NA: non assisted]
  - Booster [Y: Yes; N: No]
  - Manipulation of the booster (time interval; operationalization)
  - Time(s) when the cue-dependent plan was manipulated (e.g.: T1)
  
- VI. Measurements and analyses
  - Follow-up (period between the measurements) [d: day(s); w: week(s); m: month(s)]
  - For correlational studies: characteristics of the planning measure
    - Type (according to the authors) [II: implementation intention; CP: coping planning; AP: action planning]
    - Item(s)
    - Type of scale
    - Source
  
- VII. Characteristics of the DV/main outcome
  - Measure
  - Type [SR: self-report; BM: behavioural measure; PM: physiological measure]
  - Unit of measurement
  - SR: item formulation
  - Type of scale
  - References
  - [V: validated (PM, BM or validated SR, pr SR already used in previous studies); NV: not validated]
  
- VIII. ITT (Intention-to-treat analysis) or CCA (Complete Case analysis)

- IX. Characteristics of the main dependent variables/outcome measure
- Experimental Group mean (SD) at the main outcome measure (or % (n)) for each time point
  - Experimental group: n (for each time point)
  - Control Group mean (SD) at the main outcome measure (or % (n)) for each time point
  - Control group: n (for each time point)
  - F/t/Chi2 and p-value
  - Effect size (d)
- X. Intention measure
- Characteristics of the intention measure
    - Item formulation
    - Type of scale and range scores
    - References
  - Intention outcome
    - Experimental Group mean (SD) at the intention measure (or % (n)) for each time point
    - Experimental group: n (for each time point)
    - Control Group mean (SD) at the intention measure (or % (n)) for each time point
    - Control group: n (for each time point)
    - F/t/Chi2 and p-value
    - Effect size (d)
- XI. Self-efficacy measure
- Characteristics of the intention measure
    - Item formulation
    - Type of scale and range scores
    - References
  - Self-efficacy outcome
    - Experimental Group mean (SD) at the self-efficacy measure (or % (n)) for each time point
    - Experimental group: n (for each time point)
    - Control Group mean (SD) at the self-efficacy measure (or % (n)) for each time point
    - Control group: n (for each time point)
    - F/t/Chi2 and p-value
    - Effect size (d)
- XII. Physiological measure
- Characteristics of the intention measure
    - Item formulation
    - Type of scale and range scores
    - References
  - Physiological measure outcome
    - Experimental Group mean (SD) at the physiological measure (or % (n)) for each time point



- Experimental group: n (for each time point)
- Control Group mean (SD) at the physiological measure (or % (n)) for each time point
- Control group: n (for each time point)
- F/t/Chi2 and p-value
- Effect size (d)

XIII. Checks

- Presence of planning measure or manipulation checks? [Y: reported; N: non reported]
- Attrition checks included (or sent) [Y: reported; N: non reported] (except for the cross-sectional studies or the studies in ITT)
- Randomisation checks included (or sent) [Y: reported; N: non reported] (except for the studies with only 1 group)

XIV. Correlations for each time point

- Plan/DV (cue-dependent planning intervention dummy coded for the studies with several groups)
- Plan/Mediator (cue-dependent planning intervention dummy coded for the studies with several groups)
- Mediator/DV

XV. Risk of assessment bias Judgement [High; Low; Unclear]; Support of judgement [Quote and citation]Random sequence generation

- Allocation concealment
- Blinding of participants and personnel
- Blinding of outcome assessment
- Incomplete outcome data
- Selective reporting
- Other bias

**ANNEXE IV:** Table of the extracted and recoded data for the qualitative analysis (Partie I).

Article	#	Study design	N	Type of sample	Type of health behaviour	Main outcome		Congruence theory / plan	Characteristic of the planning intervention				Manipulation checks
						Type	Validation		Type of cue-dependent plan	If-then format	Assisted vs not assisted	Presence of booster	
(Abraham et al., 1999)		C	453	S	HB	SR	NV						
(Achtziger, Gollwitzer, & Sheeran, 2008)	1	E	92	S	D	SR	NV	C	II	Y	NA	Y	N
(Adriaanse, van Oosten, de Ridder, de Wit, & Evers, 2011)	3	E	124	S	D	SR	V	C	II	Y	NA	N	Y
	4	E	61	S	D	SR	V	C	II	Y	NA	N	Y
(Adriaanse et al., 2010)	1	E	51	S	D	SR	V	C	II	Y	A	N	N
	2	E	59	S	D	SR	NV	C	II	Y	NA	N	N
(Adriaanse, de Ridder, & de Wit, 2009)	1	E	108	S	D	SR	NV	C	II	Y	A	N	N
	2	E	72	S	D	SR	NV	C	II	Y	A	N	N
(Allan, Sniehotta, & Johnston, 2013)	1	C	72	S	D	SR	NV						
(Andersson & Moss, 2011)		E	50	G	PA	SR	V	C	II	N	NA	N	Y

(Araujo-Soares, McIntyre, MacLennan, & Sniehotta, 2009)		E	195	S	PA	SR	V	C	AP + CP	?	A	N	Y
(Arbour & Martin Ginis, 2009)		E	42	G	PA	BM	V	C	II	N	A	Y	Y
(Arbour-Nicitopoulos, Ginis, & Latimer, 2009; Arbour & Martin Ginis, 2004)		E	46	C	HB	SR	V	C	AP	N	NA	Y	Y
(Arbour & Martin Ginis, 2004; Arden & Armitage, 2008)		E	41	G	PA	SR	NV	C	II	N	NA	N	Y
(Arden & Armitage, 2008)		E	393	G	C	SR	V	C	II	?	?	N	N
(Armitage, 2015a)		E	65	G	A	SR	V	C	II	Y	NA	N	N
(Armitage, 2015b)		E	62	G	D	SR	V	C	II	Y	NA	N	N
(Armitage, Rowe, Arden, & Harris, 2014)		E	67	G	A	SR	V	C	II	Y	NA	N	N

(Armitage, 2014)		E	132	G	D	SR	V	C	II	N	NA	N	Y
(Armitage, Norman, Noor, Alganem, & Arden, 2014)		E	?	G	D	SR	?	C	II	Y	NA	N	N
(Armitage & Arden, 2012)		E	68	G	A	SR	V	C	II	Y	NA	Y	N
(Armitage & Arden, 2010)		E	52	G	PA	SR	V	C	II	Y	NA	Y	N
(Armitage & Sprigg, 2010)		E	71	G	PA	SR	NV	C	II	Y	A	Y	N
(Armitage, 2009)		E	119	G	A	SR	V	C	II	N	NA	Y	N
(Armitage, 2008)	1	E	182	G	S	SR	V	C	II	Y	NA	Y	N
(Armitage & Arden, 2008)		E	282	G	S	SR	V	C	II	N	NA	Y	N
(Armitage, 2007a)		E	120	S	D	SR	NV	C	II	N	NA	Y	N
(Armitage, 2007b)		E	84	G	S	SR	V	C	II	N	NA	Y	N
(Armitage, 2006)		E	325	G	D	SR	V	C	II	?	NA	Y	N
(Armitage, 2004)		E	127	G	D	SR	V	C	II	N	NA	Y	N
(Astrom, 2008)		C	500	G	DH	SR	NV						
(Auzoult, Hardy-Massard, Gandon, & Georges, 2015)		C	150	S	H	SR	NV						

(Bamberg, 2002)		E	320	S	D	BM	V	C	II	N	NA	N	N
(Barg et al., 2012)		C	174	G	PA	SR	V						
(Barz et al., 2016)		C	166	G	PA	SR	V						
(Belanger-Gravel, Godin, Bilodeau, & Poirier, 2013)		E	78	G	PA	BM	V	C	II AND AP + barriers management	Y	A	Y	Y
(Benyamini et al., 2013)		E	602	G	PA + D	PM	V	C	II	N	A	N	N
(Benyamini, Ashery, & Shiloh, 2011)		E	127	G	BSE	SR	NV	C	II	N	NA	Y	N
(Blanchard, 2008)		C	76	C	PA	SR	V						
(Bolman et al., 2015)		E	1375	G	S	SR	V	C	AP + CP	Y	NA	N	Y
(Borland, Balmford, & Swift, 2015)		E	2565	G	S	SR	NV	C	II	Y	NA	N	N
(Brawley, Arbour-Nicitopoulos,		E	10	C	PA	SR	V	C	Planning	?	A	N	Y

& Martin Ginis, 2013)													
(Bray et al., 2011)		E	255	S	PA	SR	V	I	AP	N	NA	Y	Y
(Brendryen, Drozd, & Kraft, 2008)		E	290	G	S	SR	NV	I	CP	?	?	N	Y
(Brickell, Chatzisarantis, & Pretty, 2006)		C	162	S	PA	SR	V						
(D. M. Brown, Bray, Beatty, & Kwan, 2014)		E	60	S	PA	SR	V	C	AP + CP	?	A	N	Y
(I. Brown, Sheeran, & Reuber, 2009)		E	69	C	MA	BM	V	C	II	Y	NA	Y	N
(Budden & Sagarin, 2007)		E	361	G	PA	SR	NV	C	II	N	NA	Y	N
(Burkert, Knoll, Luszczynska, & Gralla, 2012)		C	141	C	PFE	SR	NV						
(Burkert, Knoll, Scholz, Roigas, & Gralla, 2012)		C	106	C	PFE	SR	NV						
(Bycura, 2009)		E	84	S	PA	SR	V	C	II	N	?	N	N
(Cameron et al., 2015)		E	1196	S	A	SR	NV	C	II	Y	NA	N	Y
(Carraro &	1	C	317	S	PA	SR	V						

Gaudreau, 2015)	2	C	97	S	PA	SR	V						
(T. Carvalho & Alvarez, 2014)		C	203	S	C	SR	V						
(C. Carvalho, Mazzoni, Kirsch, Meo, & Santandrea, 2008)	2	E	124	S	PA	SR	NV	C	II	N	NA	N	N
(Caudroit, Boiche, & Stephan, 2014)		C	157	G	PA	SR	V						
(Caudroit, Stephan, & Le Scanff, 2011)		C	120	G	PA	SR	V						
(Chan & Cameron, 2012)		C	136	G	PA	SR	V						
(Chapman & Armitage, 2012)		E	393	S	D	SR	V	C	II	Y	NA	Y	N
(Chapman & Armitage, 2010)		E	383	S	D	SR	V	C	II	Y	NA	Y	N
(Chapman, Armitage, & Norman, 2009)		E	300	S	D	SR	V	C	II	Y	NA	Y	Y
(Chatzisarantis & Hagger, 2010)		E	48	S	A	BM	V	C	II	As soon as, I	NA	Y	N

(Chatzisarantis, Hagger, & Wang, 2010)		E	199	S	D	BM	V	C	II	N	NA	N	N
(Chatzisarantis, Hagger, & Thøgersen-Ntoumani, 2008)		E	127	S	PA	SR	V	C	II	N	NA	N	Y
(Chiu, Lynch, Chan, & Rose, 2012)		C	209	C	D	SR	V						
(Chiu, Lynch, Chan, & Berven, 2011)		C	195	C	PA	SR	V						
(Chow & Mullan, 2010)		C	259	S	H	SR	NV						
(Churchill & Jessop, 2011)		E	430	G	D	SR	NV	C	II	N	NA	Y	N
(Churchill & Jessop, 2010)		E	256	G	D	SR	NV	C	II	N	NA	N	Y
(Commere & Gauchet, 2016)		E	76	S	V	SR	NV	C	AP + CP	Y	NA	N	N
(Conner & Higgins, 2010)		E	1338	G	S	SR	V	C	II	N	?	Y	N
(Conner, Sandberg, & Norman, 2010)	1	C	777	G	PA	SR	V						
	2	C	356	G	PA	SR	V						
(Contzen & Mosler, 2015)	1	C	806	G	H	SR	V						
	2	C	462	G	H	SR	V						
(Costa, Pereira, & Pedras,		C	179	C	MA	SR	V						



2012)													
(Craciun, Schüz, Lippke, & Schwarzer, 2012)		E	524	G	HB	SR	NV	C	AP + CP	N	NA	Y	N
(Craciun, Schuz, Lippke, & Schwarzer, 2012)		E	205	G	SU	SR	NV	C	AP + CP	N	NA	Y	Y
(Craciun, Schuz, Lippke, & Schwarzer, 2010)		C	154	G	SU	SR	NV						
(Craciun & Baban, 2008)		E	233	G	D	SR	V	C	AP	N	NA	N	N
(Cunningham, Swanson, O'Carroll, & Holdsworth, 2012)		E	58	C	PA	BM	V	C	AP	N	A	N	N
(Darker, French, Eves, & Sniehotta, 2010)		E	118	G	PA	BM	V	I	AP + CP	N	A	Y	Y
(de Bruijn, Wiedemann, & Rhodes, 2014)		C	413	S	D	SR	V						
(de Bruijn, Rhodes, & van Osch, 2012)		C	415	S	PA	SR	V						
(de Bruijn, 2011)		C	443	S	D	SR	V						

(Ghisi, Grace, Thomas, & Oh, 2015)		E	173	C	PA	SR	NV	C	AP	?	?	N	Y
(de Nooijer, de Vet, Brug, & de Vries, 2006)		E	293	G	D	SR	NV	C	II	N	NA	N	Y
(De Ridder, de Wit, & Adriaanse, 2009)		C	142	S	D	SR	NV						
(De Vet, Oenema, Sheeran, & Brug, 2009)		E	511	G	PA	SR	V	C	II	N	NA	Y	N
(de Vries, Kremers, Smeets, Brug, & Eijmael, 2008)		E	1331	G	PA	SR	(a) V (b) NV (c) V	C	AP	N	A	N	N
(Dehdari et al., 2014)		E		G	SC	BM	V	C	II	N	A	N	Y
(Dombrowski & Luszczynska, 2009)		C	155	S	PA	SR	V						
(Downs, 2003)		E	53	S	HB	BM	V	C	II	N	NA	Y	Y
(Duncan et al., 2013)		E	286	S	HB	SR	V	?	?	?	?	N	?
(Elfeddali, Bolman, Candel, Wiers,		E	392	G	S	SR	NV	C	Plans + CP	?	?	N	N

& de Vries, 2012)													
(Elliott & Armitage, 2006)		E	258	G	DR	SR	NV	C	II	Y	NA	N	N
(Epton & Armitage, 2016)		E	131	G	PA	SR	V	C	II	Y	NA	N	N
(Epton et al., 2014)		E	1107	S	A	SR	a, : V; b: V, c : V; d: NV	C	II	Y	NA	N	Y
(Ernsting, Knoll, Schneider, & Schwarzer, 2015)		C	200	G	V	SR	V						
(Evans, Kawabata, & Thomas, 2015)		C	139	S	D	SR	V						
(Evers, Klusmann, Ziegelmann, Schwarzer, & Heuser, 2012)		E	80	G	PA	BM	V	C	CP	?	NA	Y	Y
(Farmer et al., 2005)		E	194	C	MA	BM	V	I	AP	Y	NA	N	N
(Fleig, Kuper, Lippke, Schwarzer, & Wiedemann, 2015)		C	1002	G	D + PA	SR	V						
(Fleig, Ngo, et al., 2015)		C	416	G	PA + D	SR	V						

(Fleig, Pomp, Parschau, et al., 2013)	1	C	231	S	PA	SR	V						
	2	C	134	C	PA	SR	V						
(Fleig, Pomp, Schwarzer, & Lippke, 2013)		E	884	C	PA	SR	V	C	AP	N	A	Y	Y
(Fleig, Lippke, Pomp, & Schwarzer, 2011a)		C	248	C	PA	SR	V						
(Fleig, Lippke, Pomp, & Schwarzer, 2011b)		E	504	C	PA	SR	V	C	AP	Y	NA	Y	Y
(Fodor, Antoni, Wiedemann, & Burkert, 2014)		C	272	G	D	SR	V						
(Fuchs, Goehner, & Seelig, 2011)		E	220	C	PA	SR	V	C	II	?	A	Y	N
(Gaston & Prapavessis, 2014)		E	56	G	PA	BM	V	C	AP + CP	?	A	N	Y
(Gaston & Prapavessis, 2009)		C	70	G	PA	SR	V						
(Gerber, Fuchs, & Pühse, 2010)		E	50	G	HB	SR	V	?	?	?	?	N	N
(Gellert, Ziegelmann, Krupka, Knoll, & Schwarzer, 2011)		E	386	G	PA	SR	V	C	AP + CP	N	NA	Y	N

2014)													
(Gellert, Ziegelmann, Lippke, & Schwarzer, 2012)	1	C	909	G	D	SR	V						
	2	C	289	G	PA	SR	V						
(Gerber, Mallett, & Pühse, 2011)		C	210	S	PA	SR	V						
(Gholami, Knoll, & Schwarzer, 2015)		E	166	G	DH	SR	NV	C	AP + CP	N	?	N	Y
(Gholami, Lange, Luszczynska, Knoll, & Schwarzer, 2013)		E	144	G	D	SR	NV	C	AP + barrie rs mana geme nt	N	?	N	Y
(Gibson et al., 2012)		E	65	C	PA	SR	V	C	II	N	A	Y	N
(Gillison et al., 2015)		E	90	G	D + PA	a: SR; b: SR; c: BM	V	C	AP + CP	N	A	Y	Y
(Godin et al., 2010)		E	221	G	PA	SR	V	C	II	N	NA	Y	N
(Godinho, Alvarez, Lima, & Schwarzer, 2014)		C	203	S	D	SR	V						

(Gohner et al., 2012)		E	316	G	D + PA	SR	V	C	II + AP	?	A	Y	Y
(Gratton, Povey, & Clark-Carter, 2007)		E	198	G	D	SR	NV	C	II	N	NA	N	N
(Greene, 2004)		E	74	G	HB	SR	V	C	II	When, I	NA	N	N
(Greer, Milner, Marcello, & Mazin, 2015)		C	91	C	MA	SR	V						
(Greiner et al., 2014)		E	470	G	SC	SR	V	C	II	?	?	N	N
(Guillaumie, Godin, Manderscheid, Spitz, & Muller, 2012)		E	263	G	D	SR	V	C	II	Y	A	Y	Y
(Gutiérrez-Doña, Lippke, Renner, Kwon, & Schwarzer, 2009)	1	C	245	G	D	SR	NV						
(Hagger, Lonsdale, & Chatzisarantis, 2012)		E	79	S	A	SR	NV	C	II	Y	NA	Y	Y
(Hagger, Lonsdale, Koka, et al.,		E	185	S	A	SR	NV	C	II	Y	NA	Y	Y

2012)													
(Hagger & Montasem, 2009)		E	35	S	D	BM	V	C	II	N	NA	Y	Y
(Hall, Zehr, Paulitzki, & Rhodes, 2014)		E	75	G	PA	BM + SR	V	C	II	N	A	Y	N
(Hamilton, Cox, & White, 2012)		C	458	G	PA	SR	V						
(Hammer, 2011)		E	85	G	PA	SR	V	I	II	N	?	N	Y
(Hankonen, Absetz, Kinnunen, Haukkala, & Jallinoja, 2013)		C	679	G	D	SR	V						
(Harris et al., 2014)		E	332	G	D	SR	V	C	II	Y	NA	N	Y
(Heverin & Byrne, 2011)		E	78	S	TSE	SR	NV	C	II	N	NA	Y	N
(Higgins & Conner, 2003)		E	162	G	S	SR	NV	C	II	N	NA	N	N
(Hill, Abraham, & Wright, 2007)		E	386	S	PA	SR	V	C	II	N	NA	Y	N
(Hirai et al., 2013)		C	559	G	SC	SR	NV						
(Huang, 2012)		E	330	S	PA	SR	V	C	II	N	?	N	N
(Hurling, Fairley, &		E	53	G	PA	SR	NV	C	II	N	?	Y	N

Dias, 2006)													
(Inauen & Mosler, 2014)	2	E	265	G	SWC	SR	NV	C	II	N	A	N	Y
(Inauen, Tobias, & Mosler, 2014)		E	226	G	SWC	SR	NV	C	II	N	A	N	N
(Inauen, Hossain, Johnston, & Mosler, 2013)		C	1268	G	SWC	SR	NV						
(Jackson et al., 2006)		E	206	C	MA	SR	NV	C	II	N	A + NA	Y	N
(Jackson et al., 2005)		E	94	C	D	SR	V	C	II	N	NA	Y	N
(Jessop, Sparks, Buckland, Harris, & Churchill, 2014)	1	E	91	G	PA	SR	NV	C	II	When, I'	NA	N	N
	2	E	97	S	PA	SR	NV	C	II	When, I'	NA	N	N
(Johnson, 2012)		C	110	C	PA	SR	V						
(Johnson, 2012)		C	109	G	SU	SR	V						
(Karimi-Shahanjarini, Rashidian, Omidvar, & Majdzadeh, 2013)		E	590	G	D	SR	V	C	II	N	NA	N	N
(Kellar &		C	218	S	D	SR	NV						



Abraham, 2005)													
(Keller et al., 2015)		C	169	C	PFE	SR	NV						
(Kelly, Leung, Deane, & Lyons, 2015)		C	177	C	A	BM	V						
(Kendzierski, Ritter, Stump, & Anglin, 2015)	1	E	142	S	D	SR	V	C	II	N	NA	N	N
(Kersten, McPherson, Kayes, Theadom, & McCambridge, 2015)		E	20	C	PA	SR	V	C	II	Y	A	Y	?
(Kinney et al., 2014)		E	384	G	SC	BM	V	C	II	N	A	Y	N
(Knauper et al., 2011)		E	177	S	D	SR	V	C	II	Y	NA	Y	Y
(Koring, Richert, Lippke, et al., 2012)		C	290	G	PA	SR	V						
(Koring, Richert, Parschau, et al., 2012)		E	883	G	PA	SR	V	C	Planning	N	NA	Y	Y
(Kothe, Mullan, & Amaratunga,		E	378	S	D	SR	NV	C	II	N	NA	Y	N

2011)													
(Kreausukon, Gellert, Lippke, & Schwarzer, 2012)		E	114	S	D	SR	V	C	AP + CP	N	?	N	Y
(Kroese, Adriaanse, & De Ridder, 2013)		E	64	C	PA + D	SR	V	?	AP	?	?	N	N
(Kroese, Adriaanse, Evers, & De Ridder, 2011)		E	57	G	HB	SR	NV	C	II	Y	?	N	N
(Kwak, Kremers, van Baak, & Brug, 2007)		E	87	G	PA	BM	V	C	II	N	NA	N	N
(Lamongese & Gauchet, 2016)		E	31	C	MA	SR	V	C	II + CP	Y	NA	N	N
(Lange et al., 2013)		E	791	G	D	SR	V	C	Planning	N	NA	Y	Y
(Latimer, Ginis, & Arbour, 2006)		E	37	G	PA	SR	V	C	II	N	A	Y	N
(Lavin & Groarke, 2005)		E	80	S	DH	SR	NV	C	II	N	?	N	N
(Lester, Gerstein, Nicholas, &		C	153	C	D	SR	NV						

Hilgendorf, 2014)													
(Lhaxhang, Gholami, Knoll, & Schwarzer, 2015)		E	205	S	DH	SR	NV	C	Plans	N	NA	N	Y
(Lhaxhang, Lippke, Knoll, & Schwarzer, 2015)		E	206	S	H	SR	V	C	Plans	N	NA	N	Y
(Lhaxhang, Godinho, Knoll, & Schwarzer, 2014)		E	205	S	D	SR	NV	C	Plans	N	NA	N	Y
(Lippke, Fleig, Wiedemann, & Schwarzer, 2015)		E	384	G	PA + D	SR	NV	C	AP + CP	N	A	N	Y
(Lippke & Plotnikoff, 2014)		C	1193	C	PA	SR	V						
(Lippke, Schwarzer, Ziegelmann, Scholz, & Schuz, 2010)		E	226	G	PA	SR	V	C	AP + CP	N	NA	N	Y
(Lippke, Wiedemann, Ziegelmann, Reuter, &		C	812	G	PA	SR	V						

Schwarzer, 2009)													
(S. Lippke, J. P. Ziegelmann, & R. Schwarzer, 2004)		C	509	C	PA	SR	NV						
(S. Lippke, J. Ziegelmann, & R. Schwarzer, 2004)		E	56	C	PA	SR	V	C	AP + CP	N	A	N	Y
(Liu & Park, 2004; Lo et al., 2014)		E	31	G	MA	BM	V	C	II	N	NA	Y	N
(Lo et al., 2014)		E	2318 2	G	SC	BM	V	C	II	Y	NA	N	N
(Loft & Cameron, 2013)		E	99	G	SL	SR	V	C	II	N	NA	Y	Y
(Lourenco et al., 2014)		E	115	C	MA	SR	V	I	AP + CP	N	A	Y	N
(Lubans, Plotnikoff, Jung, Eves, & Sigal, 2012)		E	48	C	PA	SR	V	C	Planni ng	?	A	N	Y
(Luszczynska et al., 2016)		E	506	G	D	SR	V	C	Planni ng	N	A	Y	Y
(Luszczynska, Schwarzer, Lippke, &	1	E	58	C	PA	SR	V	C	Planni ng	N	A	Y	N

Mazurkiewicz, 2011)	2	E	187	G	PA	SR	NV	C	Planning	If, I	NA	Y	N
(Luszczynska et al., 2010)	2	C	620	G	PA	SR	V						
(Luszczynska & Cieslak, 2009)		C	130	C	D	SR	NV						
(Luszczynska & Haynes, 2009)		E	120	G	D + PA	SR	NV	C	AP + CP	N	NA	Y	Y
(Luszczynska & Tryburcy, 2008)		C	187	C	PA	SR	NV						
(Luszczynska, Scholz, & Sutton, 2007)		E	114	C	D	SR	V	C	II	N	A	Y	N
(Luszczynska, Sobczyk, & Abraham, 2007)		E	50	G	D	SR	V	C	II + CP	N	A	Y	Y
(Luszczynska, Tryburcy, & Schwarzer, 2007)		E	200	G	D	SR	NV	C	AP + plan	N	NA	Y	Y
(Luszczynska, 2006)		E	114	C	PA	SR	NV	C	II	N	A	Y	N
(Luszczynska, 2004)		C	440	S	BSE	SR	NV						
(Maher & Conroy, 2015)		E	187	S	PA	SR	V	C	AP	N	NA	Y	N

(Mairs & Mullan, 2015)		E	72	S	SL	SR	NV	C	II	Y	NA	Y	N
(Matcham, McNally, & Vogt, 2014)		E	160	G	S	SR	V	C	II	?	?	N	N
(McGowan, North, & Courneya, 2013)		E	303	C	PA	SR	V	C	II + barrie rs mana geme nts	?	NA	N	Y
(Meslot, Gauchet, Allenet, Francois, & Hagger, 2016)	1	E		S	PA	SR	V	C	II	Y	NA	N	Y
	2	E	184	G	PA	BM	V	C	II	N	NA	N	N
(Meslot, Gauchet, Hagger, et al., 2016)		E	71	C	MA	SR	V	C	II + CP	Y	NA	N	N
(Milkman, Beshears, Choi, Laibson, & Madrian, 2011)		E	3272	G	V	BM	V	C	II	N	NA	N	N
(Milne & Sheeran, 2005)		E	642	S	HB	SR	NV	C	II	N	?	N	Y
(Milne, Orbell, & Sheeran, 2002)		E	248	S	PA	SR	NV	C	II	N	NA	Y	N

(Mistry, Sweet, Latimer-Cheung, & Rhodes, 2015)		C	337	G	PA	SR	V						
(Moan & Rise, 2006)		C	145	S	S	SR	NV						
(Molloy, Dixon, Hamer, & Sniehotta, 2010)		C	903	S	PA	SR	V						
(Mullan & Wong, 2010)		E	184	S	H	SR	V	C	II	N	NA	N	N
(Muller, Houbre, & Lanfranchi, 2012)		E	59	S	D	SR	NV	C	II	N	A	N	N
(Murgraff, Abraham, & McDermott, 2007)		E	347	S	A	SR	NV	C	II	N	NA	Y	N
(Murgraff, White, & Phillips, 1996)		E	102	S	A	SR	NV	C	Planning	N	NA	N	N
(Murray, Rodgers, & Fraser, 2009)		E	52	G	PA	BM	V	C	II	N	NA	Y	N
(Neter, 2015)		E	60	S	PA	SR	NV	?	II	Y	?	Y	Y
(Neter, Stein, Barnett-Griness, Rennert, &		E	2755 5	G	SC	BM	V	C	II	Y	NA	N	N

Hagoel, 2014)													
(Newberry, 2013)	1	E	159	G	D	SR	NV	C	II	Y	A	N	N
	2	E	168	G	D	SR	NV	C	II	Y	?	N	N
(Norman & Wrona-Clarke, 2016)		E	283	S	A	SR	V	C	II	Y	NA	N	N
(Norman & Conner, 2005)	1	C	58	S	PA	SR	NV						
	2	C	76	S	PA	SR	NV						
(O'Carroll, Chambers, Dennis, Sudlow, & Johnston, 2013)		E	58	C	MA	BM	V	C	II	Y	A	N	Y
(O'Connor, Armitage, & Ferguson, 2015)		E	202	G	D	SR	NV	C	II	Y	NA	N	N
(O'Neill et al., 2008)		C	2062	G	SC	SR	NV						
		C	99	G	S	PM	V						
(Orbell & Verplanken, 2010)		E	274	S	HB	BM	V	C	II	N	NA	Y	Y
(Orbell, Hodgkins, & Sheeran, 1997)		E	155	S	BSE	SR	NV	C	II	N	NA	Y	N
(Pakpour et al., 2015)		E	275	C	MA	SR	V	C	AP + CP	N	A	N	Y



(Pakpour et al., 2016)		E	1158	G	DH	SR	V	C	II AND planni ng	Y	NA	N	Y
(Pakpour, Gellert, Asefzadeh, & Sniehotta, 2014)		C	1301	G	DH	SR	V						
(Pakpour, Gellert, Asefzadeh, Updegraff, et al., 2014)		C	197	C	MA	SR	V						
(Pakpour, Hidarnia, Hajizadeh, & Plotnikoff, 2012)		C	714	G	DH	SR	V						
(Pakpour & Sniehotta, 2012)		C	961	S	DH	SR	V						
(Pakpour et al., 2011)		C	144	C	PA	SR	V						
(Parschau, Barz, et al., 2014)		C	484	G	PA	SR	V						
(Parschau, Fleig, et al., 2014)	1	C	350	G	PA	SR	V						
	2	C	275	C	PA	SR	V						
(Parschau et		C	660	G	PA	SR	V						

al., 2012)													
(Payaprom, Bennett, Alabaster, & Tantipong, 2011)		E	201	C	V	BM	V	C	II AND AP	Y	NA	Y	Y
(Perrier, Sweet, Strachan, & Latimer-Cheung, 2012)		C	187	G	PA	SR	V						
(Plaete, De Bourdeaudhuij, Verloigne, & Crombez, 2015)		E	192	G	PA + D	SR	V	C	AP + CP	N	NA	Y	N
(Pomp, Fleig, Schwarzer, & Lippke, 2013)		E	325	C	PA	SR	V	I	AP	?	?	N	N
(Prestwich et al., 2014)		E	427	G	D	SR	V	C	II	Y	NA	N	Y
(Prestwich et al., 2012)		E	195	G	PA	SR	V	C	II	Y	NA	N	Y
(Prestwich, Perugini, & Hurling, 2010)		E	134	G	PA	SR	V	C	II	Y	NA	Y	Y
(Prestwich, Perugini, & Hurling, 2009)		E	154	S	PA	SR	NV	C	II	When, then or As soon as	?	Y	N

(Prestwich, Ayres, & Lawton, 2008)		E	174	G	D	SR	V	C	II	Y	NA	N	Y
(Prestwich et al., 2005)	1	E	83	S	BSE	SR	NV	C	II	N	NA	Y	N
	2	E	91	S	BSE	SR	NV	C	II	N	NA	Y	N
(Prestwich, Lawton, & Conner, 2003)	1	E	68	G	PA	SR	NV	C	II	N	NA	Y	N
(Rackow, Scholz, & Hornung, 2015)		C	175	G	PA	SR	V						
(Radtke, Scholz, Keller, & Hornung, 2012)		C	385	G	S	SR	V						
(Ransom-Flint, 2006)		E	92	S	PA	SR	NV	C	II	N	?	N	N
(Reinwand, Kuhlmann, Wienert, de Vries, & Lippke, 2013)		E	792	G	PA + D	SR	V	C	AP + CP	N	NA	N	Y
(Renner, Spivak, Kwon, & Schwarzer, 2007)		C	662	G	PA	SR	V						
(Reuter et al., 2010)		C	265	G	PA	SR	NV						

(Reuter, Ziegelmann, Wiedemann, & Lippke, 2008)	2	E	115	G	D	SR	V	C	Planning	N	A	N	Y
(Reyes Fernandez, Fleig, et al., 2015)		C	497	S	PA	SR	V						
(Reyes Fernandez, Lippke, Knoll, Blanca Moya, & Schwarzer, 2015)		E	242	S	H	SR	NV	C	AP + CP	N	A	N	Y
(Rhodes, Naylor, & McKay, 2010)		E	65	G	PA	SR	V	C	Planning	N	NA	N	N
(Rhodes, Blanchard, Matheson, & Coble, 2006)		C	230	S	PA	SR	V						
(Richert et al., 2010)		C	411	G	D	SR	NV						
(Rise, Thompson, & Verplanken, 2003)		C	112	S	PA	SR	NV						
(Rivis & Sheeran, 2013)		E	326	S	HB	SR	NV	C	II	Y	NA	N	N
(Roberts, Maddison, Magnusson, &		C	72	S	PA	BM	V						

Prapavessis, 2010)													
(Rodgers et al., 2014)		E	39	C	PA	BM	V	C	II	?	A	Y	N
(Rodrigues, João, Gallani, Cornélio, & Alexandre, 2013)		E	136	C	PA	SR	V	Unclear	AP + CP	N	?	Y	N
(Rutter, Steadman, & Quine, 2006)		E	1894	G	SC	BM	V	C	II	Y	NA	N	N
(Schmitt, 2004)		C	150	G	SC	SR	NV						
(Scholz, Ochsner, & Luszczynska, 2013)		E	373	G	HB	SR	V	C	AP + CP	N	A	Y	Y
(Scholz, Nagy, Gohner, Luszczynska, & Kliegel, 2009)	1	C	344	G	D	SR	V						
	2	C	235	G	S	SR	V						
(Scholz, Schuz, Ziegelmann, Lippke, & Schwarzer, 2008)		C	354	G	PA	SR	V						
(Scholz, Sniehotta, Burkert, & Schwarzer,		E	205	C	PA	SR	V	I	AP + CP	N	A	Y	Y

2007)													
(Scholz, Knoll, Sniehotta, & Schwarzer, 2006)		E	95	C	PA	SR	V	C	AP	N	A	Y	N
(Schuz et al., 2012)	2	C	237	G	PA	SR	V						
(Schuz, Sniehotta, Mallach, Wiedemann, & Schwarzer, 2009)		C	288	G	DH	SR	V						
(Schuz, Wiedemann, Mallach, & Scholz, 2009)		E	194	G	DH	SR	V	C	Planning	N	A	N	N
(Schüz, Sniehotta, Wiedemann, & Seemann, 2006)		C	157	S	DH	SR	NV						
(Schwarzer, Cao, & Lippke, 2010)		E	534	S	PA	SR	V	C	AP + CP	N	NA	N	N
(Schwarzer & Luszczynska, 2008)	1	C	166	C	S	SR	V						
	2	C	116	C	D	SR	V						
(Schwarzer et al., 2007)	2	C	298	S	SB	SR	V						
	3	C	700	G	D	SR	V						
(Schwerdtfeger, Schmitz, &		E	63	G	PA	BM	V	C	II	N	?	Y	N

Warren, 2012)													
(Sellers, 2010)		E	107	S	HB	SR	NV	C	AP + CP	?	A	Y	Y
(Sheeran & Silverman, 2003)		E	271	G	FT	BM	V	C	II	N	NA	N	N
(Sheeran & Orbell, 2000)	1	E	114	G	SC	BM	V	C	II	N	NA	Y	N
(Sheeran & Orbell, 1999)	1	E	78	S	D	BM	V	C	II	N	NA	Y	N
	2	E	37	S	D	BM	NV	C	II	N	NA	Y	N
(Simonetti & Gauchet, 2016)		E	79	C	MA	SR	V	C	II + CP	Y	NA	N	N
(Skar, Sniehotta, Molloy, Prestwich, & Araujo-Soares, 2011)		E	677	S	PA	SR	V	C	AP + CP	N	NA	Y	N
(Sniehotta, Gorski, & Araujo-Soares, 2010)		C	95	C	PA	BM	V						
(Sniehotta, Soares, & Dombrowski, 2007)		E	134	S	DH	SR	V	I	AP	N	NA	N	N
(Sniehotta, Schwarzer,		E	211	C	PA	SR	V	C	AP (+	N	A	Y	N

Scholz, & Schüz, 2005)									CP)				
(Sniehotta, Scholz, & Schwarzer, 2005)		C	307	C	PA	SR	V						
(Sniehotta, Scholz, Schwarzer, et al., 2005)		E	199	C	PA	SR	V	C	AP + CP	N	A	N	Y
(Sniehotta, Schwarzer, et al., 2005)		C	352	C	PA	SR	V						
(Soureti et al., 2011)		E	571	G	D	SR	V	C	Planning	Y	NA	N	Y
(Springvloet, Lechner, de Vries, Candel, & Oenema, 2015)		E	1349	G	D	SR	V	C	II	N	NA	N	N
(Stadler, Oettingen, & Gollwitzer, 2010)		E	255	G	D	SR	NV	C	II	Y	A	Y	N
(Stadler, Oettingen, & Gollwitzer, 2009)		E	256	G	PA	SR	V	C	II	Y	A	Y	N
(Steadman & Quine, 2004)		E	76	S	TSE	SR	NV	C	II	N	NA	Y	N



(Stin, 2013)		E	71	G	D	SR	V	C	II	Y	NA	N	N
(Stolte, van Tilburg, & Aartsen, 2016)		C	115	G	PA	SR	V						
(Sudeck & Höner, 2011)		E	485	C	PA	SR	V	C	AP + CP	N	A	N	Y
(Sullivan & Rothman, 2008)		E	115	S	D	SR	V	C	II	N	NA	Y	N
(Svenson, Östergren, Merlo, & Råstam, 2002)		C	401	S	C	SR	NV						
(Tam, Bagozzi, & Spanjol, 2010)		E	559	S	D	SR	NV	C	II	N	NA	N	N
(Tapper, Jiga-Boy, Maio, Haddock, & Lewis, 2014)		E	67	G	D	SR	V	C	II	Y	NA	Y	N
(Te Poel, Bolman, Reubsaet, & de Vries, 2009)		E	195	G	S	SR	NV	C	AP	?	NA	Y	Y
(Teng & Mak, 2011)		C	217	G	C	SR	NV						
(Thompson et al., 2015)		E	387	G	D	SR	NV	I	AP	N	NA	N	Y
(Troop, 2013)		E	59	S	D	SR	V	C	II	N	NA	N	N

(Ungar, Sieverding, Weidner, Ulrich, & Wiskemann, 2016)		E	67	C	PA	SR	V	C	AP + CP	N	A	N	Y
(van Genugten et al., 2012)		E	361	G	PA + D	SR	V	C	II	Y	NA	N	N
(van Koningsbruggen, Veling, Stroebe, & Aarts, 2014)	1	E	89	S	D	BM	V	C	II	?	NA	N	N
	2	E	89	S	D	BM	V	C	II	?	NA	N	N
(van Koningsbruggen, Stroebe, Papies, & Aarts, 2011)	2	E	236	G	D	SR	NV	C	II	Y	NA	Y	N
(van Osch et al., 2009)	1	C	434	G	D	SR	V						
	2	C	442	G	D	SR	V						
(van Osch, Lechner, Reubsæet, Wigger, & de Vries, 2008)		E	571	G	S	SR	NV	I	CP	Y	NA	Y	N
(A. A. Verhoeven, Adriaanse, de Vet, Fennis, & de Ridder, 2014)		E	161	S	D	SR	V	C	II	Y	NA	N	N

(A. A. C. Verhoeven, Adriaanse, de Ridder, de Vet, & Fennis, 2013)	1	E	63	S	D	SR	V	C	II	Y	NA	N	N
(Verplanken & Faes, 1999)	1	E	102	S	D	SR	NV	C and I	AP AND II	Y	NA	Y	N
(Vinkers, Adriaanse, Kroese, & de Ridder, 2015)		E	300	G	V	BM	V	C	II	N	NA	N	Y
		E	107	S	HB	BM	V	C	II	Y	NA	N	N
(J. C. Walsh, 2005)		E	156	G	SC	BM	V	C	II	N	NA	N	N
(J. J. Walsh, da Fonseca, & Banta, 2005)		E	80	G	PA	SR	NV	C	II	N	NA	Y	N
(Warner et al., 2016)		E	245	G	PA	BM	V	C	Planning	N	NA	N	N
(Webb, Sheeran, & Luszczynska, 2009)	2	E	172	S	S	SR	V	C	II	When, then	NA	Y	N
(Wiedemann, Lippke, & Schwarzer, 2012)		E	362	S	D	SR	V	I	AP	?	NA	Y	Y
(Wiedemann, Lippke, Reuter,		E	264	G	PA	SR	V	C	AP +	N	NA	Y	N

Ziegelmann, & Schüz, 2011)									CP				
(Wiedemann, Lippke, Reuter, Ziegelmann, & Schwarzer, 2011)		E	276	G	D	SR	V	C	AP + CP	N	NA	Y	Y
(Wiedemann, Schuz, Sniehotta, Scholz, & Schwarzer, 2009)	1	C	124	C	PA	SR	V						
	2	C	209	C	DH	SR	V						
(Zandstra, den Hoed, van der Meer, & van der Maas, 2010)		E	57	G	D	SR	NV	C	II	Y	NA	Y	N
(Zhang & Cooke, 2012)		E	84	S	PA + D	SR	V	I	AP + CP	N	NA	N	N
(Zhou, Gan, et al., 2016)		C	164	S	FU	SR	NV						
(Zhou, Gan, et al., 2015)		C	156	S	D	SR	V						
(Zhou, Jiang, Knoll, & Schwarzer, 2015)		E	307	S	H	SR	V	C	AP + CP	N	NA	Y	Y
(Zhou, Sun, Knoll, Hamilton, &		E	215	G	DH	SR	V	C	AP + CP	N	?	N	Y

Schwarzer, 2015)													
(Zhou, Wang, Knoll, & Schwarzer, 2016)		C	249	S	PA	SR	V						
(Zhou, Zhang, Knoll, & Schwarzer, 2015)		E	253	S	SU	SR	V	C	AP + CP	N	NA	N	Y
(Zhou, Gan, Knoll, & Schwarzer, 2013)		C	240	S	D	SR	V						
(Ziegelmann, Luszczynska, Lippke, & Schwarzer, 2007)		C	368	C	PA	SR	NV						
(Ziegelmann, Lippke, & Schwarzer, 2006)		E	373	C	PA	SR	NV	C	Planni ng AND AP + CP	N	?	N	Y

*Note.* E = experimental; C = correlational; N : Number of participants at the last follow-up and/or in the analysis; G: general population; S: students; C: clinical population; PA: Physical Activity; D: Diet (healthy diet, organically produced food consumption, testing a bio-shop, multivitamine intake, carbohydrate-electrolyte solution drinking); S: Smoking; MA: Medication Adherence or Treatment Adherence; BSE: Breast Self-Examination; TSE: Testicular Self-Examination; A: Alcohol Consumption; DH: Dental hygiene; C: Condom Use; DR: Driving; H: Hygiene behaviour (handwashing, food hygiene); PFE: Pelvic-Floor Exercise; SU: Sunscreen Use; SC: Screening (cervical cancer screening, mammography); V: Vaccination; SWC: Safe Water Consumption; SL: Sleeping; FU: Facemask Use; SB: Seat belt use; SR: self-report or

interview; BM: behavioural measure; PM: physiological measure; V: validated (PM, BM or validated SR, or SR already used in previous studies); NV: not validated; ; C = congruent; I = incongruent; II: implementation intention; CP: coping planning; AP: action planning; "AND": when 2 terms used alternatively by the authors]; Y: yes; N: No; A: assisted; NA: non assisted; ?: unclear or non-reported.

## ANNEXE V. Questionnaire for the Mental Simulation and Implementation Intention Group at T1 (Partie II).



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### Notice d'information

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#### Projet : Identification des Leviers à l'Activité Physique chez les étudiants

##### Chercheurs responsables scientifiques du projet :

Carine Meslot<sup>1,2</sup>, Aurélie Gauchet<sup>2</sup>, Martin Hagger<sup>3</sup> et Benoît Allenet<sup>1</sup>

<sup>1</sup>Laboratoire TIMC-IMAG, Domaine de la Merci, 38706 La Tronche Cedex

<sup>2</sup>Laboratoire Interuniversitaire de Psychologie (EA4145), Université Pierre Mendès-France, Grenoble

<sup>3</sup>Faculty of Health Sciences, Curtin University, Perth, Australie

**Lieu de recherche :** BSHM, Département Psychologie (Université de Grenoble).

**But du projet de recherche :** Identifier les leviers à l'activité physique chez les étudiants.

**Ce que l'on attend de vous :** Si vous acceptez de participer à cette étude, il vous faudra répondre à un questionnaire de manière anonyme (10 à 15 minutes environ) avant le programme, une deuxième fois après 1 semaine puis une troisième après 4 semaines (2 x 5 minutes ; vous générerez vous-même un code pour que l'on puisse identifier les questionnaires qui vont ensemble aux 3 temps de l'étude).

##### Vos droits à la confidentialité

- 1) Les données obtenues seront traitées avec la confidentialité la plus totale.
- 2) Vous êtes la seule personne à connaître votre code, donc personne ne pourra vous identifier en tant que personne, et les résultats de l'étude seront diffusés de manière à ce qu'aucune personne ne puisse être reconnue directement.
- 3) Toutes les données seront gardées dans un endroit sécurisé et seuls les responsables scientifiques y auront accès le temps des traitements statistiques.

##### Vos droits de vous retirer de la recherche à tout moment

- 1) Votre contribution à cette recherche est volontaire ;
- 2) Vous pouvez cesser votre participation à tout moment et demander que vos données soient détruites, sans aucune conséquence. Il suffira d'envoyer un email aux responsables scientifiques afin qu'ils puissent retirer ces informations de la base de données informatisée.

**Bénéfices :** Les avantages attendus de cette recherche sont de mieux connaître les leviers à l'activité physique chez les étudiants.

**Risques possibles :** À notre connaissance, cette recherche n'implique aucun risque ou inconfort autre que ceux de la vie quotidienne.

**Diffusion :** Cette recherche sera diffusée dans des colloques et sera publiée dans des actes de colloque et des articles de revue académique.

##### Vos droits à poser des questions à tout moment

Vous pouvez poser des questions au sujet de la recherche à tout moment en communiquant avec les responsables du projet par courrier électronique : [carine.meslot@upmf-grenoble.fr](mailto:carine.meslot@upmf-grenoble.fr)

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## Formulaire de consentement éclairé

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### Projet : Identification des Leviers à l'Activité Physique chez les étudiants

#### Chercheurs responsables scientifiques du projet :

Carine Meslot<sup>1,2</sup>, Aurélie Gauchet<sup>2</sup>, Martin Hagger<sup>3</sup> et Benoît Allenet<sup>1</sup>

<sup>1</sup>Laboratoire TIMC-IMAG, Domaine de la Merci, 38706 La Tronche Cedex

<sup>2</sup>Laboratoire Interuniversitaire de Psychologie (EA4145), Université Pierre Mendès-France, Grenoble

<sup>3</sup>Faculty of Health Sciences, Curtin University, Perth, Australie

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- 3) Toutes les données seront gardées dans un endroit sécurisé et seuls les responsables scientifiques y auront accès le temps des traitements statistiques.

#### Vos droits de vous retirer de la recherche à tout moment

- 1) Votre contribution à cette recherche est volontaire ;
- 2) Vous pouvez cesser votre participation à tout moment et demander que vos données soient détruites, sans aucune conséquence. Il suffira d'envoyer un email aux responsables scientifiques afin qu'ils puissent retirer ces informations de la base de données informatisée.

**Bénéfices :** Les avantages attendus de cette recherche sont de mieux connaître les leviers à l'activité physique chez les étudiants.

**Risques possibles :** À notre connaissance, cette recherche n'implique aucun risque ou inconfort autre que ceux de la vie quotidienne.

**Diffusion :** Cette recherche sera diffusée dans des colloques et sera publiée dans des actes de colloque et des articles de revue académique.

#### Vos droits à poser des questions à tout moment

Vous pouvez poser des questions au sujet de la recherche à tout moment en communiquant avec les responsables du projet par courrier électronique : [carine.meslot@upmf-grenoble.fr](mailto:carine.meslot@upmf-grenoble.fr)

J'ai lu et compris les renseignements ci-dessus et j'accepte de plein gré de participer à la recherche.

**Nom et prénom du participant :** ..... **Date :** ..... / ..... / .....

**Signature**



Nous nous intéressons aux différents types d'activités physiques que vous faites dans votre vie quotidienne. Les questions suivantes portent sur le temps que vous avez passé à être actif physiquement au cours des **7 derniers jours**. Répondez à chacune de ces questions même si vous ne vous considérez pas comme une personne active. Les questions concernent les activités physiques que vous faites au travail, dans votre maison ou votre jardin, pour vos déplacements, et pendant votre temps libre.

Pensez à toutes les activités **intenses** que vous avez faites au cours des **7 derniers jours**. Les activités physiques intenses font référence aux activités qui vous demandent un effort physique important et vous font respirer beaucoup plus difficilement que normalement. Pensez *seulement* aux activités que vous avez effectuées pendant au moins 10 minutes d'affilée.

1. Au cours des 7 derniers jours, combien y a-t-il eu de jours pendant lesquels vous avez fait des activités physiques intenses comme porter des charges lourdes, bêcher, faire du VTT ou jouer au football ?

\_\_\_\_\_ **jours par semaine**

Pas d'activités physiques intenses



***Passez à la question 3***

2. En général, combien de temps avez-vous passé à faire des activités **intenses** au cours de l'un de ces jours ?

\_\_\_\_\_ **heures par jour**

\_\_\_\_\_ **minutes par jour**

Ne sait pas

Pensez à toutes les activités **modérées** que vous avez faites au cours des **7 derniers jours**. Les activités physiques modérées font référence aux activités qui vous demandent un effort physique modéré et vous font respirer un peu plus difficilement que normalement. Pensez *seulement* aux activités que vous avez effectuées pendant au moins 10 minutes d'affilée.

3. Au cours des 7 derniers jours, combien y a-t-il eu de jours pendant lesquels vous avez fait des activités physiques modérées comme porter des charges légères, passer l'aspirateur, faire du vélo tranquillement, ou jouer au volley-ball ? Ne pas inclure la marche.

\_\_\_\_\_ **jours par semaine**

Pas d'activités physiques modérées



***Passez à la question 5***

4. En général, combien de temps avez-vous passé à faire des activités **modérées** au cours de l'un de ces jours ?

\_\_\_\_\_ heures par jour  
\_\_\_\_\_ minutes par jour

Ne sait pas

Pensez au temps que vous avez passé à **marcher** au cours des **7 derniers jours**. Cela comprend la marche au travail et à la maison, la marche pour vous rendre d'un lieu à un autre, et tout autre type de marche que vous auriez pu faire pendant votre temps libre pour la détente, le sport ou les loisirs.

5. Au cours des **7 derniers jours**, combien y a-t-il eu de jours pendant lesquels vous avez **marché** pendant au moins 10 minutes d'affilée.

\_\_\_\_\_ jours par semaine

Pas de marche → *Passez à la question 7*

6. En général, combien de temps avez-vous **marché** au cours de l'un de ces jours ?

\_\_\_\_\_ heures par jour  
\_\_\_\_\_ minutes par jour

Ne sait pas

La dernière question porte sur le temps que vous avez passé **assis** pendant un jour de semaine, au cours des **7 derniers jours**. Cela comprend le temps passé assis au travail, à la maison, lorsque vous étudiez et pendant votre temps libre. Il peut s'agir par exemple du temps passé assis à un bureau, chez des amis, à lire, à être assis ou allongé pour regarder la télévision.

7. Au cours des **7 derniers jours**, combien de temps avez-vous passé **assis** pendant **un jour de semaine**?

\_\_\_\_\_ heures par jour  
\_\_\_\_\_ minutes par jour

Ne sait pas

Pourquoi décidons-nous de pratiquer ou non un sport ? Attribuez une cote de 0 à 4 à chacun des points ci-dessous, en fonction de ce qui vous correspond le mieux.

Attention : il n'y a pas de "bonne" ou de "mauvaise" réponse ! Notre seul objectif est de connaître votre attitude personnelle face au sport.

	<b>MOTIVATION A PRATIQUER UNE ACTIVITE PHYSIQUE</b>	<b>Non, pas du tout</b>		<b>C'est parfois vrai</b>		<b>Oui, tout à fait</b>
1.	Je fais du sport parce que les autres estiment que je dois en faire	0	1	2	3	4
2.	Je me sens coupable si je ne fais pas de sport	0	1	2	3	4
3.	J'apprécie les avantages que m'apporte le sport	0	1	2	3	4
4.	Je fais du sport parce que j'aime ça	0	1	2	3	4
5.	Je ne vois pas pourquoi je devrais faire du sport	0	1	2	3	4
6.	Je fais du sport parce que mes amis / ma famille / mon partenaire estime(nt) que je dois en faire	0	1	2	3	4
7.	J'ai honte quand je loupe un de mes entraînements	0	1	2	3	4
8.	J'estime qu'il est important de pratiquer une activité physique régulière	0	1	2	3	4
9.	Je ne vois pas pourquoi je devrais prendre la peine de faire du sport	0	1	2	3	4
10.	J'apprécie mes séances d'entraînement	0	1	2	3	4
11.	Je pratique parce que les autres n'apprécieront pas que je ne le fasse pas	0	1	2	3	4
12.	Je ne vois pas l'utilité de l'exercice physique	0	1	2	3	4
13.	Je me sens minable quand je n'ai pas fait de sport pendant un certain temps	0	1	2	3	4
14.	J'estime qu'il est important de faire un effort pour pratiquer régulièrement	0	1	2	3	4
15.	Je trouve que l'exercice physique est une activité agréable	0	1	2	3	4
16.	Je trouve que mes amis / ma famille / mon partenaire font pression sur moi pour que je fasse du sport	0	1	2	3	4
17.	Je me sens nerveux(se) si je ne fais pas du sport régulièrement	0	1	2	3	4
18.	L'activité physique m'apporte du plaisir et de la satisfaction	0	1	2	3	4
19.	Je trouve que le sport est une perte de temps	0	1	2	3	4

La section de ce questionnaire vise à en savoir un peu plus sur vous. Veuillez indiquer (en entourant un chiffre) à quel point chacune des phrases suivantes reflète **ce que vous êtes habituellement**. Chaque personne est différente à ce sujet donc il n'y a pas de bonne ou de mauvaise réponse, nous nous intéressons à vos **opinions**. Ne passez pas trop de temps sur chacune des phrases. Toutes les réponses sont strictement **confidentielles**, et veuillez répondre **à toutes les questions**.

Pour chaque proposition ci-dessous, choisissez un chiffre allant de 1 à 5 afin d'indiquer si les propositions vous correspondent totalement (5) ou pas du tout (1).

1
2
3
4
5  


---

Pas du tout
Totalement

1	Je sais bien résister aux tentations	1	2	3	4	5
2	Il est difficile pour moi de casser mes mauvaises habitudes	1	2	3	4	5
3	Je suis paresseux(euse)	1	2	3	4	5
4	Je dis des choses inappropriées	1	2	3	4	5
5	Je fais certaines choses qui sont néfastes pour moi, si elles sont amusantes	1	2	3	4	5
6	Je refuse tout ce qui est néfaste pour moi	1	2	3	4	5
7	Je souhaiterais avoir plus d'autodiscipline	1	2	3	4	5
8	Les gens diraient que j'ai une autodiscipline de fer	1	2	3	4	5
9	Le plaisir et l'amusement m'empêchent parfois de faire mon travail	1	2	3	4	5
10	J'ai du mal à me concentrer	1	2	3	4	5
11	Je suis capable de travailler efficacement pour atteindre des buts à long terme	1	2	3	4	5
12	Parfois, je ne peux pas m'empêcher de faire certaines choses, même si je sais que ce n'est pas bien	1	2	3	4	5
13	J'agis souvent sans penser aux différentes alternatives	1	2	3	4	5

---

### Renseignements généraux

---

#### Code de passation

(2 premières lettres du prénom de votre mère ; 2 premières lettres du prénom de votre père ; votre mois et département de naissance. Exemple : ME PE 04 38) : \_\_ \_\_ / \_\_ \_\_ / \_\_ \_\_ / \_\_ \_\_

Date d'aujourd'hui : \_\_ / \_\_ / \_\_

Si une montre/accéléromètre vous a été attribuée, veuillez noter sa référence (chiffres sur le dessus) : \_\_\_\_\_

Sexe :  H /  F

Date de naissance : \_\_ / \_\_ / \_\_

Votre taille : \_\_ \_\_

Votre poids : \_\_ \_\_

1) Vous êtes :

Fumeur     Non-fumeur     Ancien fumeur

2) A quelle fréquence consommez-vous des boissons alcoolisées ?

Jamais		2 fois par semaine					A peu près tous les jours	
0	1	2	3	4	5	6	7	

3) Combien de verres consommez-vous habituellement aux occasions où vous buvez de l'alcool ?  
(1 verre équivalant à 1 canette de bière, un verre de vin, un cocktail ou bien un shot)

Je ne bois pas occasion	0	1	2	3	4	5	Plus de 6 verres par occasion
-------------------------	---	---	---	---	---	---	-------------------------------

4) J'ai l'intention de pratiquer une activité physique régulièrement pendant le mois à venir.

Pas du tout d'accord	1	2	3	4	5	6	7	Tout à fait d'accord
----------------------	---	---	---	---	---	---	---	----------------------

5) Je vais essayer de pratiquer une activité physique régulièrement pendant le mois à venir.

Pas du tout d'accord	1	2	3	4	5	6	7	Tout à fait d'accord
----------------------	---	---	---	---	---	---	---	----------------------

6) Je planifie de faire une activité physique régulièrement pendant le mois à venir.

Pas du tout d'accord	1	2	3	4	5	6	7	Tout à fait d'accord
----------------------	---	---	---	---	---	---	---	----------------------

7) Pour moi, pratiquer une activité physique régulièrement pendant le mois à venir est :

Dangereux	1	2	3	4	5	6	7	Bénéfique
Déplaisant	1	2	3	4	5	6	7	Plaisant
Mauvais	1	2	3	4	5	6	7	Bon
Inutile	1	2	3	4	5	6	7	Utile
Ennuyeux	1	2	3	4	5	6	7	Amusant

8) La plupart des gens qui comptent pour moi pensent que je ne devrais pas pratiquer une activité physique régulièrement pendant le mois à venir :

Tout à fait vrai	1	2	3	4	5	6	7	Tout à fait faux
------------------	---	---	---	---	---	---	---	------------------

9) Il est attendu de moi que je pratique une activité physique régulièrement pendant le mois à venir :

Peu probable	1	2	3	4	5	6	7	Très probable
--------------	---	---	---	---	---	---	---	---------------

10) Les personnes dans mon entourage qui ont des opinions que j'estime :

- approuvent que je pratique une activité physique régulièrement pendant le mois à venir :

Tout à fait vrai	1	2	3	4	5	6	7	Tout à fait faux
------------------	---	---	---	---	---	---	---	------------------

- pensent que je devrais pratiquer une activité physique régulièrement pendant le mois à venir :

Tout à fait vrai	1	2	3	4	5	6	7	Tout à fait faux
------------------	---	---	---	---	---	---	---	------------------

11) Pour moi, pratiquer une activité physique régulièrement pendant le mois à venir semble être :

Facile	1	2	3	4	5	6	7	Difficile
--------	---	---	---	---	---	---	---	-----------

12) Si je le voulais, je pourrais pratiquer une activité physique régulièrement pendant le mois à venir :

Tout à fait vrai      1      2      3      4      5      6      7      Tout à fait faux

---

**Un exercice mental pour vous aider**

---

**Exercice 1**

Dans cet exercice, il vous est demandé de vous visualiser en train de pratiquer votre activité physique de manière à obtenir les résultats que vous attendez dans ce domaine. A partir d'aujourd'hui et pour les jours suivant la mise en place de votre plan, imaginez comment vous pratiqueriez votre exercice physique. C'est très important que vous vous voyiez en train de pratiquer cette activité physique et d'en avoir une image précise dans votre esprit.

**Merci d'écrire sur les lignes ci-dessous comment vous imaginez le moment où vous serez en train de pratiquer votre activité physique régulièrement, le mois à venir.**

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**Dans quelle mesure avez-vous visualisé de manière précise la manière dont vous pourriez pratiquer votre activité physique régulièrement le mois à venir? (Veuillez cocher une case)**

**Je n'ai pas  
réussi à la  
visualiser**

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
--------------------------	--------------------------	--------------------------	--------------------------	--------------------------	--------------------------

**Je l'ai  
précisément  
visualisée**

**Exercice 2**

Beaucoup de personnes affirment avoir **l'intention d'être plus actives physiquement**, mais finissent par oublier ou ne trouvent jamais le temps de le faire. Il a été constaté que **si vous formulez un plan** définissant quand vous allez effectuer un comportement planifié, vous aurez plus tendance à vraiment le faire et à ne pas l'oublier ou trouver le temps de le faire. Il serait donc utile pour vous de **passer quelques minutes à penser à quand vous allez pratiquer un exercice physique le mois à venir**. Essayez de penser à quand il serait mieux pour vous de faire de l'exercice, et ne discutez pas de vos réponses avec vos voisins.

*Remplissez une bulle par activité physique. Si vous avez l'intention de pratiquer un seul type d'activité physique, n'en remplissez qu'une.*

Durant le mois à venir :

Si on est \_\_\_\_\_ (jour(s)),

Qu'il est \_\_\_\_\_ (heure),

**Alors je pratiquerai/ferai**

\_\_\_\_\_

(type d'activité physique)

À/au \_\_\_\_\_ (lieu)

Durant le mois à venir :

Si on est \_\_\_\_\_ (jour(s)),

Qu'il est \_\_\_\_\_ (heure),

**Alors je pratiquerai/ferai**

\_\_\_\_\_

(type d'activité physique)

À/au \_\_\_\_\_ (lieu)

Aviez-vous déjà mis en place ce type de planning avant l'étude :  non  oui

Dans quelle mesure avez-vous trouvé une solution précise sur la manière dont vous pourriez pratiquer votre activité physique régulièrement le mois à venir? (Veuillez cocher une case)

Je n'ai pas  
trouvé de  
solution

--	--	--	--	--	--

Je l'ai  
précisément  
trouvée

Dans quelle mesure avez-vous un plan concernant quand, où et comment vous pourriez pratiquer votre activité physique régulièrement le mois à venir ? (Veuillez cocher une case)

Je n'ai pas de  
plan

--	--	--	--	--	--

J'ai un plan  
précis

A ce stade, sentez-vous que vous vous êtes bien préparé à la pratique d'une activité physique régulière pour le mois à venir ? (Veuillez cocher une case)

Je ne me suis  
pas bien  
préparé(e)

--	--	--	--	--	--

Je me suis  
bien  
préparé(e)

Vérifiez d'avoir bien répondu **à toutes les questions du questionnaire.**  
Nous vous remercions pour votre participation.

ANNEXE VI. Consort checklist (Partie II).



## CONSORT 2010 checklist of information to include when reporting a randomised trial\*

Section/Topic	Item No	Checklist item	Reported on page No
<b>Title and abstract</b>			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	1-2
<b>Introduction</b>			
Background and objectives	2a	Scientific background and explanation of rationale	2-7
	2b	Specific objectives or hypotheses	7-13
<b>Methods</b>			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	7-8; 14
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	N/A
Participants	4a	Eligibility criteria for participants	7; 14
	4b	Settings and locations where the data were collected	7; 14
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	7-10; 14-17
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	9-10; 16-17
	6b	Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a	How sample size was determined	7-8; 14
	7b	When applicable, explanation of any interim	N/A



		analyses and stopping guidelines	
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	8; 15
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	8; 15
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	8; 15
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	8; 15
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	8; 15
	11b	If relevant, description of the similarity of interventions	13-16
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	11-18
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	N/A
<b>Results</b>			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	10-11; 17-18
	13b	For each group, losses and exclusions after randomisation, together with reasons	10-11; 17-18
Recruitment	14a	Dates defining the periods of recruitment and follow-up	8; 15
	14b	Why the trial ended or was stopped	8; 15
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	27-29; 31-32

Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	10; 17
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	11-12; 18-19
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N/A
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	N/A
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	N/A
<b>Discussion</b>			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	12-13; 19
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	20
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	21-22
<b>Other information</b>			
Registration	23	Registration number and name of trial registry	N/A
Protocol	24	Where the full trial protocol can be accessed, if available	N/A
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	23

\*We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. Additional extensions are forthcoming: for those and for up to date references relevant to this checklist, see [www.consort-statement.org](http://www.consort-statement.org).

**ANNEXE VII.** Questionnaire for the Implementation Intention and Coping Group at T1  
(Partie III).



LABORATOIRE  
PERSONNALLE  
INTER-UNIVERSITAIRE  
COGNITION  
DE PSYCHOLOGIE  
CHANGEMENT SOCIAL

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**ETUDE ItIAM**  
**Notice d'information**

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**Chercheurs responsables scientifiques du projet :**

Carine Meslot<sup>1,2</sup>, Audrey Lehmann<sup>1,2</sup>, Aurélie Gauchet<sup>2</sup> et Benoît Allenet<sup>1</sup>

<sup>1</sup>Laboratoire TIMC-IMAG, Domaine de la Merci, 38706 La Tronche Cedex

<sup>2</sup>Laboratoire Interuniversitaire de Psychologie (EA4145), Université Pierre Mendès-France, Grenoble

**Lieu de recherche :** Hôpital de jour – rééducation cardiaque, Hôpital Sud (Echirolles)

**But du projet de recherche :** Améliorer la prise en charge thérapeutique des patients ayant un diagnostic de pathologie coronarienne et/ou d'insuffisance cardiaque.

**Ce que l'on attend de vous :** Si vous acceptez de participer à cette étude, il vous faudra répondre à un questionnaire de manière anonyme (10 à 20 minutes environ) avant le programme, puis une seconde fois après 6 semaines (10 minutes ; vous générerez vous-même un code pour que l'on puisse identifier les questionnaires qui vont ensemble aux 2 temps de l'étude).

**Vos droits à la confidentialité**

- 1) Les données obtenues seront traitées avec la confidentialité la plus totale.
- 2) Vous êtes la seule personne à connaître votre code, donc personne ne pourra vous identifier en tant que personne, et les résultats de l'étude seront diffusés de manière à ce qu'aucune personne ne puisse être reconnue directement.
- 3) Toutes les données seront gardées dans un endroit sécurisé et seuls les responsables scientifiques y auront accès le temps des traitements statistiques.

**Vos droits de vous retirer de la recherche à tout moment**

- 1) Votre contribution à cette recherche est volontaire ;
- 2) Vous pouvez cesser votre participation à tout moment et demander que vos données soient détruites, sans aucune conséquence pour votre suivi à l'hôpital de jour. Il suffira d'envoyer un email aux responsables scientifiques en indiquant votre code afin qu'ils puissent retirer ces informations de la base de données informatisée.

**Bénéfices :** Les avantages attendus de cette recherche sont d'améliorer la prise en charge thérapeutique des patients.

**Risques possibles :** À notre connaissance, cette recherche n'implique aucun risque ou inconfort autre que ceux de la vie quotidienne.

**Diffusion :** Cette recherche sera diffusée dans des colloques et sera publiée dans des actes de colloque et des articles de revue académique.

**Vos droits à poser des questions à tout moment**

Vous pouvez poser des questions au sujet de la recherche à tout moment en communiquant avec les responsables du projet par courrier électronique : [carine.meslot@upmf-grenoble.fr](mailto:carine.meslot@upmf-grenoble.fr)



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**ETUDE ITIAM**  
**Formulaire de consentement éclairé**

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Vous pouvez poser des questions au sujet de la recherche à tout moment en communiquant avec les responsables du projet par courrier électronique : [carine.meslot@upmf-grenoble.fr](mailto:carine.meslot@upmf-grenoble.fr)

J'ai lu et compris les renseignements ci-dessus et j'accepte de plein gré de participer à la recherche.

**Nom et prénom du participant :** ..... **Date :** ..... /..... /.....

**Signature :**

## Vous et vos médicaments

**Code de passation** (2 premières lettres : prénom de votre mère ; 2 premières lettres : prénom du père ; votre mois et département de naissance. Exemple : ME PE 04 38) : \_ \_ \_ \_ \_

**Date d'aujourd'hui** : \_ \_ / \_ \_ / \_ \_

Vous prenez des médicaments pour votre maladie cardiaque. En général, les patients rencontrent des problèmes concernant la prise de leurs médicaments et nous sommes intéressés par votre expérience. Il n'y a pas de bonne ou mauvaise réponse. Merci de répondre à chaque question en fonction de votre expérience personnelle avec vos médicaments.

( 1 ) Vous arrive-t-il quelquefois d'oublier de prendre vos médicaments ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 2 ) Il arrive que des personnes ne prennent pas leurs médicaments pour des raisons autres que l'oubli. Pensez aux deux dernières semaines, vous est-il arrivé au moins un jour de ne pas prendre vos médicaments ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 3 ) Vous est-il déjà arrivé de diminuer ou d'arrêter de prendre votre traitement sans le dire à votre médecin, parce que vous vous sentiez plus mal lorsque vous le preniez ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 4 ) Lorsque vous voyagez ou quittez votre domicile, vous arrive-t-il d'oublier d'emporter avec vous vos médicaments ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 5 ) Avez-vous pris vos médicaments hier ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 6 ) Lorsque vous sentez que votre problème de santé est maîtrisé, vous arrive-t-il de stopper votre traitement ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 7 ) Prendre son traitement tous les jours constitue une vraie gêne pour certains patients. Vous arrive-t-il de ne pas supporter de prendre votre traitement médical ?	<input type="checkbox"/> Oui <input type="checkbox"/> Non
( 8 ) Combien de fois avez-vous eu des difficultés à vous rappeler de prendre votre traitement ?	
<input type="checkbox"/> Jamais ou rarement <input type="checkbox"/> De temps à autre <input type="checkbox"/> Parfois <input type="checkbox"/> Fréquemment <input type="checkbox"/> Tout le temps	

L'équipe soignante est à votre disposition pour répondre à vos questions en lien avec votre prise en charge.

## Votre opinion sur les médicaments qui vous sont prescrits

Nous sommes intéressés par l'opinion que vous avez sur les médicaments qui vous sont prescrits

Ci-dessous se trouvent les items rédigés par d'autres chercheurs

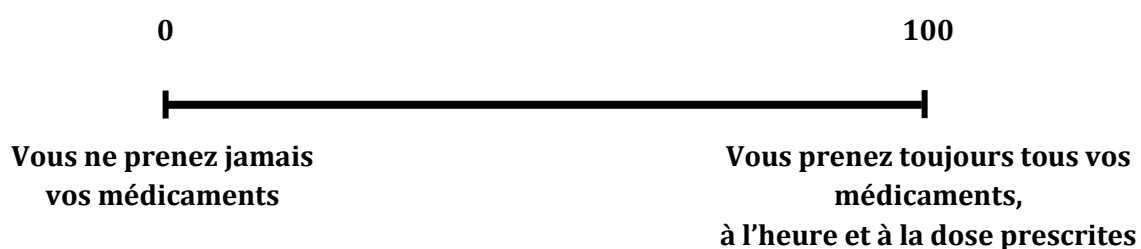
Montrer, s'il-vous-plaît, à quel point vous en accord ou en désaccord avec chacun de ces items en cochant la case appropriée

Il n'y a pas de bonnes ou de mauvaises réponses. Ce qui nous intéresse, c'est votre opinion personnelle

**Pour chaque question, entourez la réponse qui vous correspond le mieux de 1 à 5 (1 = pas du tout d'accord, 5 = Tout à fait d'accord)**

	Pas du tout d'accord					Tout à fait d'accord				
	1	2	3	4	5	1	2	3	4	5
Avoir à prendre un traitement m'inquiète										
Ma vie serait impossible sans mon traitement										
Sans mon traitement, je serais très malade										
Je m'inquiète parfois à propos des effets à long terme de mon traitement										
Je suis parfois inquiet(e) de devenir trop dépendant(e) de mon traitement										
J'ai peu confiance en mes capacités à contrôler ma maladie (avec mon traitement)										

**Sur une échelle de 0 à 100 (0 signifie que vous ne prenez jamais vos médicaments, et 100 que vous les prenez toujours, à l'heure et à la dose prescrites), placez une croix sur la barre noire là où vous estimez vous situer.**



---

## Renseignements généraux

---

Sexe  H /  F

Date de naissance : \_\_ / \_\_ / \_\_\_\_

### Niveau d'enseignement :

Primaire                       Collège (brevet, certificat d'étude)                       Lycée (baccalauréat)

Supérieur (BTS, IUT, Universitaire)

### Catégorie socio-professionnelle :

Agriculteur                       Artisan-commerçant                       Cadre                     

Profession intermédiaire                       Employé                       Ouvrier                       Retraité

Sans activité

### Situation familiale :

Marié(e), pacsé (e), ou en concubinage                       Célibataire

Séparé(e) ou divorcé (e)                       Veuf (ve)

**Situation à domicile :** vit seul(e) :  oui /  non

**Maladie :**

**Date de diagnostic de la maladie :**

**Maladies associé (e) (s) :**

**Date d'initiation du traitement actuel :**

### Gestion des médicaments :

- Je prépare mes médicaments seul(e) :  oui /  non

- Je suis aidé(e) dans la préparation de mes médicaments :

Conjoint( e )                       Enfant( s )                       Autre membre de la famille

Auxiliaire de vie                       Soignant                       Autre

- Pour organiser mes médicaments, j'utilise (un semainier, un pilulier, etc.) : .....

.....

**Je prenais des médicaments avant d'avoir connaissance de ma maladie cardiaque :**

oui /  non

---

## Prise de médicaments

---

La plupart des gens oublient de prendre leurs médicaments de temps en temps. Plusieurs équipes précisent que l'intégration de la prise de médicaments à la routine aide les patients au quotidien. Nous vous proposons donc de mettre en place une stratégie adaptée à votre quotidien qui associe la prise de médicaments à une action que vous faites tous les jours (par exemple lorsque vous vous brossez les dents, au moment du petit déjeuner, lorsque vous regardez le journal télévisé, etc.). Pour cela, nous vous proposons d'écrire cette stratégie avec l'aide du guide ci-dessous. Ecrivez l'heure, le lieu et ce que vous serez en train de faire au moment où vous avez prévu de prendre vos médicaments, dans les espaces dédiés ci-dessous.

### EXEMPLE DE STRATEGIE

#### **POUR LA PRISE DES MEDICAMENTS DU MATIN:**

***S'il est 8 heures,***

***Que je suis dans la salle de bain***

***Et que j'ai fini de me broser les dents***

***Alors je prends mes médicaments du matin.***

### EXEMPLE DE STRATEGIE

#### **POUR LA PRISE DES MEDICAMENTS DU SOIR:**

***S'il est 20 heures,***

***Que je suis dans le salon***

***Et que le journal télévisé commence***

***Alors je prends mes médicaments du soir.***

#### **MA STRATEGIE DE PRISE DES MEDICAMENTS DU MATIN :**

***S'il est \_ \_ heures \_ \_***

***Que je suis***

***Et que je***

***Alors je prends mes médicaments du matin.***

#### **MA STRATEGIE DE PRISE DES MEDICAMENTS DU SOIR :**

***S'il est \_ \_ heures \_ \_***

***Que je suis***

***Et que je***

***Alors je prends mes médicaments du soir.***

Nous vous invitons à faire de même concernant vos médicaments du midi si vous en avez.

Une fois le guide complété, nous vous proposons de relire votre stratégie pour vous-même afin de vérifier qu'elle est bien en accord avec votre mode de vie et que vous pourrez la mettre en place au quotidien.



Une fois cette stratégie mémorisée, nous vous proposons d'écrire à partir de quelle date vous pensez pouvoir la mettre en place : .....

### Fiche d'aide aux situations problématiques

Afin d'anticiper des problèmes vous empêchant de prendre votre traitement comme prescrit, vous pouvez cocher **autant de situations que vous le souhaitez** parmi celles proposées (ou de votre choix) correspondant à des situations où il est, pour vous, plus compliqué de prendre vos médicaments. Ensuite, vous pouvez réfléchir et écrire **votre/vos propre(s) solution(s)** à côté (commençant par « alors je »), ce qui vous permettra d'**anticiper** cette/ces situation(s). Vous pouvez prendre votre temps pour réfléchir à ces solutions.

	Situations	Solution
<input checked="" type="checkbox"/>	<i>Exemple :</i> <b>Si</b> je suis à court de traitement le dimanche,	<b>alors</b> je vais à la pharmacie de garde
<input type="checkbox"/>	<b>Si</b> certains jours ma mémoire me fait défaut,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> j'ai des difficultés à ouvrir la boîte/le conditionnement,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne comprends pas les instructions données par mon médecin et/ou mon infirmière sur la prise des médicaments,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> mon médecin (ou un autre professionnel de santé) ne m'a pas expliqué comment traiter correctement ma maladie,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> j'ai renouvelé mon ancien traitement et que certains comprimés ont l'air différents/ne ressemblent plus à ceux que je prends d'habitude/à ceux d'avant,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne sais plus à quel moment de la journée prendre mes médicaments,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne suis pas sûr(e) de savoir comment prendre ce médicament,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> les effets indésirables du traitement ont un impact sur mes tâches quotidiennes,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne suis pas à l'aise pour prendre mon médicament pour des raisons sociales (ex. : je suis avec des amis),	<b>alors</b>

<input type="checkbox"/>	<b>Si</b> ma routine est perturbée,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> j'ai des difficultés à faire ce que le médecin <i>m'a demandé de faire/m'a conseillé</i> ,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> j'ai du mal à gérer tous les médicaments que je dois prendre,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je n'ai personne que je peux appeler pour mes questions à propos de mes médicaments,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> personne ne me rappelle de prendre mes médicaments,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> j'oublie de prendre mes médicaments (de temps en temps/ de manière occasionnelle),	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je prends mon traitement en retard par rapport à l'heure habituelle,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je n'ai pas mes médicaments avec moi au moment où je dois les prendre,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je suis négligent(e) dans la prise de mon médicament,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne respecte pas les rendez-vous médicaux,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je ne me livre pas aux examens biologiques, cliniques ou autre,	<b>alors</b>
<input type="checkbox"/>	<b>Si</b> je n'ai pas une alimentation saine et équilibrée telle que mon médecin me le recommande,	<b>alors</b>
	<i>Autres situations (au choix) :</i>	
<input type="checkbox"/>	<b>Si</b>	<b>alors</b>
<input type="checkbox"/>	<b>Si</b>	<b>alors</b>
<input type="checkbox"/>	<b>Si</b>	<b>alors</b>

Nous vous remercions pour votre participation. N'hésitez pas à poser des questions à l'équipe soignante vous avez des doutes et des questionnements au sujet de votre traitement/prise de médicaments après avoir complété ces questionnaires.

ANNEXE VIII. TIDieR checklist (Partie III).



**The TIDieR (Template for Intervention Description and Replication) Checklist\*:**

Information to include when describing an intervention and the location of the information

Item number	Item	Where located **	
		Primary page (page or appendix number)	Other † (details)
1.	<b>BRIEF NAME</b> Provide the name or a phrase that describes the intervention.	1_____	_____
2.	<b>WHY</b> Describe any rationale, theory, or goal of the elements essential to the intervention.	4,5_____	_____
3.	<b>WHAT</b> Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL).	6, 21_____	_____
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.	5- 10_____	_____
5.	<b>WHO PROVIDED</b> For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given.	6- 7_____	_____
6.	<b>HOW</b> Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.	6- 7_____	_____

<b>WHERE</b>		
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.	5 _____ _____ _____
<b>WHEN and HOW MUCH</b>		
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.	6 _____ _____ _____
<b>TAILORING</b>		
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.	N/A _____ _____ _____
<b>MODIFICATIONS</b>		
10. <sup>‡</sup>	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).	N/A _____ _____ _____
<b>HOW WELL</b>		
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.	N/A _____ _____ _____
12. <sup>‡</sup>	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.	N/A _____ _____ _____

\*\* **Authors** - use N/A if an item is not applicable for the intervention being described. **Reviewers** – use ‘?’ if information about the element is not reported/not sufficiently reported.

† If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL).

‡ If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete.

\* We strongly recommend using this checklist in conjunction with the TIDieR guide (see *BMJ* 2014;348:g1687) which contains an explanation and elaboration for each item.

\* The focus of TIDieR is on reporting details of the intervention elements (and where relevant, comparison elements) of a study. Other elements and methodological features of studies are covered by other reporting statements and checklists and have not been duplicated as part of the TIDieR checklist. When a **randomised trial** is being reported, the TIDieR checklist should be used in conjunction with the CONSORT

statement (see [www.consort-statement.org](http://www.consort-statement.org)) as an extension of **Item 5 of the CONSORT 2010 Statement**. When a **clinical trial protocol** is being reported, the TIDieR checklist should be used in conjunction with the SPIRIT statement as an extension of **Item 11 of the SPIRIT 2013 Statement** (see [www.spirit-statement.org](http://www.spirit-statement.org)). For alternate study designs, TIDieR can be used in conjunction with the appropriate checklist for that study design (see [www.equator-network.org](http://www.equator-network.org)).

ANNEXE IX. Consort checklist (Partie III).



## CONSORT 2010 checklist of information to include when reporting a randomised trial\*

Section/Topic	Item No	Checklist item	Reported on page No
<b>Title and abstract</b>			
	1a	Identification as a randomised trial in the title	1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	1
<b>Introduction</b>			
Background and objectives	2a	Scientific background and explanation of rationale	2-5
	2b	Specific objectives or hypotheses	4-5
<b>Methods</b>			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	5-6
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	6-7
Participants	4a	Eligibility criteria for participants	6
	4b	Settings and locations where the data were collected	5
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	5-7
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	7-9
	6b	Any changes to trial outcomes after the trial commenced, with reasons	N/A
Sample size	7a	How sample size was determined	5
	7b	When applicable, explanation of any interim	N/A

		analyses and stopping guidelines	
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	6
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	6
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	6
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	6
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	6
	11b	If relevant, description of the similarity of interventions	6-7
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	10-11
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	12-16
<b>Results</b>			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	6, 10, 11
	13b	For each group, losses and exclusions after randomisation, together with reasons	6
Recruitment	14a	Dates defining the periods of recruitment and follow-up	7
	14b	Why the trial ended or was stopped	7
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	25

Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	10-16
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	12
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	N/A
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	12-16
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	N/A
<b>Discussion</b>			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	17, 19, 20
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	18
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	18
<b>Other information</b>			
Registration	23	Registration number and name of trial registry	N/A
Protocol	24	Where the full trial protocol can be accessed, if available	N/A
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	22

\*We strongly recommend reading this statement in conjunction with the CONSORT 2010 Explanation and Elaboration for important clarifications on all the items. If relevant, we also recommend reading CONSORT extensions for cluster randomised trials, non-inferiority and equivalence trials, non-pharmacological treatments, herbal interventions, and pragmatic trials. Additional extensions are forthcoming: for those and for up to date references relevant to this checklist, see [www.consort-statement.org](http://www.consort-statement.org).



**ANNEXE X.** Questionnaires auto-rapportés, références et nombres d'items, inclus dans la première version de QUILAM (Partie IV).

<b>Echelle source</b>	<b>Reference</b>	<b>Nombres d'items</b>
Adherence estimator	(McHorney, 2009)	3
ARMS (Adherence to Refills and Medications Scale)	(Kripalani, Risser, Gatti, & Jacobson, 2009)	13
ASK20 – ASK12 (Adherence Starts with Knowledge)	(Hahn et al., 2008; Matza et al., 2009)	20
ASRQ (Adherence Self-Report Questionnaire)	(Zeller, Schroeder, & Peters, 2008)	7
BMQ (Beliefs about Medicine Questionnaire)	(Fall, Gauchet, Izaute, Horne, & Chakroun, 2014)	18
Patient-Reported Adherence	(Choo et al., 1999)	5
DAI-10 (Drug Attitude Inventory)	(Hogan, Awad, & Eastwood, 1983)	10
Test d'évaluation de l'observance	(Girerd, Rosenbaum, & Villeneuve, 2009)	6
MAQ (Medication Adherence Questionnaire, Morisky 4)	(Morisky et al., 1986)	4
MARS (Medication Adherence Rating Scale)	(Thompson, Kulkarni, & Sergejew, 2000)	10
MAR-Scale (Medication Adherence Reasons Scale)	(Unni & Farris, 2015)	20
MASRI (Medication Adherence Self-Report Inventory)	(Walsh, Mandalia, & Gazzard, 2002)	11
MAS (Medication Adherence Scale)	(Wu et al., 2013)	6
MMAS (Morisky Medication Adherence Scale, Morisky 8)	(Korb-Savoldelli et al., 2012)	8
MOS (Medical Outcome Study)	(Kravitz et al., 1993)	5

RAMS (Reported Adherence to Medication Scale)	(Horne et al., 1999)	4
Satmed Q (Satisfaction with Medication Questionnaire)	(Delestras et al., 2013; Ruiz et al., 2008)	17
SEAMS (Self-efficacy for Appropriate Medication use Scale)	(Risser, Jacobson, & Kripalani, 2007)	13
SOC (Stage Of Change for Adherence Measure)	(Willey et al., 2000)	2
Echelle de compliance	(Tarquinio, Fischer, & Gregoire, 2012)	12
<b>TOTAL</b>		<b>194</b>

**Annexe XI.** Matrice factorielle issue de l'AFE lors de la réduction de QUILAM (Partie IV).

**Matrice de forme<sup>a</sup>**

	Facteur			
	1	2	3	4
8. Les médecins utilisent trop de traitements.	1,041			
18. Si les médecins passaient plus de temps avec les patients, ils prescriraient moins de traitements.	,600			
10. Je m'inquiète parfois à propos des effets à long terme de mon traitement.	,410		,304	
34. Les remèdes naturels sont plus sûrs que les traitements médicaux.	,340			
56. Il m'arrive d'oublier de faire renouveler mes prescriptions.		,988		
53. Il m'arrive de ne pas avoir mes médicaments avec moi au moment où je devais les prendre.		,492		
49. J'ai des difficultés à gérer tous les médicaments que je dois prendre.		,464		
46. Il m'arrive de ne pas être à l'aise pour prendre mon médicament pour des raisons sociales (ex : j'étais avec des amis).			,790	
16. Je suis parfois négligeant(e) dans la prise de mes médicaments.			,576	
43. Il m'arrive de diminuer ou d'arrêter de prendre mon traitement sans le dire à mon médecin, parce que je me sens plus mal lorsque je le prends.			,539	
55. Nous prenons les décisions ensemble avec mon médecin.				,765
54. Je comprends les instructions données par les professionnels de santé sur la prise des médicaments.				,563
17. Mon médecin (ou autre professionnel de santé) m'a expliqué comment traiter correctement ma maladie.				,478
39. Je suis globalement satisfait(e) de ce traitement.				,388

Méthode d'extraction : Maximum de vraisemblance.

Méthode de rotation : Oblimin avec normalisation Kaiser.

a. Convergence de la rotation dans 5 itérations.

**ANNEXE XII.** Questionnaire QUILAM : 14 items (Partie IV).

	<b>Pas du tout d'accord</b>							<b>Tout à fait d'accord</b>							
Les médecins utilisent trop de médicaments.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Je m'inquiète parfois à propos des effets à long terme de mon traitement.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Je suis parfois négligeant(e) dans la prise de mes médicaments	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Mon médecin (ou autre professionnel de santé) m'a expliqué comment traiter correctement ma maladie.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Si les médecins passaient plus de temps avec les patients, ils prescriraient moins de médicaments.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Les remèdes naturels sont plus sûrs que les traitements médicaux.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Je suis globalement satisfait(e) de ce traitement.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Il m'arrive de diminuer ou d'arrêter de prendre mes médicaments sans le dire à mon médecin, parce que je me sens plus mal lorsque je les prends.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Il m'arrive de ne pas être à l'aise pour prendre mon médicament pour des raisons sociales (ex : j'étais avec des amis).	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
J'ai des difficultés à gérer tous les médicaments que je dois prendre.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								

	<b>Jamais</b>							<b>Systématiquement</b>							
Il m'arrive de ne pas avoir mes médicaments avec moi au moment où je devais les prendre.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Je comprends les instructions données par les professionnels de santé sur la prise des médicaments.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Nous prenons les décisions ensemble avec mon médecin.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								
Il m'arrive d'oublier de faire renouveler mes prescriptions.	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>								

## ANNEXE XIII. CV

### Carine MESLOT

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Nationality: French

Date of Birth: 13.08.87

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## CURRICULUM VITAE

### # STUDIES and Degrees

- 2013-2016**    **PhD Candidate** in Health Psychology; « Identification of the barriers, facilitators and cue-dependant planning interventions to promote health behaviours », Université Grenoble Alpes
- 2015-2016**    **University Associate (research assistant and visiting researcher) at Curtin University**, HPBM group (Perth, Western Australia)
- 2014**            **Clinical Psychologist (qualification)**
- 2012-2013**    **Master 2 (MSc)** in Research in Clinical Psychology (pass 70%-80%), Université Pierre Mendès France (France)
- 2010-2012**    **Master 1** in Clinical Psychology (pass 70%-80%), Université Pierre Mendès France
- 2010**            **Licence (BA)** in Psychology, (pass 60-70%), Université Pierre Mendès France
- 2007**            Graduated from high school specializing in Literature (pass 60-70%)
- 2005**            Bookkeeping BEP (Technical School Certificate)

## **# TEACHING**

### **Teaching assistant (Grenoble Alpes University), Department of Psychology**

*64 hours (2nd semester 2015):*

- Licence 3 Psychology – Teaching units UE1 S6: Clinical evaluation and consultation (8 hours)
- Licence 3 Psychology – Teaching units UE1 S6: Introduction to psychological care (26 hours)
- Master 1 Clinical Psychology – Teaching units 9c: Methodology and research (30 hours)

### **Teaching for other PhD Students, Department of Psychology**

*8 hours (2nd semester 2015):*

- Mindfulness and stress management to help the teachers

### **Teaching assistant (Université Pierre-Mendès-France, Grenoble), Department of Psychology**

*66 hours (1st semester 2014):*

- Licence 1 Psychology – Teaching units 1: Introduction to Psychology (32 hours)
- Licence 1 Psychology – Teaching units 2: Introduction to social behavior (8 hours)
- Master 2 (professional) Clinical Psychology (option Health Psychology) – Teaching units 67: Chronic diseases (13.5 hours)
- Master 2 (professional) Clinical Psychology (option therapies) – Teaching units 61: Behavioral and Cognitive therapies (12.5 hours)

## **# BOOK**

Ogden, J., Desrichard, O., Blum, A., Gauchet, A., Dantzer, C., Fall, E., Izaute, M., Le Barbenchon, E., Meslot, C., Moussaoui, L., Muller, L., Pellissier, S., Poulet, C., & Verhac, J. (2014). La psychologie et la maladie, 2ème partie : L'obésité et la maladie cardiovasculaire. In *Psychologie de la santé*. De Boeck.

## **# PAPERS**

Meslot, C., Gauchet, A., Lehmann, A., Hagger, M.S., Chatzisarantis, N.L.D., & Allenet, B. (Accepted). A randomized controlled trial to test the effectiveness of planning strategies to improve medication adherence in patients with cardiovascular disease. *Applied Psychology: Health and Well-Being*.

Hagger, M. S., Luzszcynska, L., de Wit, J., Benyamini, Y., Burkert, S., Chamberland, P. E., Chater, A., Dombrowski, S. U., van Dongen, A., French, D. P., Gauchet, A., Hamkonen, N., Karekla, M., Kinney, A. Y., Kwasnicka, D., Lo, S. H., López- Roig, S., Meslot, C., Marques, M. M., Neter, E., Plass, A. M., Potthoff, S., Rennie, L., Scholz, U., Stadler, G., Stolte, E., ten Hoor, Verhoeven, A., Wagner, M., Oettingen, G., Sheeran, P., Gollwitzer, P. M. (2016). Implementation Intention and Planning Interventions in Health Psychology: Recommendations from the Synergy Expert Group for Research and Practice. *Psychology & Health*, 49(2), 104-105.

Lehmann, A., Meslot, C., Gauchet, A., Beaudrant, M., Roustit, M., Sarrazin, P.G., Bedouch, P., & Allenet, B. (2014). QUILAM : construire et valider un questionnaire d'identification des leviers pour accompagner l'adhésion du patient à son traitement médicamenteux. *Le Pharmacien Hospitalier et Clinicien*, 49(2), 104-105.

Under review:

- Meslot, C., Gauchet, A., Allenet, B. & Hagger, M.S. (2016). Combining Implementation Intention and Mental Simulation Interventions to Increase Physical Activity.

In preparation:

- Meslot, C., Gauchet, A., Kwasnicka, D., Allenet, B. & Hagger, M.S. (2016). A systematic review and meta-analysis of the effect of cue-to-act planning interventions on health-related behaviours.
- Meslot, C., Lehmann, A., Gauchet, A., Baudrant-Boga, M., Roustit, M., Pansu, P., Sarrazin, P., Grangeat, M., Bedouch, P., & Allenet, B. (2016). Development of a Questionnaire to Identify the Levers of Adhesion to patients' Medication: QUILAM.

## # ORAL COMMUNICATIONS AND POSTERS

Meslot, C., Lehmann, A., Gauchet, A., Baudrant-Boga, M., Roustit, M., Pansu, P., Sarrazin, P., Grangeat, M., Bedouch, P., & Allenet, B. (2016). Development of a Questionnaire to Identify the Levers of Adhesion to patients' Medication: QUILAM. 30<sup>th</sup> conference of the European Health Psychology Society (EHPS), Aberdeen (Scotland), 23-27 August 2016.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2016). Une Intervention basée sur le Planning et le Contraste Mental pour augmenter l'Adhésion Médicamenteuse chez les Patients Greffés, Geneva (Switzerland), 29-30 June and 1<sup>st</sup> July 2016.

Meslot, C., Gauchet, A., Hagger, M.S., & Allenet, B. (2016). Une Intervention combinant l'Implémentation d'Intention et l'Imagerie Mentale pour augmenter la Pratique de l'Activité Physique. Journées d'études SFPS, Grenoble (France), 21-22 April 2016.

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Lehmann, A., Meslot, C., Gauchet, A., Baudrant-BOGA, M, Roustit, M., PANSU, P., Sarrazin, P., Grangeat, M., Bedouch, P., & Allenet, B. (2015). Development and validation of a self-administered QUestionnaire to Identify Levers of Adhesion behavior to patient's Medication in order to adapt the educational monitoring: QUILAM. 19<sup>th</sup> ESPACOMP Annual Meeting (European Society for Patient Adherence, COMpliance, and Persistence), Praha (Czech Republic), 13-14 November 2015.

Meslot, C., Gauchet, A., Hagger, M.S., & Allenet, B. (2015). Implementation intention and mental imagery to improve physical activity in students. 29<sup>th</sup> conference of the European Health Psychology Society (EHPS), Innsbruck (Cyprus), 1-5 September 2015.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2015). The combination of planning strategies to improve medication adherence in transplanted patients. 29<sup>th</sup> conference of the European Health Psychology Society (EHPS), Innsbruck (Cyprus), 1-5 September 2015.

Meslot, C., Gauchet, A., Hagger, M. S., & Allenet, B. (2015). L'implémentation d'intention et l'imagerie mentale : une aide pour augmenter la pratique de l'activité physique? 6<sup>èmes</sup> journées doctorales en psychologie de la santé, Geneva (Switzerland), 15-17 June 2015.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2015). L'implémentation d'intention : une aide à l'adhésion médicamenteuse chez les patients ayant une maladie cardio-vasculaire? Journée de la Recherche Médicale, Grenoble (France), 5 June 2015.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2014). « If I anticipate the problems linked with my medication, then I will take my treatment »: Can some cognitive strategies improve medication adherence? 18<sup>th</sup> ESPACOMP Annual Meeting (European Society for Patient Adherence, COMpliance, and Persistence), Lausanne (Suisse), 20-22 novembre 2014.



Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2014). Implementation intention to improve medication adherence behaviors in patients with cardiovascular diseases: A pilot-study. 28<sup>th</sup> conference of the European Health Psychology Society (EHPS), Innsbruck (Autriche), 26-30 août 2014.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2014). L'implémentation d'intention : un levier à l'adhésion médicamenteuse chez les patients présentant une maladie cardiaque ? (Résultats préliminaires). 6<sup>èmes</sup> journées doctorales en psychologie de la santé, Metz (France), 24-25 juin 2014.

Meslot, C., Gauchet, A., Lehmann, A., & Allenet, B. (2014). L'implémentation d'intention pour améliorer l'adhésion médicamenteuse chez les patients ayant une maladie cardio-vasculaire ? (Etude-pilote). Rencontres InterLaboratoires (RIL), Genève (Suisse), 9-10 septembre 2014.

## **# WORK PLACEMENTS**

**Mars to May 2014: Work placement in a day hospital of cardiac rehabilitation (University Hospital of Grenoble) – 260 hours**

- ✓ Psychological follow-ups with patients

**January 2013 to Mars 2013: Work placement in a Mindfulness-based intervention, Marseille (France) – 50 hours**

- ✓ Conducting a research for my master thesis (Master 2) by administering questionnaires to measure the effects of a Mindfulness-based intervention on pathological symptoms (depression, anxiety), cognitive measures and mindfulness skills.

**2011-2012: Work placement in an institution for handicapped adults with psychosis, autism, Down syndrome, etc. (le Perron, St Sauveur, France) - 800 hours**

- ✓ Psychological follow-ups with patients (on my own, without the referent psychologist) and writing of the synthesis' interview in patients' files.
- ✓ Independent management of the discussion groups bimonthly (with a member of the healthcare team)
- ✓ Conducting a research for my master thesis (Master 1) by administering questionnaires to study autobiographical memory in people suffering from schizophrenia.

**Mars 2012 to May 2012: Work placement in a Center for Mental Health (MGEN) in Grenoble (France) - 140 hours**

**2010-2011: GISME (Center for addictology), St Martin d'Hères (France) - 54 hours**

## **# PROFESSIONAL EXPERIENCE**

**August 2012 to February 2013: Cleaner** in a hairdressing salon, an architects' office, a notaries' office, and building hallway ("Solnet", cleaning company).

**Summers 2007, 2008, 2009, 2010, 2011: TRÉSOR PUBLIC (the French Treasury), Grenoble and St Egrève (France)**

**2005-2006 : MARKETPLACE – Seine-et-Marne (France)**

- ✓ 3-weeks work experience scheme involving installation, recommendation and selling of accessories, textile and toys for children between 0 and 12 years old.

## **# LANGUAGE SKILLS**

French: native speaker

English: professional competence

German: basic school knowledge

Portuguese: basic school knowledge

## **# COMPUTER SKILLS**

Word, Excel, Access, SPSS, Statistica, G-Power\*, Comprehensive Meta-Analysis.

## **# INTERESTS**

Sport (fitness), music, cinema, arts, drawing.