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The process of posttraumatic growth in firefighters : a French-American comparison

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THESE DE DOCTORAT DE L'UNIVERSITE DE BOURGOGNE – FRANCHE-COMTE

PREPAREE A L'UNIVERSITE DE BESANCON

Ecole Doctorale n°594

ED SEPT

Doctorat en Psychologie

De

Mme Henson Charlotte

Le processus de croissance post-traumatique chez les sapeurs-pompiers : Une comparaison française-américaine

Thèse soutenue à Besançon, le 30 septembre 2022

Composition du jury :

Mme. Laurent Alexandra	Professeure à l'Université de Dijon	Présidente
M. Bernaud Jean-Luc	Professeur au CNAM, Paris	Rapporteur
M. Jaafari Nemat	Professeur à l'Université de Poitiers	Rapporteur
M. Truchot Didier	Professeur à l'Université de Besançon	Directeur
Mme. Canevello Amy	Associate Professor at the University of North Carolina at Charlotte	Co-directrice

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Ms. Canevello Amy	Associate Professor at the University of North Carolina at Charlotte	Co-supervisor

Titre : Stress post-traumatique et croissance post-traumatique chez les sapeurs-pompiers français et américains : une approche culturelle

Mots clés : PSTD, PTG, trauma, sapeurs-pompiers

Résumé : Les sapeurs-pompiers sont confrontés à un large panel d'événements potentiellement traumatisants (EPT), ce qui les rend particulièrement susceptibles de développer un trouble de stress post-traumatique (TSPT) et de vivre une croissance post-traumatique (PTG). Tandis que le TSPT est étudié depuis des décennies, le PTG quant à lui est un concept récent dans le domaine de la psychologie. Les études qui existent sur le sujet documentent les facteurs qui favorisent et/ou empêchent la croissance post-traumatique ; cependant, elles mettent aussi en évidence un grand nombre de contradictions. De plus, les études sur le PTG ont majoritairement été réalisées auprès d'individus n'ayant vécus qu'un seul et unique événement traumatique, et rares sont celles qui explorent le concept auprès de populations étant confrontées à des EPT de façon régulière, telles que les répondants de première ligne. Ainsi, cette thèse a pour objectif de clarifier un certain nombre de contractions qui ont été identifiées dans la littérature, et d'offrir une meilleure compréhension du processus de croissance post-traumatique chez les individus qui sont confrontés de manière quotidienne à des événements hors du commun : les sapeurs-pompiers. Afin de déterminer si le PTG est un processus universel, nous menons cette recherche auprès de deux groupes culturels différents : un groupe de pompiers américains, et un groupe de pompiers français.

Title: Post-traumatic stress and posttraumatic growth in French and American firefighters: A cultural approach

Keywords: PTSD, PTG, trauma, firefighters

Abstract: Firefighters are exposed to a great variety of potentially traumatizing events (PTEs), which makes them particularly susceptible to experiencing post-traumatic stress (PTSD) and posttraumatic growth (PTG). While PTSD has been studied for decades, PTG is a recent concept in the field of psychology. The research that does exist on PTG documents the factors that may promote and/or hinder the growth process; however, a large number of contradictions/discrepancies was brought to light. Additionally, studies on growth were mostly conducted with individuals who have experienced one single traumatizing event, while very few have been carried out with people who experience trauma on a regular basis, such as first responders. Therefore, this dissertation aims to clarify a lot of the contradictions that were identified in previous studies, and to offer a better understanding of the process of growth in individuals who experience out-of-the-ordinary/uncommon/extra-ordinary events on a daily basis: Firefighters. In order to determine whether PTG is a universal process, we conduct this research with two different cultural groups: A group of American firefighters, and a group of French firefighters.

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History of the concept of Posttraumatic Growth (PTG)

Throughout history, physicians, psychologists and researchers have attempted to understand the nature and effects of trauma, defined by the American Psychological Association as "an emotional response to a terrible event", which includes "unpredictable emotions, flashbacks, strained relationships, and even physical symptoms like headaches or nausea". Before the concept of PTSD was formalized, the symptoms following exposure to a traumatic event were first referred to as "nostalgia" in 1678 (Bentley, 2005). These symptoms were characterized by "melancholy, incessant thinking of home, disturbed sleep or insomnia, weakness, loss of appetite, anxiety, cardiac palpitations, stupor, and fever". During the same period, German doctors grouped these symptoms under the term "heimweh" ("homesickness"), while the French and Spanish used the terms "maladie du pays" and "estar roto" ("to be broken") (Bentley, 2005). Later on, American physicians started documenting trauma symptoms in Civil War soldiers after war broke out in 1861. Indeed, it was noted that soldiers reported different cardiac symptoms, such as a rapid pulse, anxiety, and trouble breathing. In 1871, Da Costa names the condition "soldier's heart".

During World War I, another physiological model emerged: Soldiers' psychological distress was attributed to a disruption of neuronal connections caused by shell shock. In other words, symptoms were associated with the intensity of the bombardments that may have caused soldiers to have "concussions". However, it was noted that soldiers who were not exposed to exploding shells experienced these symptoms as well. Therefore, psychiatrists gradually came to realize it was emotions and not brain damage that was causing soldiers to develop stress symptoms. Nevertheless, the general belief was that soldiers who displayed these symptoms were weak in character and lacking "soldierly qualities". Many psychiatrists concluded that the answer to this problem was to more thoroughly screen the men who joined the military, in order to filter out those who were not mentally fit for combat.

However, despite the fact that the military used the best available psychiatric testing to reject those who were apparently predisposed to break down during combat, World War II took a much bigger toll on soldiers. Indeed, with the use of bigger weapons, soldiers were at increased risk of dying or being injured at war. Given the overwhelming number of soldiers affected by psychological

distress, psychiatrists were eventually forced to admit that weakness of character could not be a suitable explanation for their symptoms. The literature shows it is only in the late 1880s that psychologists such as Janet and Freud started to emphasize the importance of unconscious memories in the aftermath of trauma. Indeed, Freud (1928) criticized the brain concussion hypothesis that was put forward after World War I, and considered "traumatic events to be external stressors that were strong enough to break through the 'prospective shield' and inflict injury" (Wilson, 1994, in Birmes, 2003, p. 24). This premise will later lay the foundation for Freud's theory of repressed traumatic memories. At the same time, Pierre Janet emphasizes the process of dissociative flashback episodes. In fact, according to Janet, traumatization came from "the inability to emotionally process traumatic memories" (in Birmes, 2003, p. 20). Thus, Freud and Janet both supported the idea that avoidance could trigger the onset of pathogenic symptoms. More specifically, according to Janet's dissociation theory, the avoidance of traumatic memories (or failure to confront the traumatic experience) may lead to the dissociation of the memory, meaning that the memory is split off from conscious awareness and is not integrated into the person's narrative. Individuals may therefore experience some kind of amnesia in regards to the traumatic event, meaning they "dissociate" the event from themselves and become unable to remember that the event happened to them. Individuals may even go to the extent of attributing the event to someone else. Therefore, unlike Freud's repression theory which states that repressed memories are buried in the *id*, Janet's dissociation theory states that dissociated memories are separated and stored in a different part of the *ego*; which is why dissociation involves the notion of "identity" (e.g., separating the event from the self). However, similarly to Freud's resurgence of repressed memories, Janet notes that "fragments of unintegrated events may show up later on as pathological impulses" (van der Kolk et al., 1989, p. 368). Indeed, Janet states that "an experience becomes traumatic when it cannot be assimilated into existing meaning schemes" (van der Kolk & Ducey, 1989, p. 269). Therefore, when a person is "unable to tell the story of the traumatic events as they occurred, he/she remains confronted with the situation" (Janet, 1919, p. 660).

These major theoretical advances represented a turning point for the understanding of traumatic stress reactions, and helped introduce the implementation of preventive measures during the Vietnam War. In fact, medical personnel trained to treat psychological distress were provided to each battalion. Although this new preventive measure seemed to reduce psychological casualties at first, other factors contributed to the undermining of soldiers' psychological health. Indeed, they

were heavily stigmatized due to the questioning of the legitimacy of the war. Thus, the combination of battle trauma and harsh treatment from anti-war civilian activists caused post-traumatic stress cases to increase rapidly. The afflicted Vietnam War soldiers were described as having "post-Vietnam syndrome".

Shortly after the Vietnam War, Psychiatrist Chaim Shatan criticized the absence of combat-stress diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders*. In the 1980s, following approval by the APA, the stress disorder was finally incorporated in the 3rd edition of the DSM under the term "post-traumatic stress disorder". The *American Psychiatric Association* defined "traumatic events" as events in which an individual has ''experienced, witnessed, or was confronted with an occurrence that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others'' (APA, 2000, p. 467). According to the DSM-IV, post-traumatic stress disorder is characterized by the development of specific symptoms following exposure to an extremely traumatic stressor. Since PTSD was first incorporated in the DSM, post-traumatic stress diagnostic criteria have evolved, and symptoms were finally divided into four clusters: (A) re-experiencing of the trauma, (B) avoidance of trauma-related stimuli, (C) numbing, negative cognitions and mood, and (D) increased emotional arousal. According to Briere and Scott (2015), **re-experiencing** includes symptoms such as flashbacks, intrusive thoughts and/or memories of the trauma, recurring nightmares, and distress when exposed to stimuli that remind the person of the event. **Avoidance** includes pushing thoughts or feelings out of one's mind, avoidance of people or places, or the inability to recall certain aspects of the event. **Numbing, negative cognitions and moods** include diminished interest, detachment, amnesia, and persistent negative thoughts and emotional states. And finally, **Arousal** symptoms are characterized by increased jumpiness, physiological reactivity that can be triggered by events, smells, sights, and people that remind the person of the traumatic event, irritability and sleep disturbances (Briere & Scott, 2015).

Thus, when looking at the history of trauma, we notice that exposure to traumatic events has only been associated with negative outcomes for centuries. Indeed, researchers have essentially put their focus on understanding and classifying these negative psychological effects. However, later on in the 1980's, psychologists began noticing some positive psychological changes that were sometimes reported by victims of trauma. Consequently, it was brought to light that, when confronted with a stressful or traumatizing event, individuals' reactions may greatly differ: While some may be more prone to developing pathogenic symptoms such as intrusive thoughts, hypervigilance or avoidance

(PTSD), others may be more inclined to adapt and overcome the event. Indeed, when looking at mythology or religious scripts, we notice that ancient literature had already long recognized that adversity and trauma could result in positive changes: Whether it be the rebirth of the phoenix who rose from the ashes or the Christ's resurrection, pain had been indirectly showcased as a catalyst for transformation and growth.

However, it is only recently that this notion was applied in the field of psychology, and was first pointed out by Taylor in his *Theory of Cognitive Adaptation* (1983). Indeed, according to Taylor, individuals tend to cope with stressful events by creating positive illusions that aim to protect their psychological well-being. More specifically, when confronted with a traumatic event, individuals are often left with a feeling of emptiness and non-sense. In order to give back meaning to their lives, individuals try to find meaning in the event they experienced, which will help them perceive positive impacts. According to Taylor, they will also try to regain a sense of control over their environment, by believing they will be able to deal with similar situations in the future. Lastly, individuals attempt to increase their self-esteem by comparing themselves to other victims that might be more disadvantaged. More specifically, social comparison refers to a behavior where individuals compare certain aspects of themselves (e.g., their behavior, opinions, status, and success) to other people so that they have a better assessment of who they are (Buunk & Gibbons, 2007). Initially, Festinger (1954) suggested that social comparison was driven by a need to have more information about ourselves; however, more recent work suggests that social comparison is motivated by three drives (Gibbons & Buunk, 1999): Self-evaluation, self-improvement, and self-enhancement. Thus, according to Taylor, these cognitive strategies help individuals feel less threatened, adjust to their new reality, and create space for personal growth. Similarly, Horowitz's *Model of Loss and Adaptation* (1986) postulates that trauma can create/induce a sense of disruption in the individual's life. In order to face this disruption, people tend to reflect on the event to give it some meaning and, consequently, facilitate its integration in the psyche. More specifically, this integration occurs by a process of modification of the meaning of the traumatic event and of the individual's preexisting schemes of interpretation. According to Horowitz, this reinterpretation and integration of the trauma will lead to the resolution of pathological symptoms, and offer individuals an opportunity to reach new levels of maturity, a sense of competency, and new actions or relationships.

A few years later, Janoff-Bulman (1992) specifies in her *Theory of Shattered Assumptions* that exposure to a traumatic event disrupts three fundamental beliefs: (1) The overall belief that the world

is “good” and that human beings are trustworthy, (2) the belief that the world is meaningful and that events happen for specific reasons, and (3) the belief that the self is worthy and deserving of good outcomes in life. According to Janoff-Bulman, the challenging of these fundamental beliefs in the aftermath of trauma offer individuals the opportunity to transform themselves. Indeed, the question “Why me?” pushes trauma survivors to try to understand why the event happened and how it impacts their present and future life. Individuals are “forced” to reassess their beliefs about the world, their values and their priorities. However, Janoff-Bulman specifies that attributing an internal or external cause to the event will not be sufficient to restore the individual’s fundamental beliefs, but that people must also recognize the positive impacts the event has on their lives: The acknowledgment of these positive changes will then lead to the re-establishment of the three fundamental beliefs and the development of a new conception of the world (Geninet & Marchand, 2007).

The research done by Taylor, Horowitz, and Janoff-Bulman constitutes the theoretical basis for Tedeschi and Calhoun’s *Model of Posttraumatic Growth* (or “PTG”, 1995), which was developed essentially at the same time as Positive Psychology – the “scientific study of what makes life most worth living” (Peterson, 2008). Positive psychology studies topics such as optimism, life satisfaction, well-being, gratitude, compassion, self-esteem and self-confidence (Seligman & Csikszentmihalyi, 2000). In line with the emergence of positive thinking, the concept of posttraumatic growth postulates that experiencing negative and stressful events can be enriching and impact individuals in a positive way. More specifically, Tedeschi and Calhoun suggest that individuals who are confronted with life-or-death situations (such as a car accident, serious illness, natural disasters or assault) can not only overcome the crisis induced by the trauma, but can also benefit from the event and go through major positive internal changes. Thus, according to the authors, traumatizing events can lead individuals to surpass their pre-trauma level of functioning: By undergoing a process of reevaluation and redefinition of their belief system, trauma victims can experience personal growth and acquire a deeper understanding of themselves and the world they live in. Thus, unlike Taylor’s model, PTG is not based on the creation of positive “illusions”, but on a continuous process leading to the perception of actual positive impacts (Tedeschi & Calhoun, 2003). The perception of these psychological changes can only occur if the individual’s fundamental schemes are shattered (as Horowitz’s model first suggested), and if this disruption is followed by rumination processes, in other words, by deliberately thinking about the event and its circumstances with the goal of giving it some

meaning, and making sense of how the event impacts one's life. Tedeschi and Calhoun add that the re-establishment of the person's fundamental beliefs will be fostered by disclosure of the event, social support and narrative: Eventually, shattered assumptions are rebuilt, the trauma is incorporated in the individual's life narrative, and new beliefs and life goals emerge. Individuals may then access to posttraumatic growth. According to Tedeschi and Calhoun, the growth construct encompasses five different dimensions: Relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Changes in *Relating to others* refer to an increased desire to express emotions and accept help from others. Changes in *New possibilities* refer to an increased willingness to take new paths in life and redefine priorities. Changes in *Personal strength* refer to an improved sense of self-efficacy, strength, and self-confidence. Changes in *Spirituality* refer to increased religious beliefs and interest in existential/philosophical questions. Lastly, changes in *Appreciation of life* refer to an increased perception of meaning, worth, and value in life's little things.

The Posttraumatic Growth Inventory: A tool for all cultures?

Before the concept of PTG emerged, several scales had been developed to try to measure individuals' capacities to initiate positive outcomes in the aftermath of trauma (Magne, Jaafari, & Voyer, 2020), such as The *Changes in Outlook Questionnaire* (Joseph, Williams, & Yule, 1993), the *Stress-Related Growth Scale* (Park, Cohen, & Murch, 1996), the *Perceived Benefits Scale* (McMillen & Fisher, 1998), and the *Thriving Scale* (Abraido-Lanza, Guier, & Colon, 1998). While these scales are all valid tools, Tedeschi and Calhoun truly allowed PTG to gain momentum in the field of psychology thanks to the creation of their scale, the Posttraumatic Growth Inventory (or PTGI, 1996), which is now the most used for research on growth. Indeed, by refining the definition of growth, the PTGI appeared as the most pertinent instrument to study the concept, and lead to the emergence of more and more research on the subject, especially in English-speaking countries. A few years later, around the 2000's, other countries started translating and validating the PTGI in their language, which reinforced the prominence of the scale, but also brought to light some inconsistencies. Indeed, while the PTGI now exists in German, Italian, Spanish, Dutch, Bosnian, Chinese, Japanese, Portuguese, Hungarian, Hebrew, and Canadian French, it appears that some of the other translated versions were unable to truly replicate Tedeschi and Calhoun's original model. Some versions had different factorial solutions, while others had to create new dimensions or reorganize item distribution. Thus, while

PTG has been studied in the world via the Posttraumatic Growth Inventory for the past 20 years, it appears that the PTGI has its flaws, or that perhaps growth may express itself differently in individuals coming from different cultural backgrounds.

Indeed, cultural context shapes experiences, appraisal of stressfulness, and coping strategies individuals use when faced with a traumatic event (Pérez-Sales, 2008). More specifically, when looking at the literature, we notice that what might be considered "traumatic" in some cultures, may not appear as a stressor in others. For example, in Brazilian culture, the death of a child is not seen as a traumatic incident, and bereaved mothers do not go through the typical mourning process after having lost their baby (Scheper-Hughes, 1993). Scheper-Hughes explains that the deceased child is believed to have guaranteed happiness in the afterlife, which helps mothers deal with the event with much more detachment. Thus, it would appear that applying concepts such as "trauma" and "PTG" to any culture might sometimes be inadequate, as it is clear that society influences the way individuals process and react to extreme events (Fava & Ruini, 2014).

Matsui, Tomoko, Taku, and Kanako (2016) further explain this by referring to the effects of distal culture elements on the experience of trauma. Distal culture refers to the large framework, in other words, the set of rules, values, norms and behaviors that are transmitted on a national level, in a given culture (Morling & Lamoreaux, 2008). Matsui et al. (2016) mention five distal culture elements that are likely to explain why PTG may be experienced differently in some countries: Positive psychology movement, shame and guilt, cultural view of self, collectivism-individualism, and religion.

Positive psychology movement refers to the way people apprehend negative emotions and react to them. Matsui et al. (2016) illustrate this element by comparing Westerners and Easterners: While western people may often try to suppress negative emotions and seek for positive ones, Easterners such as the Japanese tend to accept negative emotions and perceive them as inevitable. As Easterners accept negativity as part of their lives, they do not cognitively engage as much to try to give meaning to the negative event they experienced which, consequently, makes them less susceptible to report high levels of PTG (Westerners (Shigemoto & Poyrazli, 2013; Taku et al., 2009a).

Then, the *shame and guilt* element refers to the way people respond to events based on whether they belong to a guilt society or a shame society. In a guilt society (in Western countries), social control is achieved by instilling feelings of guilt for behaviors that are considered undesirable

and with the threat of punishment, whereas in a shame society (in Eastern countries), social control is achieved with the inculcation of shame and the threat of ostracism. In other words, guilt is when individuals think they have done something wrong, while shame is when individuals believe they are not good enough and that there is something undesirable about themselves they cannot change. Thus, while Western countries such as the US may ask "How could you do this to him/her?", Eastern countries such as Japan will state "You are a terrible person for doing this". Studies show that individuals living in a shame culture may experience less PTG than people living in a guilt culture (Barr, 2011), as shame induces hiding behaviors while guilt fosters compensating behaviors. Indeed, while individuals living in a guilt society may look for ways to overcome their own guilt (with positive reappraisal coping for example), individuals living in a shame culture do not feel the need to "improve" as much, which makes them less likely to seek positive change.

Next, the element of *cultural view of self* refers to the way people perceive themselves and others. More specifically, Markus and Kitayama (1991) suggest two cultural views of the self: The interdependence view, and the independence view. The interdependence view relies on the idea that individuals from a same culture are connected to each other and that an event impacts the society as a whole, while the independence view relies on the idea that each individual is unique and that events are experienced on a very personal level. Thus, while people from the interdependence culture emphasize group harmony, people from the independence culture emphasize personal expression and want to understand how the event impacts their individuality, which makes them more likely to seek for help when confronted with a stressful event (Matsui et al., 2016). As help seeking behaviors are linked to growth outcomes (Drapeau et al., 2018), individuals from an independence culture may be more inclined to reach positive psychological change.

Similarly, the distal element of *collectivism-individualism* refers to the type of goal that is prioritized in a given culture. For instance, in collectivist cultures, the community is put at the forefront, whereas in an individualist culture, the focus is put on the individual's rights and concerns. Thus, collectivism prioritizes collective goals, while individualism prioritizes personal goals (Triandis et al., 1988). Studies show that people living in Eastern and more collectivist cultures tend to demonstrate less help-seeking behaviors than people living in western and more individualist cultures (Mojaverian et al., 2012), perhaps because collectivist individuals do not feel the need to seek for help given their strong bond with their community. As social support seeking promotes PTG, collectivist individuals tend to report relatively lower levels of growth.

Lastly, the *religion* element mentioned by Matsui et al. (2016) refers to the degree of religiosity of a culture. Studies show that religious commitment plays a strong role in the onset of PTG (Tsai et al., 2016; Jeon et al., 2015), as religious coping can have various positive impacts on a person's daily life. Indeed, religious devotion helps individuals give meaning to negative events, provides a sense of comfort during hard times, and promotes social support through the religious community (Pargament, Koenig, & Perez, 2000). Thus, cultures who exhibit strong levels of religiosity, such as the US culture, tend to report much higher levels of posttraumatic growth than countries who do not exhibit such strong faith, such as Europeans and Japanese (Tedeschi & Calhoun, 1996; Matsui et al., 2016).

Given the available data, it is easy to hypothesize that the experience of posttraumatic growth could be influenced by cultural background. As mentioned previously, research shows some strong inconsistencies between the different versions of the PTGI, which must be taken into consideration when studying the concept of growth: Is the PTGI an adequate tool to measure positive psychological change in any given culture, or is it simply impossible to create a universal scale to measure growth, knowing that trauma may be experienced differently from one culture to the next?

Growth and its promoting factors

The factors that seem to promote PTG do not find consensus between authors either. More specifically, Magne et al. (2020) describe three types of factors that should be considered when studying the onset of growth: The pre-traumatic factors, the traumatic factors, and the post-traumatic factors.

The *pre-traumatic factors* refer to individuals' personal characteristics that influence their experience of negative events, such as gender, age, level of education, employment, and personality traits. While all studies seem to agree on the fact that women report higher levels of PTG than men (Jeon et al., 2015), and that Agreeableness, Extraversion, Openness (Taku & Matthew, 2018) and Conscientiousness (Owens, 2016) are the personality traits that promote the most PTG, contradictions appear when looking at the other variables: Some authors suggest that younger age (Sharp et al., 2018) and lower levels of education (Tang et al., 2015) promote PTG, whereas others show that older age (Ullman, 2014), higher levels of education, and higher professional positions (Grace et al., 2015) are the most predictive of positive psychological change. Perhaps these

discrepancies are due to the lack of longitudinal studies on the matter. Additionally, possible comorbidities that sometimes accompany older age may influence whether younger or older adults experience the most growth. Indeed, while studies suggest that the increased life experience elderlies have may promote PTG, the health problems they might be dealing with could have a counter effect on the onset of positive psychological outcomes. Lastly, PTG may not depend as much on the educational level individuals have, but rather on their other available resources. Indeed, while Hobfoll (1989) states that time, money, and education are valuable resources when dealing with a stressful situation, social resources may have a more powerful impact when coping with trauma. Thus, many factors need to be taken into consideration when studying PTG, as sociodemographics alone may be insufficient to determine whether individuals are more likely to experience growth.

Contradictions also appear when looking at the *traumatic factors*, which refer to the characteristics of the event itself. Indeed, authors initially thought the type of event had a big influence on PTG. However, studies evaluated the impact of various critical incidents but never came to a clear agreement, as some showed that unexpected and sudden-death types of events promoted the most growth (Roden-Foreman et al., 2018), while others supported the idea that predictable deaths such as the ones caused by long-lasting illnesses fostered the most PTG (Pan et al., 2016). Thus, it seems that posttraumatic growth would depend more on the intensity of the distress felt at the time of the event, rather than on the type of event itself (Tedeschi & Calhoun, 2004). However, there is a lack of consensus on this point as well, since some studies show that the relationship between distress and growth is curvilinear, while others suggest that the higher the level of distress, the higher the level of PTG.

Lastly, the *post-traumatic factors* are not free of contradictions either. They refer to the individual's behaviors following exposure to the event, especially in terms of cognitive engagement. Indeed, engaging in rumination processes (Ting et al., 2018), positive reappraisal (Helgeson, Reynolds, & Tomich, 2006), acceptance coping (Prati & Pietrantoni, 2009), and problem-solving attitudes (Tedeschi & Calhoun, 2004) strongly promote the onset of PTG (Magne et al., 2020). However, while some authors agree that intrusive and deliberate rumination are both key in the onset of growth, others show that deliberate rumination is the only determinant of positive psychological change.

We note that authors do agree on the fact that the availability of social resources and relationships plays a strong role in the onset of growth (Linley & Joseph, 2004), as social support helps

reduce feelings of distress and offer an opportunity for deliberate rumination. Indeed, benefiting from a supportive social environment allows individuals to talk about what happened to them and find meaning in the event. This experience sharing will not only help individuals integrate the event to their narrative story, but will also help rebuild their fundamental beliefs (Tedeschi & Calhoun, 2004), and strengthen the bonds they have with their social environment (Magne et al., 2020).

Thus, while some variables achieve consensus among psychologists, others still cause disagreements and have an unclear role in the process of growth. Why would some variables predict PTG in certain studies but not in others? When looking closely at the literature, we notice that longitudinal studies are extremely limited and that most of the knowledge on PTG comes from cross-sectional studies. Additionally, studies were conducted in various countries and, since trauma may be experienced differently from one country to the next, so might be posttraumatic growth. Thus, is the process that leads to PTG universal? Indeed, it has been made obvious that fundamental differences exist between cultures, as shown in Hofstede's *dimensional model of culture* (2011). Hofstede defines "culture" as the "collective mental programming of the human mind which distinguishes one group of people from another" (2011). This "programming" shapes individuals' perceptions, reactions, behaviors, coping strategies, social attitudes and, consequently, the way people manage/face hardship. Indeed, data shows that individuals exposed to traumatic events do not all develop PTSD symptoms, and that some are able to overcome and cope with adversity through different strategies. One of these strategies is called "resilience". The difference between resilience and posttraumatic growth has caused quite a debate in scientific literature, as these concepts have easily been confused with one another.

PTG vs. Resilience: Two closely related concepts

More specifically, resilience can be defined as an individual's ability to adapt and successfully overcome the difficulties he/she is facing (Connor, 2006). Bonanno also defines resilience as the capacity to maintain a relatively stable level of physical and psychological functioning in the face of hardship (2004). With these definitions, we understand that resilience is characterized by a return of the individual to his/her initial state, meaning that he/she does not actually experience any psychological change.

In contrast, posttraumatic growth allows individuals to surpass their pre-trauma level of functioning, hence the term "growth". Thus, PTG distinguishes itself from resilience as it refers to individuals' capacities to (1) resist and overcome the traumatic event, and (2) experience higher levels of adaptations and positive transformations. In other words, posttraumatic growth implies a real process of cognitive reconstruction, while resilience does not.

Furthermore, studies show that individuals who report high levels of resilience already possess the necessary psychological "tools" to face adversity, which makes them less likely to experience posttraumatic growth (Levin, Laufer, & Stein, 2009). Thus, while a logical assumption would be that resilience helps promote PTG in individuals who experience trauma, it appears that resilience actually impedes the development of positive psychological change (Bensimon, 2012). Indeed, individuals who are strongly resilient may not experience traumatic events as stressful as individuals who demonstrate low levels of resilience. As Tedeschi and Calhoun explain in their original model (2004), individuals must experience intense levels of distress in order to question their schemes of interpretation and grow from their negative experience. If the distress felt isn't important enough, then fundamental beliefs are not shattered, and individuals do not feel the need to search for meaning or process the endured trauma.

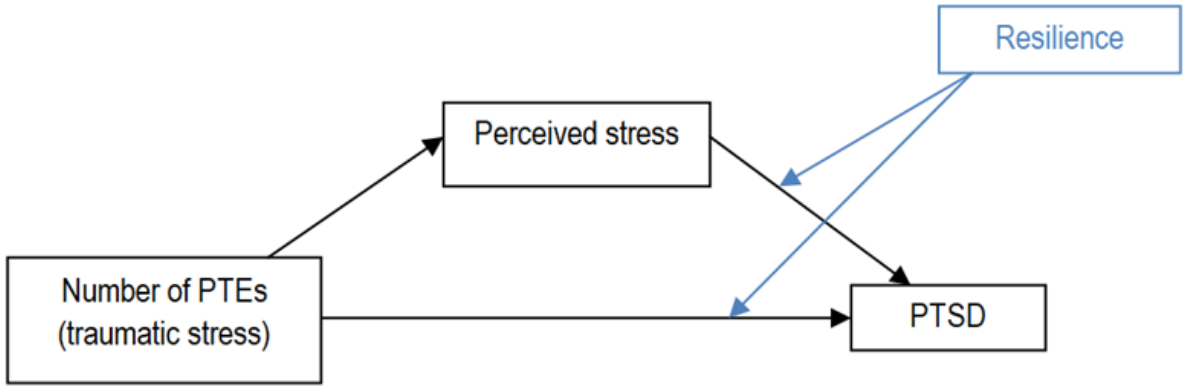
Studies support this last point, as Pietrzak et al. (2009) demonstrate that resilience reduces the risks of depression and suicide among veterans. Thus, it appears that resilience may be a protective factor against the onset of negative outcomes. Based on this idea, Lee et al. (2014) investigated whether resilience could also have such a positive effect on PTSD among firefighters having been exposed to PTEs (Potentially Traumatic Events). In their study, the authors first hypothesized that traumatic stress (PTEs), when combined with high levels of perceived stress[1] and work-related stress[2], increases the risk of developing PTSD symptoms. Lee et al. (2014) then hypothesized that high levels of resilience will protect firefighters from the negative outcomes of traumatic stress and, therefore, reduce the onset of PTSD. In total, 552 Korean firefighters participated in the study, and completed a series of self-assessment questionnaires: Traumatic events were identified using the LEC (Life Event Checklist), perceived stress was assessed through the PSS (Perceived Stress Scale), work-related stress was assessed through the OSS (Occupational Stress

[1] *Stress perceived by the individual in his/her life in general.*
[2] *Stress specifically related to the individual's professional activities.*

Scale), PTSD was assessed through the IES-R (Impact of Event Scale-Revised), and resilience was assessed through the CD-RISC (Connor-Davidson Resilience Scale).

Lee et al.'s results (2014) show that the higher the number of PTEs, the higher the level of perceived stress; perceived stress also being positively correlated to higher levels of PTSD. However, firefighters with high levels of resilience (in the upper 25th percentile) seem to be protected from the negative outcomes of traumatic stress. Thus, two key elements were brought to light in this study: First, exposure to PTEs influences both directly and indirectly, via perceived stress, the onset of PTSD symptoms; and second, the direct and indirect effects of traumatic stress on PTSD via perceived stress are moderated by the individual's level of resilience (see diagram below).

The direct and indirect effect of traumatic stress on PTSD via perceived stress and the moderating role of resilience on PTSD severity.



Thus, while resilience and PTG have been confused by authors at times, it is now easier to distinguish these two concepts, as one of them allows individuals to reduce feelings of distress, while the other characterizes the transformation of distress into positive psychological change. We note that resilience and posttraumatic growth are concepts that appeared in the field of psychology at approximately the same time (around the 1990's), but that resilience was strongly publicized in France by Boris Cyrulnik in his studies with survivors of concentration camps, orphans, and homeless children. Thus, the concept of resilience overshadowed the concept of PTG in French research for a long time, meaning that growth is still relatively under-studied in France. As research clearly

demonstrates the importance of posttraumatic growth, especially when dealing with survivors of trauma in a clinical setting, we took a strong interest in the concept.

Goals and objectives of this thesis:

Given the available knowledge on growth, we believe that PTG deserves to be emphasized and used by clinicians in the context of therapeutic guidance and psychological support. Indeed, promoting the emergence and importance of posttraumatic growth in France could help design innovative methods of patient care, especially with those who have experienced severe trauma and present major PTSD. However, in order to do so, we need to fully understand the growth process and the factors/variables that come into play.

As stated previously, the literature highlights many contradictions that still prevent us from having a clear view on PTG and on the way it might be influenced. Indeed, while some variables are linked to growth in certain studies, they appear to have no connection to PTG in others. These discrepancies could either come from the fact that most of the studies on growth are cross-sectional, or that PTG might be experienced differently in individuals coming from various cultures. Additionally, the *Posttraumatic Growth Inventory* (PTGI) was not replicable in all languages, which further suggests the influence of cultural background on growth.

For these reasons, we decided to design a longitudinal and comparative study between two groups of individuals who are exposed to PTEs on a regular basis: A group of French firefighters and a group of American firefighters. Before conducting this study, we first needed to gather as much information as possible on growth, as well as create a European French version of the PTGI. Thus, the first and second chapters of this thesis were dedicated to two systematic reviews, the first one being devoted to the factors that promote PTG, and the second to the factors that impede it. Then, the third chapter of this thesis was dedicated to the validation of the PTGI-F, without which we could not have conducted our longitudinal study. The fourth chapter was dedicated to the analysis and comparison of PTG between our French and American samples at T1. Factors that raised controversy in the literature such as rumination, level of stress, time since the event, and sociodemographics, alongside others, where studied in relation to PTG, in our two large samples of firefighters to promote statistical accuracy and allow a comparison of the growth process in two different countries. Lastly,

the fifth and last chapter of this thesis was dedicated to the analysis and comparison of the process of growth at T2 between French and Americans, on a longitudinal level. This way, we were able to confirm the results provided by our T1 study, and better establish the correct sequence of events, identify changes over time, and provide better insight into cause-and-effect relationships between posttraumatic growth and the other variables under study. Thus, through this thesis, we hope to: (1) give more visibility to the concept of PTG in France and increase awareness among psychologists and clinical practitioners, (2) provide some clarity on the concept of posttraumatic growth and the existing discrepancies, and (3) allow methods of patient care to evolve and become more efficient, especially towards victims of trauma. As emergency personnel play such a prominent role in society, it is crucial that psychologists are able to provide them with the most efficient support possible, so that care-takers and rescue workers, whether on the field as firefighters, or in hospitals as emergency doctors and nurses, are still fully capable of fulfilling their duties without impeding their psychological well-being. This may be even more true in today's sanitary context, as studies show that the emergence of the COVID-19 pandemic has triggered post-traumatic stress in Emergency Medical Service workers (Martínez-Caballero et al., 2021). This increasing demand towards health care and emergency professionals only confirms the relevance of this research, which provides expanded knowledge on the process of posttraumatic growth.

Chapter 1

What promotes posttraumatic growth: A systematic review

The literature suggests that traumatic experiences can be "catalysts" for positive change (i.e., posttraumatic growth; PTG). While the general population isn't confronted with traumatic events regularly, individuals such as firefighters, policemen, and EMTs are. But what factors foster the emergence of PTG? To answer this question, a systematic search was conducted. Factors that promoted PTG included sharing negative emotions, cognitive processing or rumination, positive coping strategies (e.g., positive reappraisal), personality traits (e.g., agreeableness), experiencing multiple sources of trauma, event centrality, resilience, and growth actions. Other factors were mediators of PTG rather than direct influencers (e.g., seeking social support coping, social support, optimism, etc.). Finally, studies show a positive correlation between PTG and support for aggressive behavior suggesting that growth may be more nuanced than originally thought. By exploring the factors that foster PTG in trauma-exposed professionals, we hope this systematic review will both provide avenues for future research and help design new methods of prevention and intervention for first responders.

Reference:

Henson, C., Truchot, D., Canevello, C. (2021). What promotes posttraumatic growth: A systematic review. *European Journal of Trauma & Dissociation*, 5(2):100195. DOI: 10.1016/j.ejtd.2020.100195

1. Background

The assumption that suffering can make individuals stronger (Tedeschi & Calhoun, 1995) is not new in religious and philosophical literature. The idea that positive changes may result from adversity and trauma has been present across cultures for centuries. Indeed, from the rebirth of the phoenix in Egyptian mythology to the forgiveness of sin for all people who believed in the Christ's resurrection, ancient literature already long recognized the opportunities for growth that come from hardship. Philosophers also introduced this idea, in particular Friedrich Nietzsche with his famous quote ''was mich nicht umbringt macht mich stärker" (''that which does not kill me makes me stronger'', 1888), or ''increscunt animi, virescit volnere virtus'' (''spirits grow and courage increases through wounds'', 1888).

However, it is only recently that this notion was applied in the field of psychology. The available data suggests that at least a minority of individuals who have been confronted with trauma (e.g., sexual assault, military combat) report meaningful levels of personal growth (e.g., Calhoun & Tedeschi, 1999, 2006, 2013; Tedeschi & Calhoun, 1995, 2004), i.e., the positive changes that may arise from the struggle to cope with a critical or traumatizing situation. Therefore, it is important to note that growth is not a result of the event itself, but rather a result of the struggle to deal with it. The types of changes that may occur as a result of the struggle to cope with major life crises are listed in the Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), and include ''improved relationships, new possibilities for one's life, a greater appreciation for life, a greater sense of personal strength, and spiritual development''.

Despite these positive changes, the link between posttraumatic growth (PTG) and "the sense of psychological comfort" remains uncertain. According to Tedeschi and Calhoun (2014), it would appear that PTG and psychological comfort may be distinct constructs. Indeed, the literature mostly suggests that ''growth will not necessarily decrease pain or increase happiness, but on the contrary, significant growth may only occur when it is preceded by, or when it occurs together with significant amounts of subjective distress'' (Tedeschi, Park, & Calhoun, 1998, p.217). The authors base this affirmation on several studies, including Edmonds and Hooker (1992) showing that positive psychological changes will occur after bereavement. Thus, growth experiences do not put an end to distress in trauma survivors (Calhoun & Tedeschi, 1998; Tedeschi & Calhoun, 1995). Tedeschi and Calhoun (2014) add that ''the maintenance of the growth experienced may require unpleasant

periodic cognitive reminders of what has been lost, so that in an apparently paradoxical way, what has been gained remains in focus'' (Tedeschi & Calhoun, 2014, p. 505). Thus, while PTG helps individuals live a fuller and more meaningful life, it does not allow a return to normality. The aim of this systematic review is to better understand in what circumstances posttraumatic growth may occur, and whether or not it has a protective effect on mental health outcomes.

2. Method

2.1 Search strategy

Studies published between 1998 and 2019 were identified through four major database searches: Psychology and Behavioral Sciences Collection, PsycARTICLES, PsycINFO, and ScienceDirect. We used the following keywords: PTG, post-traumatic growth, posttraumatic growth, and vicarious PTG.

2.2 Inclusion criteria

Studies were included if the title contained the words ''post-traumatic growth'' or ''posttraumatic growth''.

2.3 Exclusion criteria

Studies were excluded if they didn't measure PTG or positive changes as a result of exposure to potentially traumatic events, and if they did not use the PTGI (Posttraumatic Growth Inventory) to measure growth.

1.1 Results

A total of 281 articles met inclusion criteria. Thirty-eight studies were longitudinal while 243 were cross-sectional. Samples were comprised of firefighters, HIV-positive individuals, cancer survivors, natural disaster survivors, sexual assault survivors, veterans, refugees, accident survivors, students, bereaved adults, medical staff, homeless women, police officers, and parents of children

with severe illness. Studies were carried out in various countries: United States, Australia, Romania, Japan, Poland, France, Germany and Portugal (Fig. 1).

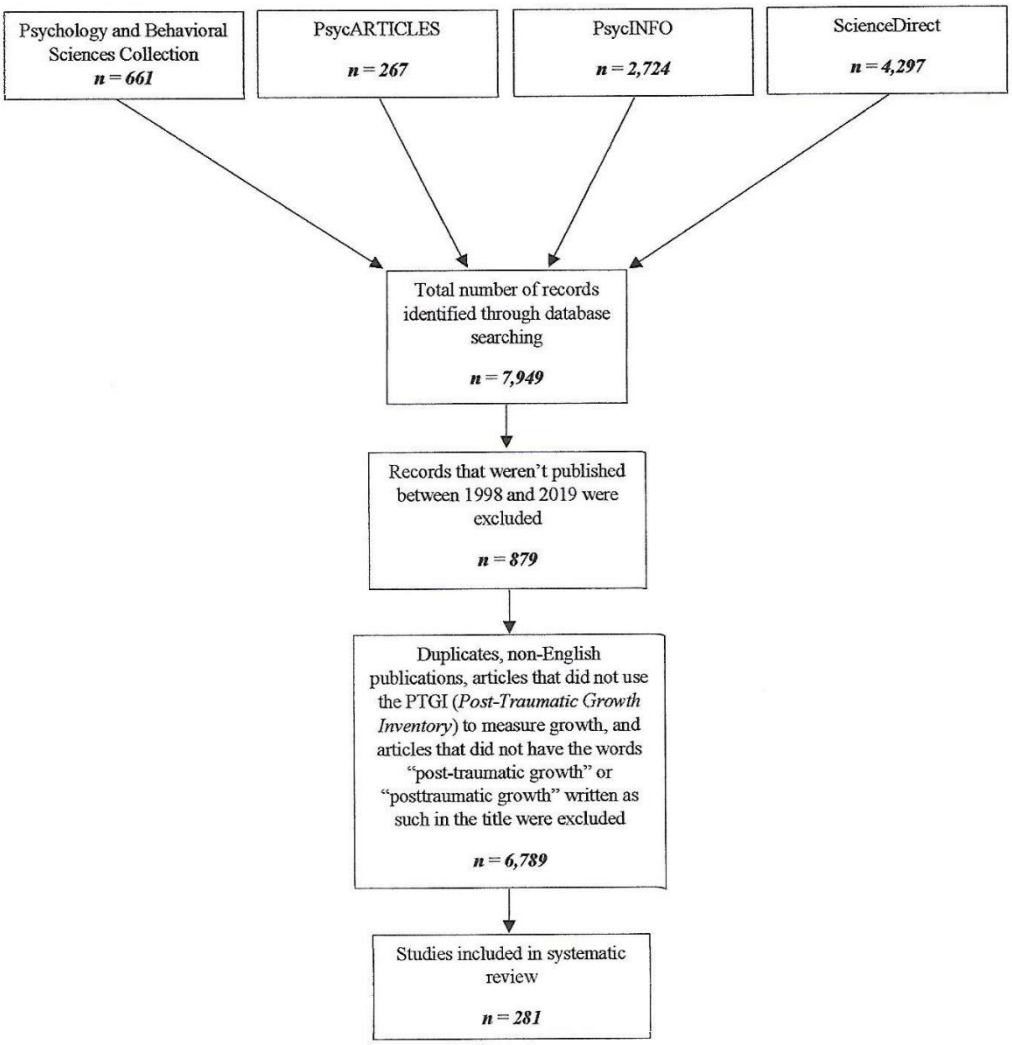


Fig.1 *Schema of selected studies in systematic review of the literature.*

3. Results

3.1 The role of "cognitive engagement" and "cognitive processing" in PTG

Tedeschi and Calhoun (2014, p. 506) compare traumatic events (or life challenges) to "earthquakes" that can severely ''shake, challenge, or sometimes shatter'' the way individuals perceive the world and their place in it. Therefore, because they challenge the individual's

assumptive world (Park, 1998), these ‘‘seismic events’’ have a great life-changing potential. However, Tedeschi and Calhoun (2014) insist on the fact that, in order for growth to be possible, traumatic events must have a big enough impact to "force" individuals to reassess their representation of themselves and others, the world they live in, and what the future may bring. It had been demonstrated empirically that core beliefs must be challenged in order for growth to occur (Krosch & Shakespeare-Finch, 2017; Ramos et al., 2018; Wilson, Morris, & Chambers, 2014). Once they have been challenged or shattered, these representations (or "assumptive worlds") must be reconstructed. Calhoun and Tedeschi (2013) extend their seismic metaphor by comparing this reconstruction to the physical rebuilding that occurs after an earthquake. According to them, the "reconstruction" that occurs after a trauma leads individuals to rethink repeatedly about the circumstances of the traumatic event they have experienced, in the hope of giving it some meaning: They refer to this process as "cognitive engagement". This first step towards growth may lead individuals to realize that some of their life goals are no longer feasible, and that some of their representations and beliefs do not reflect the world they live in anymore. These deep reconsiderations are what will enable individuals to establish new life goals. This process can sometimes take months or years and, in some cases, individuals who have been confronted with trauma may never experience positive psychological changes, as PTG also depends on personal and individual characteristics.

Furthermore, Tedeschi and Calhoun (2014) explain that individuals who face major life challenges generally tend to "cognitively engage" with two main purposes: 1) Finding an explanation to the immediate circumstances of the event (‘‘why did this happen?’’), and 2) understanding the fundamental issues raised by the event (‘‘what impact does the event have in my life?’’). Tedeschi and Calhoun (2014) refer to this process as ‘‘cognitive processing’’. Empirical studies suggest that cognitive processing is associated with higher levels of PTG. For example, Calhoun, Cann, Tedeschi, and McMillan (2000) investigated rumination and growth in a group of 54 young adults who had experienced a traumatic event. Their results indicated a positive relationship between event-related rumination and the level of reported PTG: The more rumination participants reported experiencing soon after the event, the greater the degree of posttraumatic growth. Palmer, Murphy, and Spencer-Harper (2016) add in one of their studies that veterans tend to report growth after reaching a certain ‘‘turning point’’ following the traumatic event. This turning point typically occurs after several years of living with PTSD symptoms and is generally prompted by the veterans themselves after reaching

extreme levels of despair due to their symptoms. In other words, the authors suggest that, in some cases, growth may be triggered by a posterior crisis situation caused by dealing with PTSD symptoms. This ‘‘crisis’’ may be what leads individuals to ‘‘cognitively engage’’ when rumination about the event hasn’t occurred yet. Furthermore, they note that the individuals’ acknowledgment of their PTSD symptoms is an important part of the growth process, as it enables them to separate these symptoms from their own identity and restore a sense of control. Thus, when dealing with individuals who are diagnosed with PTSD, focusing on helping them recognize and understand their symptoms may help promote PTG.

Going back to Tedeschi and Calhoun’s (2014) model, the authors also make a distinction between cognitive engagement characterized by "deliberate rumination" and cognitive engagement characterized by ‘‘intrusive rumination’’. While intrusive rumination is often associated with PTSD and depression, Taku, Cann, Tedeschi, and Calhoun (2009) showed that both types of rumination were in fact associated with higher levels of PTG. More specifically, Taku, Cann, Tedeschi, and Calhoun (2009) examined the effects of four types of rumination across US (n = 224) and Japanese (n = 431) samples: Intrusive and deliberate rumination soon after the event, and intrusive and deliberate rumination recently (still present well after the traumatic event).

The results indicate that both rumination types (intrusive and deliberate) were positively associated with posttraumatic growth; however, intrusive rumination recently did not significantly predict PTG, which is consistent with Cann, Calhoun, Tedeschi, and Solomon (2010) study. Furthermore, the authors assume that intrusive rumination soon after the event was positively correlated to PTG because it may subsequently help trigger deliberate cognitive processing: Intrusive rumination soon after the event may therefore be considered as a ‘‘catalyst’’. Indeed, several studies confirm the positive link between intrusive rumination and PTG (Hallam & Morris, 2014; Jeon, Yoo, Kim, & Lee, 2015; Ramos et al., 2018; Wilson et al., 2014).

In addition, for both samples, recent deliberate rumination predicted the strongest levels of PTG, possibly because, according to Taku et al. (2009), the presence of deliberate rumination long after the event occurred was proof of an ongoing process of sense-making and reconstructing of one’s representations of the world over a large period of time (continuous cognitive processing = higher levels of growth). Several studies confirm the positive association between deliberate rumination and growth (Hill & Watkins, 2017; Hirooka, Fukahori, Taku, Togari, & Ogawa, 2017; Palacio-Gonza´lez, Clark, & O’Sullivan, 2017; Stockton, Hunt, & Joseph, 2011).

3.2 Experience sharing and social support

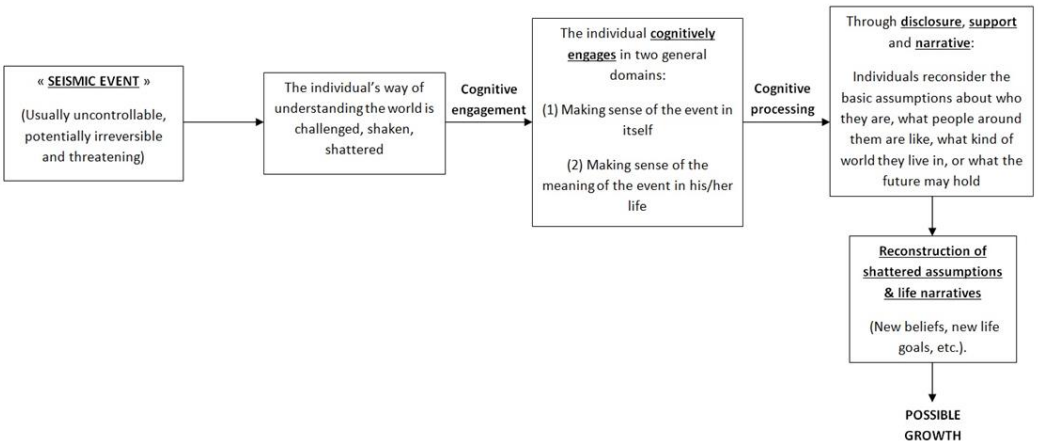
According to Calhoun and Tedeschi (2013), cognitive engagement and cognitive processing of traumatic events could be fostered by the sharing (or the "disclosure") of one's internal experience with others, as long as the individual's social environment is able to provide the necessary support. Indeed, the disclosure of internal cognitive processes with a supportive social environment reduces the risks of depression and/or promotes higher levels of growth (Nolen-Hoeksema & Larson, 1999; Saltzman et al., 2018). This is consistent with Oginska-Bulik and Kobylarczyk (2015) and Dirik and Go¨ cek-Yorulmaz's (2018) results showing that venting negative emotions is positively associated with PTG (Fig. 2).

Therefore, disclosure could be considered as a mediator of the relationship between cognitive engagement and PTG. This appears to be particularly true when sharing with people who have gone through similar traumatic experiences, as it has the positive effect of normalizing the individual's situation and feelings (Palmer, Murphy, & Spencer-Harper, 2016; Richardson, 2016). Additionally, Palmer et al. (2016) showed it was not simply the presence of social support that contributed to PTG, but that the ''support network'' needed to have an in-depth knowledge of the individual's difficulties and trauma experiences (e.g., the spouse) in order to maximize growth. Canevello, Michels, and Hilaire (2016) add that having a partner who experiences PTG will increase people's perception of partner's PTG, which predicts actor's increased relationship quality (Lee, Kim, Lim, & Kim, 2017) and, in turn, predicts people's decreased psychological distress. Thus, partners' PTG can benefit people's evaluations of their relationship and, ultimately, people's psychological well-being. This is supported by Weiss (2004), who shows that couples facing cancer together share not only the pain but also the potential for gain from the trauma.

Additionally, Albuquerque, Narciso, and Pereira (2018) and Büchi et al. (2009) show that higher levels of stress communication by the partner and higher levels of emotional exchange between partners also promote actor's PTG. This is consistent with Canevello et al.'s (2016) longitudinal study, suggesting that the perception of the partner's responsiveness in married couples was greatly associated with PTG. Additionally, secure partner attachment seems to play an important role in the prediction of PTG (Levi-Belz & Lev-Ari, 2018; Salo, Qouta, & Punamäki, 2005). Furthermore, the literature suggests that parents' PTG may also affect their children's experience with growth. For example, in families who had been directly exposed to the 2004 tsunami in Thailand, parents' self-

reported PTG was a significant predictor of their children's PTG (Hafstad, Gil-Rivas, Kilmer, & Raeder, 2010). Thus, parents' functioning can affect children's positive adaptation after experiencing a disaster. This further suggests, along with the positive effect of partners' PTG, that interconnections and relatedness play a major role in the development of growth in individuals who experience trauma.

Fig. 2. Tedeschi and Calhoun's model of post-traumatic growth (2004).



3.3 Coping strategies

As coping strategies foster a more positive perception of potentially threatening situations, influence behaviors, strengthen one's ability to adapt, and help individuals give meaning to the events they experience, they play a major role in the facilitation of growth. For instance, Prati and Pietrantoni (2009) showed in a meta-analysis of 103 studies the influence of several coping strategies on PTG. Indeed, religious coping was strongly correlated to growth. As stated by Pargament, Koenig, and Perez (2000), religious coping could have various positive consequences for individuals in their daily lives (e.g., giving meaning to negative events, providing a sense of control and comfort during difficult times, fostering social relations through the religious community, and helping individuals make major life changes). Furthermore, spirituality predicted moderate positive changes (Prati & Pietrantoni, 2009; Rzeszutek, Oniszczenko, & Firlag-Burkacka, 2017, Danhauer et al., 2013a, Tsai & Pietrzak, 2017). Spirituality differs from religious coping in that it is defined as ''an individual's sense of peace, purpose, and connection to others, and beliefs about the meaning of life''; whereas religion

is defined as a set of beliefs and practices associated with a particular religious tradition or denomination (Vallurupalli et al., 2012). According to Prati and Pietrantoni (2009), spirituality may foster PTG because it increases feelings of belonging within the religious community, ensures the presence of social support through the community, and promotes beliefs that encourage individuals to search for meaning. Thus, spirituality may only be indirectly related to growth. Indeed, meaning-making has been positively associated with PTG in several studies (Cadell et al., 2014; Dursun, Steger, Bentele, & Schulenberg, 2016). Additionally, the positive effect of the sense of belonging on PTG is supported by Armstrong, Shakespeare-Finch, and Shochet (2014), who found that belongingness was a mediator of the relationship between coping strategies and posttraumatic growth. Indeed, the sense of belonging may encourage individuals to seek social support which, consequently, will lead to higher levels of PTG. Prati and Pietrantoni (2009) hypothesize that seeking social support could have a positive influence on the quantity and quality of social support and, therefore, also act as a mediator of PTG.

Positive reappraisal coping was also associated with PTG. This coping strategy implies the individual's attempt to construe negative events in a more positive way which, consequently, may generate positive changes. This is consistent with several studies suggesting that positive reframing/reinterpretation, positive affect/attitude, and positive sense-making are positively correlated to PTG (Hamama & Sharon, 2013; Trzebinski & Zieba, 2013). Other coping strategies that promote growth include the appraisal of the event as a ''challenge'' (''challenge appraisal''; see Yeung, Lu, Wong, & Huynh, 2016; Goldberg, McDonald, & Perrin, 2018; Wilson et al., 2014), which could be considered as a form of positive reinterpretation of the event, and ''gratitude'', also known as the tendency to show appreciation for something done or received which, consequently, may result in increased use of positive reappraisal (Tsai & Pietrzak, 2017; Tsai, Sippel, Mota, Southwick, & Pietrzak, 2016). Additionally, Prati and Pietrantoni (2009) show that acceptance coping, defined as ''accepting that a difficult situation is real and must be addressed'' (Carver, Scheier, & Weintraub, 1989), had a small but significant effect on PTG. According to the authors, this supports the hypothesis that people's ability to accept whatever situation may come their way plays an important role in the growth process (Rzeszutek et al., 2017; Zoellner & Maercker, 2006).

In addition, three other coping strategies positively predict PTG: Self-care coping (Armstrong, Shakespeare-Finch, & Shochet, 2016), Problem-focused coping, and avoidance coping (Akbar & Witruk, 2016), the last two being quite contradictory. Indeed, several studies show that problem-

focused coping is positively associated with growth (Dirik & Göcek-Yorulmaz, 2018; Rodriguez-Rey & Alonso-Tapia, 2017), which supports Lazarus and Folkman's (1984) findings suggesting that individuals who use problem-based coping (vs. avoidance coping) feel they have more control over the situation and a greater ability to manage the problem. However, avoidance coping was also found to be positively related to growth (Akbar & Witruk, 2016; Carboon, Anderson, Pollard, Szer, & Seymour, 2005; Hallam & Morris, 2014), which is inconsistent with the literature on coping and health. Thus, how can avoidance and solution-focused coping both be correlated to PTG? Kunz, Joseph, Geyh, and Peter (2018) show in a longitudinal study that higher levels of growth are predicted by the use of both approach- and avoidance-oriented coping, as well as by coping flexibility, that is, the use of both types of coping equally. The authors hypothesize that a flexible use of approach- and avoidance-oriented coping strategies may enable individuals to process trauma at times, but also avoid thoughts and activities when such a confrontation is too overwhelming, which together could promote PTG. Avoidance coping would therefore allow distress reduction preceding engagement in cognitive processing. Thus, this suggests that a flexible use of different coping strategies according to situational demands may be most predictive of posttraumatic growth. This is consistent with Su and Chen's (2015) longitudinal study, suggesting that distractive coping style, described as ''a mode of purposefully turning one's attention away from one's distress to pleasant or neutral activities'' (p. 104), is an important facilitator of growth.

3.4 Personality traits

The role of the personality traits of the Big Five (Goldberg, 1992) on PTG has been examined in several studies. More specifically, Agreeableness, Extraversion, Openness (Mattson, James, & Engdahl, 2018; Taku & Matthew, 2018) and Conscientiousness (Karanci et al., 2012; Owens, 2016) were positively correlated to growth, which doesn't come as a surprise since these Big Five personality traits are generally associated with positive health outcomes (Cheng, Weiss, & Siegel, 2015). We note that Mattson et al.'s (2018) findings suggest that Openness was the most predictive of PTG. The authors do not offer any explanation for this; however, given the personality traits associated with Openness, e.g., imagination and adventurousness, it is possible to hypothesize that individuals high in Openness may be more prone to adapt to unexpected life events (Costa & McCrae, 1992).

Personality traits also have an indirect effect on growth through the use of either adaptive or maladaptive coping strategies (Mattson et al., 2018). On the one hand, Extraversion, Agreeableness, and Openness significantly predicted adaptive coping in a sample of 271 OIF and OEF veterans, and in turn promoted growth. We note that Optimism, which isn't one of the Big Five personality traits, also predicted PTG through the use of adaptive coping in Mattson et al.'s study (2018). On the other hand, Neuroticism significantly predicted maladaptive coping, which impeded the development of growth (Mattson et al., 2018). Nevertheless, while we expect neurotic individuals to be less likely to develop PTG because of their lower ability to manage stress, one study found a positive association between neuroticism and PTG in motor vehicle accident perpetrators (Merecz, Waszkowska, & Wezyk, 2012). However, Merecz et al. (2012) specify that the mean value of neuroticism in their sample was rather low and insufficient to assume that those individuals were emotionally unstable. Thus, the authors come to the conclusion that low levels of neuroticism may sensitize individuals to life events (which is essential for posttraumatic growth), but has no detrimental effect on the individual's ability to cope with them.

Additionally, altruistic behavior (e.g., the tendency for an individual to act out of concern for the well-being of others, regardless of his/her own self-interest) positively predicted PTG (Tsai et al., 2016). Indeed, while altruism is not a personality trait, it is a trait that could stem from high levels of Agreeableness.

Lastly, ''narcissism'' (Levi & Bachar, 2019) was also reported as a predictor of PTG. Indeed, according to Levi and Bachar (2019), narcissistic individuals are more inclined to use processes of self-deception associated with the adoption of positive attributions and the exclusion of negative attributions. Therefore, despite being a ''negative'' trait, narcissism may be relatively useful when confronted with stressful events as it may provide an illusory sense of control (''I have all the necessary qualities to face and overcome this situation''). Individuals who feel they have control over themselves or the situation they are facing usually feel they are more capable of managing the problem (Lazarus & Folkman, 1984). Indeed, self-control (or personal mastery) reduces the onset of PTSD symptoms (Smith et al., 2011). In addition to being a protective factor against PTSD, the sense of control may also be a factor that promotes PTG. For example, for survivors of diverse traumatic events, control was a key determinant of psychological adjustment after adversity (Dekel, Mandl, & Solomon, 2011; Kaye-Tzadok & Davidson-Arad, 2016). Kaye-Tzadok and Davidson-Arad (2016) specify that both realistic control and ''unrealistic'' control are associated with PTG. Thus, simply being under

the impression that one is in control of their environment can facilitate growth. Consistent with these findings, Shuwiekh, Kira, and Ashby (2018) show that striving for 'standards' (high performance expectations) and 'order' promotes PTG. Furthermore, Mamon, Solomon, and Dekel (2016) show in a group of Israeli Veterans that Obsessive Compulsive Behavior (OCB), a disorder characterized by the attempt to control one's environment, may facilitate psychological growth. Indeed, according to Mamon et al. (2016), OCB symptoms trigger an ongoing ruminative processing of the event, ''initiating a more deliberate search for understanding and finding meaning in the trauma, which subsequently supports growth'' (Mamon et al., 2016, p.488). However, an alternative explanation is that OCB promotes PTG due to a ''cognitive bias towards exaggerated personal control'' (Mamon et al., 2016, p.489). Indeed, ''individuals with OC symptoms tend to use compulsive rituals as a way to compensate and instill an illusory sense of control'' (p.489). However, in a paradoxical way, belief in social complexity (or the belief that the world is nearly impossible to control) also appears to be positively associated with PTG (Nalipay, Bernardo, & Mordeno, 2016). Indeed, Nalipay et al. (2016) show that generalized beliefs about how the world functions, specifically social complexity, may be one of the factors that could provide a framework for individuals to understand and make sense of stressful events. More specifically, they argue that individuals who believe in social complexity may be more likely to engage in cognitive processes that will allow them to view a traumatic experience from various perspectives which, ultimately, will promote flexible coping strategies, positive cognitive restructuring, and acceptance of what happened (Nalipay et al., 2016).

The sense of coherence (SOC), defined as ''the extent to which one has a pervasive, enduring though dynamic, feeling of confidence that one's environment is predictable and that things will work out as well as can reasonably be expected'' (Antonovsky, 1979), also appears to be a potential enhancer of PTG. Indeed, Xiu, Mc Gee, and Maercker (2018) and Lopez et al. (2015) demonstrate that high levels of SOC are positively associated with growth. In other words, SOC could be described as a form of ''optimism'' and personal belief that one's environment is ''controllable'' (controllability), which are both known to enhance psychological growth. SOC, in contrast to the Big Five personality traits, is a trait that individuals develop through various life events. Thus, while biological personality characteristics (such as Extraversion) play a major role in the experience of PTG, socio-cognitive characteristics (such as the sense of control or the sense of coherence) can also be harnessed for positive psychological change. Therefore, promoting SOC in individuals who are low on Extraversion or Openness may help them experience posttraumatic growth.

In addition to the sense of control and coherence, the sense of purpose also appears as a potential facilitator of PTG. According to Reker (2000), the sense of purpose can be defined as having the ability to find meaning in non-materialistic aspects of life, having goals, a sense of direction, a sense of self-worth, a reason for existence (e.g., having children, enjoying the ‘‘little things’’, etc.). Reker states that the sense of purpose is ‘‘an important construct in the prevention of illness, the promotion of wellness and successful adaptation to life’s changing circumstances’’ (Reker, 2000, p. 39). Indeed, it was found that having a sense of purpose promoted PTG in samples of U.S. Veterans, Traumatic brain injury survivors, adults living with chronic illness, and hurricane survivors (Lowe, Manove, & Rhodes, 2013; Powell, Gilson, & Collin, 2012; Tsai & Pietrzak, 2017; Zeligman, Varney, Grad, & Huffstead, 2018). Similar to purpose, ‘‘hope’’ also seems to play a significant role in reaching PTG (Yuen, Ho, & Chan, 2014). Like purpose, the hope construct represents a focus on significant future aims, and can be defined as ‘‘a belief that one knows how to reach one’s goals and a belief that one has the motivation to use those pathways to reach one’s goals’’ (Cotton Bronk, Hill, Lapsley, Talib, & Finch, 2009, p.501).

3.5 Event centrality

According to Berntsen and Rubin (2006), ‘‘highly accessible and vivid personal memories help to give meaning and structure to our life narratives and help to anchor and stabilize our conceptions of ourselves’’ (p. 219). More specifically, the extent to which an individual feels a particular event has become central in the organization of his/her identity is called ‘‘Event Centrality’’ (EC). Indeed, Berntsen (2001) hypothesized that a traumatic event accompanied by significant consequences and repercussions in one’s life may be more likely to be centralized or viewed as an important part of one’s life story (Wright, 2015). It has been reported that high EC is associated with high levels of PTSD (Berntsen & Rubin, 2006; Bohn, 2010; Rubin, Boals, & Hoyle, 2014) and emotional distress (Zaragoza, Salgado, Shao, & Berntsen, 2014). Indeed, high EC may cause individuals to overestimate or emphasize the negative effects of the endured trauma which, in turn, will foster post-traumatic stress. However, EC may also be associated with posttraumatic growth in survivors of different traumatic events (Allbaugh, Wright, & Folger, 2016; Barton, Boals, & Knowles, 2013; Boals & Schuettler, 2011; Roland, Currier, Rojas-Flores, & Herrera, 2014; Schuettler & Boals, 2011; Staugaard, Johannessen, Thomsen, Bertelsen, & Berntsen, 2015). This positive link could be explained by the

fact that construing a traumatic experience as central to one's identity may result in more posttraumatic cognitions (deliberate and intrusive rumination) which, as demonstrated previously, is highly associated with PTG. Thus, the centrality given to trauma appears to serve as a ''double-edged sword'', in that this construct might foster both PTSD and PTG. However, Blix, Birkeland, Hansen, and Heir (2015) showed in a longitudinal study that the positive association between EC and PTG attenuated over time. Thus, it is possible to hypothesize that high EC may only be beneficial soon after the traumatic event occurred, as it may help trigger cognitive processes related to growth outcomes (e.g., intrusive and deliberate rumination, see Taku et al., 2009).

3.6 Resilience

Resilience can be defined as a process characterized by the ability to successfully cope with a crisis and to return to pre-crisis status quickly (De Terte & Stephens, 2014). More specifically, resilience is the ''ability to go on with life after hardship and adversity'' and ''to remain psychologically healthy despite very difficult circumstances'' (Tedeschi & Calhoun, 2004, p.4). Therefore, Resilience differs from posttraumatic growth in that it is characterized by a return of the individual to its initial state (pre-crisis state), whereas PTG is characterized by the « gain » of positive psychological benefits. Indeed, according to Tedeschi and Calhoun (2004), ''posttraumatic growth refers to a change in people that goes beyond an ability to resist and not be damaged by highly stressful circumstances [. . .] posttraumatic growth, then, has a quality of transformation'' (Tedeschi & Calhoun, 2004, p.4).

It has been demonstrated that high levels of resilience reduce the onset of PTSD symptoms in firefighters (Lee, Ahn, Jeong, Chae, & Choi, 2014). However, resilience may also promote growth in individuals who are confronted with various traumatic events (Kong et al., 2018; Rzeszutek et al., 2017). Additionally, Liu et al. (2018) demonstrate that high levels of family resilience are positively correlated to PTG in patients with early-stage breast cancer. Thus, individuals facing adversity seem to benefit from their own level of resilience, but also from the levels of resilience displayed by their social environment. These findings suggest that individual resilience as well as collective resilience are key determinants of growth. However, some studies have found a negative correlation between resilience and PTG. Indeed, Garrido-Hernansaiz, Murphy, and Alonso-Tapia (2017) and Levine, Laufer, Stein, Hamama-Raz, and Solomon (2009) showed that high levels of resilience were associated with

lower levels of posttraumatic growth. The authors hypothesize that resilience may decrease PTG because resilient individuals tend to struggle with adversity less than others, thus making them less likely to engage in the meaning-making behaviors that are associated with PTG. Therefore, it is argued that resilience may provide little opportunity for growth (Westphal & Bonanno, 2007).

3.7 Resource loss

As stated by Hobfoll (1989), individuals ''strive to retain, protect, and build resources and [. . .] what is threatening to them is the potential or actual loss of these valued resources'' (Hobfoll, 1989, p. 516). Thus, according to Hobfoll's Conservation of Resource theory (COR; 1989), resource loss is known to increase traumatic stress. This assumption is verified by Cook, Aten, Moore, Hook, and Davis (2013) study, showing a negative association between resource loss and health in a sample of university students soon after Hurricane Katrina hit the Gulf coast in 2005. However, Cook et al.'s results also show the presence of a positive association between resource loss and PTG. We note that resource loss was assessed by the 18-item measure developed by Sattler et al. (2002) specifically to assess resource loss in response to a hurricane. Respondents were asked to describe the amount of loss experienced as a result of the hurricane. Resource loss was a significant positive predictor of PTG. Since resource loss increases levels of distress, it is possible to assume that resource loss fosters growth through high levels of traumatic stress. This finding is consistent with Tedeschi and Calhoun's (2004) model suggesting that growth can only occur through high levels of distress.

3.8 Growth actions

Hobfoll, Hall, Canetti-Nisim, Galea, Johnson, and Palmieri (2007) show in a group of Jewish and Arab citizens of Israel highly exposed to terrorism that PTG may be beneficial when accompanied by action, not solely cognitive maneuvers. Indeed, while Calhoun and Tedeschi (2013) tend to describe the growth process as a search for meaning (e.g., cognitive engagement), Hobfoll et al. (2007) make a distinction between growth actions and growth cognitions, stating that cognitive change alone is not sufficient for growth to occur. Indeed, they show in one of their studies that PTG may only be beneficial if it includes taking action. The authors compared PTG levels between a group

of settlers in Israel who took part in the resistance in the days prior to the disengagement from Gaza, and a group of settlers who did not take part in the resistance. The results show that individuals who took action by resisting the disengagement reported more PTG and were less likely to develop PTSD. Thus, this suggests that ‘‘growth actions’’ may play an important role in the development of posttraumatic growth and the reduction of post-traumatic stress. This hypothesis is consistent with Anderson et al. (2016) results, showing that volunteers in the March 2011 Disaster in Fukushima (Japan) reported significantly higher levels of PTG than non-volunteers. The authors found that volunteers were also less likely to feel guilty than non-volunteers. These findings, along with Hobfoll et al.’s (2007), indicate that actions can have lasting positive effects and convey a protective benefit.

3.9 Sociodemographic characteristics

3.9.1 Gender

According to several studies, sociodemographic characteristics such as gender, age, education, and ethnicity play an important role in posttraumatic growth. Indeed, it was often found that women reported higher levels of growth than men (Jeon et al., 2015; Jin, Xu, & Liu, 2014; Nakayama et al., 2017; Sharp, Redfearn, Timmons, Balfe, & Patterson, 2018; Val & Linley, 2006). A possible explanation for this is that women may be more susceptible than men to sharing their experiences with others when confronted with adversity which, in turn, facilitates cognitive processes such as deliberate rumination. This hypothesis is consistent with Wu et al.’s (2016) study, showing that women score significantly higher on the "Relating to Others" subscale of the PTGI than men.

3.9.2 Age

Additionally, it was largely found that individuals of a younger age tend to report higher levels of growth than older individuals (Boyle, Stanton, Ganz, & Bower, 2017; Sharp et al., 2018). Bellizzi and Blank (2006) explain this by hypothesizing that older individuals may be dealing with more comorbidities or other significant life events compared with younger survivors, such as dealing with the loss of loved ones, hearing and vision impairment, etc. However, Palgi (2016) suggests that time perspectives may also influence PTG. Indeed, Palgi found that older adults (age range 50–90) reporting younger subjective age and further distance to death reported higher levels of PTG than

adults reporting older subjective age and closer distance to death. Thus, while being of a younger age promotes the chances of reaching growth, the perception of being young fosters PTG as well, regardless of the individual's actual age. However, several studies found a positive association between older age and PTG in samples of sexual assault victims, individuals with Acquired Brain Injury, and breast cancer survivors (Grace, Kinsella, Muldoon, & Fortune, 2015; Ullman, 2014). A possible explanation may be that older adults have acquired more life experience, which may help them deal with stressful events more easily than younger individuals. As a matter of fact, Tallman, Shaw, Schultz, and Altmaier (2010) report in their longitudinal study that older cancer survivors reported more enhanced spirituality on the PTGI.

3.9.3 Education/employment

Furthermore, the level of education also stood out as a factor that influences PTG, even though the results remain equivocal. On the one hand, several studies demonstrate that higher levels of education are positively associated with growth (Danhauer et al., 2013b, Grace et al., 2015). Indeed, resources such as time, money, and education facilitate resistance to stress (Hobfoll, 1989): Individuals who come from an educated environment may perceive they have a wider range of possibilities and choices available to them in coping with stressful events. On the other hand, several studies also provide evidence that PTG may be associated with lower levels of education (Tang et al., 2015; Ullman, 2014). Bellizzi and Blank (2006) hypothesize that individuals with lower educational levels may have ''more room to grow in their relationships'' (p. 54). In other words, individuals with lower levels of education may lean on other types of resources to overcome stressful situations. Thus, whether individuals rely more on their education or on their relationships to grow from adversity remains unclear. Additionally, employment also seems to play an important role in the process of growth. Indeed, Salo et al. (2005); Bellizzi and Blank (2006), and Grace et al. (2015) show that individuals that hold high professional positions or a steady employment are more likely to experience PTG. Sattler, Boyd, and Kirsch (2014) and Xu and Wu (2014) add that occupation/work satisfaction predicts PTG as well. A possible explanation could be that general life satisfaction may help promote growth.

3.9.4 Ethnicity/stigmatized minorities

Lastly, the literature suggests that belonging to an ethnic minority may promote PTG (Hijazi, Keith, & O'Brien, 2015; Ullman, 2014). Hijazi et al. (2015) hypothesize that being part of an ethnic minority is associated with increased discrimination and life adversity, which may ultimately facilitate benefit finding. This is consistent with Zeligman, Barden, and Hagedorn (2016) study, suggesting that stigma may foster PTG in HIV-positive individuals. Thus, while it is unusual to associate discrimination with positive mental outcomes (Rzeszutek & Gruszczynska, 2018; Wei, Li, Tu, Zhao, & Zhao, 2016), studies suggest that individuals belonging to stigmatized groups may be more prone to developing positive changes due to their life experiences. Another hypothesis may be that stigmatized groups develop a strong sense of belonging which, ultimately, helps promote growth.

4. Conclusion

The aim of this literature review was to provide a critical analysis of different factors that may promote the development of growth among trauma-exposed individuals. Some of the factors that promote PTG include sharing negative emotions, cognitive processing or rumination, positive coping strategies (e.g. positive reappraisal), personality traits (e.g. agreeableness), experiencing multiple sources of trauma, event centrality, resilience, growth actions. Authors have also suggested that some factors may be mediators of PTG rather than direct influencers, such as seeking social support coping, social support, optimism, spirituality, and the sense of belonging. These mediators indirectly foster growth either by promoting the use of positive coping (e.g. optimism, social support), by influencing the quantity and quality of social support (e.g. seeking social support coping), by ensuring the presence of social support (e.g. spirituality), or by encouraging individuals to seek social support (e.g. sense of belonging). Additionally, the studies suggest that PTG might be more nuanced than originally thought. Indeed, Hobfoll et al. (2007) found that post-traumatic growth was positively associated with more right-wing political attitudes, support for aggressive behaviors, and ethnocentrism in a sample of individuals who experience ongoing violence and terrorism. As suggested previously, this could mean that there are multiple ways of developing growth, and that PTG may not express itself the same way in all contexts.

Chapter 2

Factors that hinder posttraumatic growth: A systematic review

While a large number of factors may help promote PTG (see previous chapter), others may impede the development of growth (e.g., attachment avoidance; Arikan et al., 2016). These factors constitute key aspects for therapy, as they can provide guidance for clinicians working with trauma victims and future research. Thus, this second review aims to present these hindering factors. A total of 39 articles met inclusion criteria and were used to conduct this review. Results showed that hindering factors included attachment style, interpersonal traumas, alexithymia, psychological disorders, anger reactions, trauma family history, substance abuse, and mortality reminders.

Reference:

Henson, C., Truchot, D., Canevello, C. (2022). Factors that hinder posttraumatic growth: A systematic review. *L'Encephale,* 17:S0013-7006(22)00074-4. DOI: 10.1016/j.encep.2022.02.001

1. Background

The idea that hardship can make people stronger (Tedeschi & Calhoun, 1995) has been present in the literature for decades. However, it is only recently that this notion has been used in applied clinical contexts. Indeed, studies show that individuals who have been confronted with trauma can report different levels of posttraumatic growth (Tedeschi, Park, & Calhoun, 1998), which include "improved relationships, new possibilities for one's life, a greater appreciation for life, a greater sense of personal strength, and spiritual development" (Tedeschi & Calhoun, 2014, p. 504). In addition to bringing positive psychological changes, authors suggest that PTG may also attenuate post-traumatic stress symptoms (Böttche et al., 2016). Indeed, as individuals grow from their experience, distress becomes less overwhelming. Thus, post-traumatic growth appears to be an important outcome for trauma patients. In a previous article, we presented the factors that promoted post-traumatic growth in the aftermath of trauma (Henson, Truchot & Canevello, 2021). These factors included sharing negative emotions, cognitive processing or rumination, positive coping strategies (e.g., positive reappraisal), personality traits (e.g., agreeableness), experiencing multiple sources of trauma, event centrality, resilience, and growth actions. However, Mattson et al. (2018) specify that several "dispositional and situational factors are likely at play in determining both severity of PTSD symptoms and whether and to what degree an individual experiences PTG" (p. 1). Indeed, "trauma exposure does not directly determine growth –many trauma survivors do not experience such growth […] many only experience post-traumatic stress" (p. 1). Thus, we understand that, while some factors can promote PTG, others can hinder it. These factors need to be taken into consideration, as they may constitute important indications for the treatment of trauma. Indeed, several studies show a positive link between PTG and psychological well-being (Peng et al., 2019). As positive psychological change is one of the aims of trauma therapy, having full knowledge of the factors that may hinder the process of growth is just as important for treatment success. In other words, investigating all factors associated with PTG, whether they promote or hinder it, is key to prevent the impeding factors from becoming counterproductive in psychotherapy. In that respect, the aim of this systematic review is to better understand the factors that may hinder posttraumatic growth, in order to maximize the experience of positive psychological change among trauma patients.

2. Method

2.1 Search strategy

Studies for this literature review were identified through four major database searches: Psychology and Behavioral Sciences Collection, PsycARTICLES, PsycINFO, and ScienceDirect. Searches were conducted using the following keywords: *PTG*, *post-traumatic growth, posttraumatic growth,* and *Trauma*. Selected studies were published between 2005 and 2018.

2.2 Inclusion criteria

Studies for this literature review were included if the title contained the words "post-traumatic growth" or "posttraumatic growth".

2.3 Exclusion criteria

Studies were excluded if they did not measure post-traumatic growth or positive changes as a result of exposure to potentially traumatic events, if they did not use the PTGI (*Post-Traumatic Growth Inventory*) to measure growth, and if they did not highlight hindering factors for PTG.

2.4 Results

A total of 39 articles met inclusion criteria. Six studies were longitudinal while 33 were cross-sectional. Samples were comprised of firefighters, HIV-positive individuals, cancer survivors, natural disaster survivors, sexual assault survivors, veterans, students, bereaved adults, homeless women, and individuals with psychosis.

3. Results

The first factor we address is attachment style. Indeed, it was found that <u>attachment avoidance</u> (discomfort with closeness and interdependence) predicted more negative posttraumatic cognitions and lower levels of PTG in samples of university staff students (Arikan et al., 2016), undergraduate students (Owens, 2016), and bereaved adult siblings (Cohen & Katz, 2015). Although the authors do not provide any interpretation, this could be explained by the fact that individuals who use this avoidant strategy may benefit less from social support which, in turn, impedes

processing of the traumatic memory. Indeed, studies show that loneliness (or the lack of social interaction), which may stem from attachment avoidance, strongly hinders PTG (Zeligman et al., 2017).

However, attachment avoidance isn't the only factors that may hinder social interactions. Indeed, Harris et al. (2010) demonstrate that survivors of interpersonal traumas (e.g., childhood abuse, domestic violence, etc.) perceive more threat in relationships, are more likely to blame themselves for the traumatic event (Elwood et al., 2007), and are less likely to seek help. Thus, interpersonal traumas may particularly hinder growth in individuals who feel a lack of trust in others. The negative effects of interpersonal dysfunction are also confirmed by Orejuela-Dávila et al.'s (2017) study, showing that alexithymia (a deficit in identifying and describing emotions) impedes relations with others and, subsequently, the development of PTG. Indeed, while the capacity to interact appropriately with others is the basis of any bond and positive social connection, it would seem logical that any dysfunction in this area would affect an individual's social circle and, consequently, his support system. As stated previously, social support is key for the development of positive psychological benefits after trauma. Thus, any factor that hinders social relations may, in turn, hinder posttraumatic growth.

Additionally, anger reactions were found to hinder PTG in a sample of combat veterans, possibly because anger may also impair interpersonal functioning (Hijazi et al., 2015). Indeed, angry people are less likely to have healthy supportive relationships, and chronic anger reduces the intimacy in close relationships (Conger et al., 2003). Thus, it can be assumed that, just as people with alexithymia or other social impairments, anger reactions reduce social support, which results in less posttraumatic growth. However, we note that anger was positively associated with PTG in a sample of violence-exposed individuals (Strasshofer et al., 2018). The authors show that the anger in this sample was associated with the hyperarousal cluster of symptoms for PTSD, which is positively associated with PTG (Lowe et al., 2013; Lurie-Beck et al., 2008). Thus, anger can be considered as a mediator of the link between PTSD and posttraumatic growth.

Furthermore, it appears that having parents who have experienced severe trauma (e.g., the holocaust) also prevents growth in a sample of combat veterans (Dekel et al., 2013). According to Dekel et al. (2013), a possible explanation is that the pathogenic effects of the traumatic event were "trans-generationally transmitted, but rather than being expressed as distress (van Ijzendoorn et al., 2003), they were evident in other domains, such as the family system where the "conspiracy of

silence" about the [event] (Danieli, 1998, p.5) could affect offspring's open verbal communication and self-disclosure about their own trauma" (p.532). Thus, the unspoken consensus to not mention, discuss, or acknowledge the parents' trauma may be harmful to the offspring in that it implements a pattern of avoiding painful subjects.

Additionally, the use of pathological avoidant coping strategies such as alcohol or substance abuse is also positively correlated to lower levels of growth in head and neck cancer survivors (Holtmaat et al., 2017), homeless women (Stump & Smith, 2008), and middle school adolescents following 9/11 (Milam et al., 2005). Indeed, the use of avoidant coping strategies prevents individuals from confronting themselves with their traumatic memories. More specifically, avoidant type of behaviors will most likely impede constructive and necessary rumination about the endured trauma. In fact, several authors demonstrate that both intrusive and deliberate rumination are associated with higher levels of PTG (e.g., Taku, Cann, Tedeschi, & Calhoun, 2009). Therefore, with substance abuse, the cognitive processing of the trauma is impeded, while the onset of PTSD symptoms is exacerbated (Meyer *et al.*, 2012).

Furthermore, Luszczynska et al. (2012) found that mortality reminders (being reminded of one's mortality) hinder growth in patients with a life-threatening illness. Visible scarring in burn survivors also appears to impede PTG (Martin et al., 2016); perhaps because scars are constant reminders of the endured trauma. In other words, factors that remind individuals of their own vulnerability seem to hinder growth.

Lastly, psychological disorders such as *anxiety* (Holtmaat et al., 2017; Casellas-Grau et al., 2017), *chronic stress* (Ruini et al., 2015), *psychotic symptoms* (Mazor et al., 2016), and *depression* (Magruder et al., 2015; Martin et al., 2017) were found to hinder PTG; possibly because these factors could prevent the use of adaptive coping strategies such as positive reappraisal. Indeed, anxious, stressed or depressed individuals tend to have negative world perceptions and have more difficulty finding positive meaning in adversity, since facing everyday life already constitutes a challenge for them. However, some studies did find a positive association between anxiety, depression and PTG (Rodríguez-Rey & Alonso-Tapia, 2017; Loiselle et al., 2011; Bianchini et al., 2017). Johnson and Boals (2015) explain these results by referring to *event centrality* (EC). EC refers to the extent to which an individual feels a particular event has become central in the organization of his/her identity (Bernsten & Rubin, 2006). When Johnson and Boals (2015) examined events low in EC, PTGI scores were associated with greater levels of stress, depression, and anxiety. However, when they examined

events that were high in EC (meaning the event was considered *impactful* by the respondent), the authors found that PTGI scores were associated with less stress, depression, and anxiety. Thus, as supported by Tedeschi and Calhoun (2014), scores on the PTGI are more likely to accurately reflect PTG when the events are more subjectively traumatic, and thus more influential to the respondent. If an event is not significant to people in a way that will make that event a turning point in their life, they may be more likely to make errors when attempting to rate the positive changes they experience. Thus, studies finding a positive association between depression, anxiety, and PTG should be interpreted cautiously.

4. Conclusion

While a majority of authors focus on studying the factors that promote post-traumatic growth, investigating the factors that may hinder PTG is just as essential. Indeed, clinicians working with trauma patients not only need to focus on enhancing the factors that will encourage growth, but should also pay attention to the factors that may inhibit psychological change. This short systematic review aimed to present the hindering factors for PTG. The factors we identified include attachment avoidance, loneliness, interpersonal trauma, alexithymia, having parents who have experienced severe trauma, alcohol and substance abuse, mortality reminders and visible scarring, anxiety and chronic stress, psychosis, depression, and anger. We notice most of these factors inhibit PTG for 3 major reasons, since they result in: (1) interpersonal dysfunction, (2) avoidance, or (3) feelings of vulnerability. Thus, they constitute key aspects for clinicians working alongside individuals confronted with traumatic events, especially professionals such as firefighters, police officers, or paramedics. Indeed, first responders are more prone to experiencing feelings of vulnerability given their high exposure to stressful events, as well as using maladaptive coping strategies such as avoidance, since psychological distress is still, to this day, rarely discussed openly in these lines of work. Further raising awareness on the potential benefits of growth, and further exploring ways of reducing the negative effects of social dysfunction, avoidance, and feelings of vulnerability, could help promote positive psychological change among emergency workers.

Chapter 3

Psychometric properties of a European French version of the Posttraumatic Growth Inventory in first responders

This study was designed to adapt and validate a European French translation of the Posttraumatic Growth Inventory (PTGI). The current study examined the factorial as well as the convergent validity of the French version of the PTGI (PTGI-F) in first responders. A first sample of 406 French firefighters was used to test the psychometric structure of the PTGI. A second sample of 210 first responders (70% male; median age 30 years) was then used to test the convergent validity of the scale, in which participants completed measures of growth, traumatic events, post-traumatic stress, anxiety and depression, and personality. The PTGI-F was unrelated to the Anxiety subscale of the HADS, supporting the convergent validity of the PTGI-F. Additionally, there was a significant positive correlation between the PTGI-F and the PCL-C. Finally, factor analyses suggest that the PTGI-F has the same five-factor structure as the PTGI. Overall, the PTGI-F appears to be a valid tool in the context of first responders.

Reference:

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1. Introduction

People who experience major life crises often report post-traumatic stress. However, the literature suggests that traumatic experiences can also be "catalysts" for positive change (i.e., posttraumatic growth; PTG). These changes are assessed by the *Post-Traumatic Growth Inventory* (or PTGI; Tedeschi & Calhoun, 1996), which describes the different life-altering psychological benefits that contribute to a personal process of change and meaningfulness. Thus, not only does the PTGI reflect the levels of positive psychological changes that may arise following major life crises; it is also an important tool for understanding the factors that may foster these changes. Indeed, they may be particularly important in fields of work that include regular exposure to traumatic and disturbing events, such as firefighting. Given the importance of this tool, this study was designed to adapt and validate a European French translation of the Posttraumatic Growth Inventory. More precisely, the PTGI, which was developed by Tedeschi and Calhoun (1996), is a self-report inventory that assesses perceptions of personal growth in the aftermath of trauma. The PTGI asks participants to indicate the degree to which positive changes occurred in their life following a traumatic experience. Items are rated on a scale ranging from 0 ("I did not experience this change as a result of my crisis") to 5 ("I experienced this change to a very great degree as a result of my crisis"). The 21 items are divided into 5 subscales: *New possibilities*, *Relating to others*, *Personal strength*, *Appreciation of life*, and *Spiritual change*.

The PTGI's reliability and validity were originally tested by Tedeschi and Calhoun (1996) in a sample of college students (199 men; 405 women) who had experienced a significant negative life event, such as bereavement, divorce or severe injury, during the preceding 5 years. The scale showed good internal consistency for the total 21 items (α=.90) and acceptable test-retest reliability over two months (r = .71). Moreover, Tedeschi and Calhoun's results (1996) showed that the PTGI was not correlated to the Marlowe-Crowne Social Desirability Scale, and that the PTGI was moderately correlated to the LOT (Life Orientation Test), a scale that measures optimism. Thus, concurrent and convergent validity were verified.

The PTGI was translated into several languages: Portuguese (Teixeira, & Pereira, 2013; Da Silva et al., 2018), Japanese (Taku, Calhoun, Tedeschi, Gil-Rivas, Kilmer & Cann, 2007), Chinese (Ho, Chan & Ho, 2004), Dutch (Jaarsma, Pool, Sanderman & Ranchor, 2006), Spanish (Weiss & Berger, 2006), Bosnian (Rosner, Powell & Butollo, 2003), Italian (Prati & Pietrantoni, 2014), German

(Maercker & Langner, 2001; Mack et al., 2015; Exenberger, Kumnig, Juen, Rumpold, & Siller, 2019), and Canadian French (Cadell, Suarez & Hemsworth, 2015). In other words, the PTGI has piqued researcher's interest all over the world. Each of these versions are described in the following table.

TABLE 1.
Internal reliability and factor structures of the PTGI in other languages

Authors	*Language*	*Sample*	*Internal consistency/reliability (total score)*	*Factorial solution*	*New dimensions*
Teixeira & Pereira (2013)	Portuguese	214 adult children of cancer patients	α = .94	Four-factor structure	"New Possibilities" and "Appreciation of Life" were combined
Da Silva et al. (2018)	Portuguese	300 university students	α = .91	Five-factor structure	/
Taku et al. (2007)	Japanese	312 undergraduate students	α = .90	Four-factor structure	"Spiritual Change" and "Appreciation of Life" were combined
Ho et al. (2004)	Chinese	188 cancer patients	α = .80	Four-factor structure	"Change in the Self" (7, 12, 10, 3, 13, 11, 9), "Spiritual" (18, 5, 4), "Life Orientation" (1, 17), "Interpersonal" (6, 8, 15)
Jaarsma et al. (2006)	Dutch	294 cancer patients	α = .95	Five-factor structure	/
Weiss & Berger (2006)	Spanish	100 immigrants	α = .92	Three-factor structure	"Philosophy of Life" (18, 13, 1, 19 & 16), "Self/Positive Life Attitude" (4, 10, 7, 3, 11, 14), "Interpersonal Relationships" (9 & 6)
Rosner et al. (2003)	Bosnian	136 refugees	α = .93	Three-factor structure	"Changes in self/positive life attitude" (7, 11, 14, 10 & 11), "Philosophy of life" (2, 13, 6 & 8), "A changed sense of relationship to others" (8, 20, 21 & 18)
Prati & Pietrantoni (2014)	Italian	1244 adults who had experienced a range of adverse life events	α = .93	Five-factor structure	/
Maercker, A., & Langner, R. (2001)	German	141 university students	/	Five-factor structure	/
Mack et al. (2015)	German	188 adult stroke patients	CFI of .957 and a RMSEA of .083	Five-factor structure	/
Exenberger et al. (2019)	German	54 adults	/	Two-factor structure	"Lessons learned", and "Processing of adversity with potential **growth** experiences" (items unspecified)
Thege et al. (2014)	Hungarian	691 adults who experienced trauma or loss	α = .93	Two-factor structure	Bifactor model with a 5 + 1 factor structure
Cadell et al. (2015)	Canadian French	10 bereaved HIV caregivers and 37 parents caring for a child with a life-limiting illness (n=47)	α = .82	Five-factor structure	/

Table 1 provides a summary of samples, internal reliability, and factorial solutions for each of the translated versions. All versions report relatively good internal consistency. We note that the only versions that also reported test-retest reliability were the Japanese (.86) and the Hungarian (.90) translations. However, while several versions managed to replicate the original five-factor structure

of the scale, overall data reveals strong inconsistencies with Tedeschi and Calhoun's model (1996). Indeed, analyses revealed a four-factor structure in one of the Portuguese versions (Teixeira & Pereira, 2013), the Japanese version (Taku et al., 2007), and the Chinese version (Ho et al., 2004) of the PTGI. As indicated in Table 1, authors either combined two of the original subscales together (in the Portuguese and Japanese versions), or discovered four completely new dimensions for the scale (in the Chinese version).

In contrast, the Spanish (Weiss & Berger, 2006) and Bosnian (Rosner et al., 2003) versions of the PTGI reported a three-factor structure. The Spanish version named these new factors "Philosophy of Life", "Self/positive life attitude", and "Interpersonal relationships", while the Bosnian version named them "Changes in self/positive life attitude", "Philosophy of Life", and "A changed sense of relationship to others". While the Spanish and Bosnian factor structures may seem similar at first, item-distribution is strongly inconsistent between these two versions (see Table 1). We note that the factor structure of the Bosnian version is more ambiguous, given that two items (8 & 11) load highly on more than one factor.

Lastly, one of the three German versions of the PTGI led to the elaboration of two main domains (Exenberger et al., 2019). The authors titled these new domains "Lessons learned" (which imply newly acquired knowledge about oneself and one's life), and "Processing of adversity with potential growth experiences" (which refers to the struggle of processing a critical incident in order to obtain growth). These new dimensions were elaborated through qualitative data; thus, Tedeschi and Calhoun's original items were not retained. Instead, the domain "Lessons learned" consisted of the four dimensions "conscious preparedness", "authenticity", "being realistic", and "being valued"; while the domain "Processing of adversity with potential growth experiences" consisted of the two dimensions "Becoming aware of (own) mortality", and "Assessing potentially disruptive event", the latter being similar to deliberately thinking about the stressful event. The idea of a two-factor model is further supported by Thege et al.'s Hungarian version of the PTGI (2014). Indeed, while the authors tested six different models in a large sample of 691 individuals, their series of confirmatory factor analyses revealed a bifactor model (with a 5+1 factor structure) provided the best fit. Thus, despite the fact that two of the German translations reported similar factor structures than the original PTGI on a quantitative level, the discrepancies found in the latest version on a qualitative level further suggest the need to reevaluate Tedeschi and Calhoun's original scale and, consequently, to verify the factor structure of our French version.

Furthermore, although the literature does provide a French version of the PTGI (Cadell, Suarez & Hemsworth, 2015), a number of issues remain unaddressed. The French version of the PTGI was created and validated using Canadian samples, which could pose linguistic challenges in using the instrument with French participants. Canadian French and French spoken in France are significantly different: Not only do the vocabulary and grammar differ, but Canadian French is not culturally relevant in Europe as it reflects the values and perceptions of a population that evolves in a North American context. Indeed, Canadian French speakers tend to use a lot more anglicisms than European French speakers. Meney specifies that in Canada, "anglicisms have penetrated every part of the language from pronunciation to lexicon, syntax, and metaphors" (1994, p. 930). For example, while the French would call a drink "une boisson", Canadian French speakers would use the word "un breuvage" which is derived from the English word "beverage". The creation of a "Canadian French dictionary" (*Le dictionnaire Québécois*, Guillot, 1999) further supports the differences that exist between the two. In the case of the PTGI, Cadell et al. translated Tedeschi and Calhoun's item "I have a better appreciation for the value of my own life" into "J'apprécie mieux la valeur de ma vie", which is a very literal (or word-for-word) translation; whereas for European French speakers, a more suitable translation would be "J'apprécie davantage ma vie à sa juste valeur". Therefore, given the linguistic variations and cultural differences from one French-speaking country to another, Cadell et al.'s (2015) Canadian French translation of the PTGI may not be appropriate when used in a European context.

Additionally, despite the fact that Cadell et al.'s results (2015) demonstrated reliability and validity of their PTGI, the authors tested their version on a very small sample. More specifically, their Canadian French-speaking sample was composed of 10 bereaved HIV caregivers and 37 parents caring for a child with a life-limiting illness, giving a total of 47 participants. This sample size may be too small to be truly representative and, thus, insufficient to validate a translated version of the Posttraumatic Growth Inventory. Establishing the psychometric properties of a French PTGI with a larger sample could help avoid misleading results and help reach statistical significance.

The lack of studies that address PTG in French samples is proof that a European French version of the scale is needed. Indeed, without a French version of the PTGI, researchers are currently unable to study posttraumatic growth on a quantitative level in French populations. Only two French studies related to growth exist; however, PTG was either investigated through phone or face-to-face interviews (Lelorain, Bonnaud-Antignac, & Florin, 2011), or through a translated version of the scale

by the authors themselves (Lelorain, Bonnaud-Antignac, Florin, 2010), the latter showing poor fit to Tedeschi and Calhoun's original model (1996). In other words, PTG has either been studied on a qualitative level in France, or with the use of a potentially unreliable translated version of the scale, which makes it harder to compare findings to the majority of other research using quantitative methods and validated tools to study the process of growth.

Lastly, none of the non-English versions of the PTGI have been validated in samples of trauma-exposed professionals, such as firefighters, police, or military personnel. Indeed, samples included caregivers (Cadell et al., 2015), adult children of parents with cancer (Teixeira & Pereira, 2013), university students (Taku et al., 2007), cancer survivors (Ho et al., 2004), stroke patients (Mack et al., 2015), immigrants (Weiss & Berger, 2006), and refugees (Rosner et al., 2003). Tedeschi and Calhoun (1996) suggest that more intense traumatic experiences may catalyze greater positive changes. Thus, validating a French version of the PTGI with emergency workers may provide new and interesting data, as these particular individuals may experience growth on a different or deeper level. Indeed, first responders, particularly firefighters, are exposed to risks likely to cause damage to their physical and psychological health. In fact, they are exposed to what is commonly referred to in the psychological literature as "PTEs" (Potentially Traumatic Events), such as deceased individuals, mutilated bodies, incarcerated people, and burn victims. In addition to being confronted with the stress of the event itself, Firefighters endure high levels of stress caused by their role as "rescuers", e.g., ensuring people's safety (Raphael, 1986). Furthermore, Firefighters have the particularity of intervening in highly dangerous circumstances, such as fires or buildings threatening to collapse. Therefore, it is not surprising that these specific individuals have a significant risk of developing post-traumatic stress (PTSD; Breslau, Davis, Andre Ski, & Peterson, 1991; McFarlane, 1988a, 1988b).

PTSD is a mental health condition triggered by a traumatizing event that was either experienced or witnessed (Crocq et al., 2015). Symptoms are divided into three distinct clusters: (1) re-experiencing of the traumatic event (through nightmares, flashbacks, and intrusive thoughts); (2) avoidance (characterized by the avoidance of trauma reminders); and (3) hyperarousal (characterized by difficulties sleeping and concentrating, irritability, and hypervigilance). PTSD has proven to be positively related to posttraumatic growth in a large number of studies (e.g. Zhou et al., 2018; Roden-Foreman et al., 2018). Thus, we expect PTSD to be positively correlated to the 5 dimensions of the PTGI in this study.

Anxiety and depression, in contrast, should be negatively correlated with the PTGI. Indeed, anxiety, on the one hand, can be defined as a disorder characterized by excessive nervousness, apprehension and worry that can severely affect day-to-day living. Depression, on the other hand, can be defined as a mental illness in which the person experiences intense feelings of unhappiness and despair. Because posttraumatic growth is characterized by the gain of positive psychological benefits, we expected the HADS (Hospital Anxiety and Depression Scale) to be negatively related to the PTGI-F (Holtmaat et al., 2017). This would allow us to test the convergent validity of the scale.

Finally, a core self-evaluation scale was used as a control variable. Indeed, core self-evaluation (CSE) is a stable personality trait that includes a person's evaluations about themselves, their abilities, and their sense of control. More specifically, the CSE concept involves 4 personality dimensions: Self-efficacy, self-esteem, neuroticism, and locus of control. Individuals high in CSE tend to think positively about themselves, while individuals low in CSE tend to view themselves in a more negative light. Because personality can have an important impact on the levels of growth people may or may not experience (see Mattson, James, & Engdahl, 2018), controlling for this variable will help provide a better understanding of the relationship between PTG and PTSD.

2. Method

2.1 Translation of the PTGI: Differences and similarities with Cadell et al.'s French version

We translated Tedeschi and Calhoun's original PTGI (1996) from English to French. The French version was then back-translated into English by a certified translator. The two versions were checked for accuracy and no significant differences were found between the original items and the back-translated items. Table 2 shows Tedeschi and Calhoun's original items, under which were inserted our French translations.

TABLE 2.

Survey items are grouped according to Tedeschi and Calhoun's (1996) different subscales. Our French translations are inserted under each original question.

	Appreciation of life
Q1	I changed my priorities about what is important in life. ***J'ai changé mes priorités par rapport à ce qui est important dans la vie.***
Q2	I have a greater appreciation for the value of my own life. ***J'apprécie davantage ma vie à sa juste valeur.***
Q13	I can better appreciate each day. ***J'arrive davantage à apprécier chaque jour.***
	New possibilities
Q3	I developed new interests. ***J'ai développé de nouveaux centres d'intérêts.***
Q7	I established a new path for my life. ***J'ai donné une nouvelle orientation à ma vie.***
Q11	I am able to do better things with my life. ***Je suis capable de faire de meilleures choses dans ma vie.***
Q14	New opportunities are available which wouldn't have been otherwise. ***De nouvelles opportunités s'offrent à moi, ce qui n'aurait pas été le cas autrement.***
Q17	I am more likely to try to change things which need changing. ***Je suis plus enclin à essayer de changer les choses qui ont besoin d'être changées.***
	Personal strength
Q4	I have a greater feeling of self-reliance. ***J'ai davantage le sentiment de pouvoir compter sur moi-même.***
Q10	I know better that I can handle difficulties. ***Je sais davantage que je peux gérer les difficultés.***
Q12	I am better able to accept the way things work out. ***Je suis davantage capable d'accepter la tournure que prennent les choses.***
Q19	I discovered that I'm stronger than I thought I was. ***J'ai découvert que j'étais plus fort/forte que je ne le pensais.***
	Spiritual change
Q5	I have a better understanding of spiritual matters. ***J'ai une meilleure compréhension de ce qui touche à la spiritualité.***
Q18	I have a stronger religious faith. ***Mes croyances religieuses sont plus fortes.***
	Relating to others
Q6	I more clearly see that I can count on people in times of trouble. ***Je vois plus clairement que je peux compter sur les autres dans les moments difficiles.***
Q8	I have a greater sense of closeness with others. ***J'ai davantage le sentiment d'être proche des autres.***
Q9	I am more willing to express my emotions. ***J'exprime plus volontiers mes émotions.***
Q15	I have more compassion for others. ***J'ai plus de compassion pour les autres.***
Q16	I put more effort into my relationships. ***Je m'investis davantage dans mes relations.***
Q20	I learned a great deal about how wonderful people are. ***J'ai vraiment appris à quel point les gens sont merveilleux.***
Q21	I better accept needing others. ***J'accepte mieux d'avoir besoin des autres.***

2.2 Sample

First, the psychometric structure of the PTGI was tested in a sample of 406 French Firefighters recruited from 14 fire stations in France. The sample included 350 men (86,8%) and 53 women

(13,2%). Participants ranged in age from 18 to 64 (M=37; SD=10,7), while seniority ranged from 1 to 49 years (M=18; SD=10,1).

Then, the convergent validity was tested in a sample of 210 French first responders, comprised of 97 professional Firefighters, 80 volunteer Firefighters, 12 Police officers, 8 Emergency Medical Technicians/Paramedics, 6 Gendarmes (French law-enforcement body), and 7 Military personnel. The sample included 147 men (70%) and 63 women (30%). Participants ranged in age from 15 to 67 (M=30,04; SD =11,4), while seniority ranged from 1 to 40 years (M=9,63; SD =9,8).

2.3 Procedure

Our first sample of 406 French firefighters was used to test the psychometric structure of the PTGI-F. Participants were asked to complete a 15-minute paper survey. Participants first completed a self-report measure designed to screen for potentially traumatic events. This first measure primed participants to think about the various traumatic events they may have encountered during the course of their life. They were then asked to think about the most stressful event they experienced within the framework of their profession, to describe it, and to answer the rest of the questions with respect to that event. Participants then completed the PTGI-F. Finally, they reported demographic information, including gender, age, relationship status, how long they had been working in their professional field, and their rank.

Our second sample of 210 first responders was then used to test the convergent validity of the scale. Participants completed a 15-minute online survey. They first reported demographic information, including gender, age, relationship status, whether they had children, their seniority in their professional field, and in their current position. Participants then completed a self-report measure designed to screen for potentially traumatic events. This first measure primed participants to think about the various traumatic events they may have encountered during the course of their life. They were then asked to think about the most stressful event they experienced within the framework of their profession, to describe it, and to answer the rest of the questions with respect to that event. Participants also reported how long ago the event occurred, and completed measures of post-traumatic stress, post-traumatic growth, anxiety, depression, and core-self evaluations. Means, standard deviations, and reliabilities for individual measures appear in Table 3.

2.4 Measures

The scales used for this study were all validated French translations of the original scales.

Potentially traumatic events were assessed through the *Life Events Checklist for DSM-5* (LEC-5; Weathers et al., 2013). Participants were presented with a list of 17 stressful events, and were asked to indicate whether: (a) it happened to them personally; (b) they witnessed it happen to someone else; (c) they learned about it happening to a close family member or close friend; (d) they were exposed to it as part of their job; (e) they're not sure if it fits; or (f) it doesn't apply to them. Participants were asked to consider their entire life (growing up as well as adulthood) as they went through the list of events.

Post-traumatic stress was assessed using the 17-item *PTSD Checklist for DSM-5* (PCL-C; Blevins et al., 2015). Participants were asked to think about the most stressful event they experienced within the framework of their profession, and to then read each problem listed in the PCL-C and indicate how much they had been bothered by the problem in the past month. Five items assessed Intrusion (e.g., "Repeated, disturbing dreams of the stressful experience"); seven items assessed Avoidance (e.g., "Feeling distant or cut off from other people"); and five items assessed Hyperarousal (e.g., "Feeling irritable or having angry outbursts"). All items were rated on a scale ranging from 1 (*not at all*) to 5 (*extremely*).

Growth was assessed using our French translation of the 21-item *Posttraumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996). Participants were asked to indicate for each statement of the PTGI the degree to which the positive change had occurred in their life as a result of the event they identified earlier. Seven items measured *Relating to Others* (e.g., "I have a greater sense of closeness with others"); five items measured *New Possibilities* (e.g., "I established a new path for my life"); four items measured *Personal Strength* (e.g., "I know better that I can handle difficulties"); two items measured *Spiritual Change* (e.g., "I have a better understanding of spiritual matters"); and three items measured *Appreciation of Life* (e.g., "I have a greater appreciation for the value of my own life"). All items were rated on a scale ranging from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change to a very great degree as a result of my crisis*).

Anxiety and depression were measured using the 14-item Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). The HADS is divided into two 7-item subscales: *Anxiety* (HADS-

A), where items reflect a state of generalized anxiety (e.g., “I feel tense or wound up”); and *Depression* (HADS-D), where items focus on the concept of anhedonia (e.g., “I feel as if I am slowed down”) (Roberts et al., 2001). Respondents rated each item on a 4-point Likert scale ranging from 0 (absence) to 3 (extreme presence). Five of the 14 items are reverse coded.

Core-Self Evaluation was measured using the 12-item Core Self-Evaluation Scale (CSES; Judge et al., 2003). The CSES assesses 4 core self-evaluation traits: (1) *Self-esteem*, or the overall value that one places on oneself as a person (Harter, 1990); (2) *generalized self-efficacy*, or an evaluation of how well one can perform across a variety of situations (Locke, McClear, & Knight, 1996); (3) *neuroticism*, or the tendency to have a negativistic cognitive/explanatory style and to focus on negative aspects of the self (Watson, 2000); and (4) *locus of control*, or beliefs about the causes of events in one’s life (internal vs. external causes; Rotter, 1966). The CSES uses a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

2.5 Data analysis

The psychometric structure of the scale was investigated using confirmatory factor analysis (CFA). CFA was conducted using the maximum likelihood procedure with Amos 18 (SPSS). The objective was to compare the fit of our model with the original version of the Posttraumatic Growth Inventory (Tedeschi & Calhoun, 1996). Various indices were used: the $\chi 2$ value, the ratio of the Chi-square statistic to the degrees of freedom ($\chi 2/df$), the Comparative-Fit-Index (CFI), the Tucker–Lewis Index (TLI) and the root mean square error of approximation (RMSEA). As a rule of thumb, a RMSEA ≤ 0.08 indicates a reasonable fit of the model, while the other fit indices should have a minimum value of 0.90 or higher (Hoyle, 1995). Correlation analyses were then performed to test criterion-related validity.

3. Results

3.1 CFA of the PTGI-F

Based on our sample of 406 firefighters, a five-factor model was tested with Confirmatory

Factor Analysis. By adding three correlations between error terms of items, the fit indices of the model were satisfactory: $\chi2$ (406) = 780.6; $\chi2/df$ = 4.43, RMSEA = 0.07, TLI = 0.90 and CFI = 0.91.

3.2 Internal consistency of the scales

Based on our sample of 210 first responders, the alpha coefficient of the total PTGI-F score was .94. Each of the five factors of the PTGI showed moderate to high internal consistency (α ranging from .61 to .88). Furthermore, the other scales used in this study showed high internal consistency as well, except for the Anxiety and Depression scale (HADS): The alpha coefficients for the post-traumatic stress scale (PCL-C) and the Core-Self Evaluation scale were .91 and .84 respectively, while the alpha coefficient for the Anxiety subscale of the HADS was .53 and .12 for the Depression subscale (see Table 3.). A possible explanation for the low alpha score of the HADS could be the effect of social desirability (van de Mortel, 2008). Indeed, social desirability bias (see Nederhof, 1985) refers to the tendency of participants to give socially desirable responses instead of choosing responses that reflect their true feelings. In a line of work that is associated with dominant masculinity, it is possible to assume that firefighters consider suffering from anxiety and depression as a sign of weakness. Therefore, it is possible to hypothesize that respondents may have under-reported undesirable behavior in order to be viewed favorably by others, which could skew the results.

3.3 Correlates of the PTGI-F

The total PTGI score was positively correlated with the total PCL-C score (r=.33, p<.0001). In other words, post-traumatic growth was positively associated with PTSD, which confirms what was already suggested by a large number of studies (Zhou et al., 2018; Roden-Foreman et al., 2018; Tsai & Pietrzak, 2017). Furthermore, the total PTGI score was significantly correlated with the 3 individual subscales of the PCL-C. In detail, the total PTGI score was positively correlated with the Reexperience subscale (r=.30), the Avoidance subscale (r=.27), and the Arousal subscale (r=.28) of the PCL-C (p<.0001). Additionally, the total PTGI score was negatively correlated with the Anxiety subscale of the HADS (r=-.28, p<.0001), which was expected, as Anxiety and Posttraumatic growth are theoretically different concepts. Indeed, as our score is well below 0.85, results suggest that the two

constructs do not overlap and aren't likely measuring the same thing. Therefore, the convergent validity of the PTGI was verified. Lastly, the PTGI was negatively but significantly correlated to the CSE, which means that individuals who score high on the Core Self and have more positive self-perceptions will experience less growth. A possible explanation could be that individuals who view themselves in a more positive light may cope better with adversity, score lower on post-traumatic stress and, therefore, have less opportunity to develop positive psychological change. Moreover, since studies suggest that personality can have an impact on the levels of growth people experience (Mattson et al., 2018), we tested the influence of the Core Self on the relationship between PTG and PTSD. Linear regressions show that, once the CSE is included in the equation, the strength of the relationship between PTG and PTSD remains the same (β=.33), p<.001). Thus, we can deduce that the personality dimensions described by the CSE do not impact the relationship between stress and growth.

TABLE 3. Means, standard deviations, reliabilities (reported on the diagonal), and correlations of the variables under study

	Means	SD	1	2	3	4	5	6	7	8	9	10
1. Anxiety	12.7	3.0	(.53)									
2. Depression	13.7	2.0	.33**	(.12)								
3. Intrusion	17.5	5.1	.12	.03	(.76)							
4. Avoidance	30.1	6.3	.17*	.01	.39**	(.66)						
5. Hyperarousal	4.1	4.9	-.54**	-.23**	-.19**	-.24**	(.62)					
6. Appreciation of life	7.0	4.5	-.24**	-.11	-.13	-.21**	.26**	(.83)				
7. New possibilities	6.9	6.1	-.35**	-.18**	-.24**	-.24**	.27**	.66**	(.83)			
8. Personal strength	9.1	5.8	-.21**	-.15**	-.19**	-.15**	.26**	.26**	.73**	(.84)		
9. Spiritual change	1.8	2.5	-.19**	-.16**	-.13	-.12	.20**	.20**	.58**	.44**	(.61)	
10. Relating to others	11.0	8.7	-.18**	-.14**	-.20**	-.18**	.22**	.22**	.74**	.66**	.54**	(.88)

Note : * p <.05 ; ** p<.01

4. Conclusion

This study provides a European French version of the Posttraumatic Growth Inventory, which is more suitable for the French-speaking population living in France. Results show good internal consistency of the PTGI-F, as well as each of the five factors of the scale. A five-factor model was tested using Confirmatory Factor Analysis. Results were satisfactory. Thus, overall findings indicate that the European French translation of the PTGI is reliable and valid. Nevertheless, we note that the literature highlights significant differences between the original PTGI (Tedeschi & Calhoun, 1996) and other translated versions. Indeed, the Portuguese, Japanese, Chinese, Spanish, Bosnian, and Hungarian versions of the PTGI fail to replicate the original five-factor model. Since factor loadings

are not the same across cultural groups, it may be necessary that the original scale be revised in future research. Additionally, when looking at the studies that do replicate the original model, we notice the Canadian French version was tested in a sample of only 47 individuals (Cadell et al., 2015). Given that this sample size is insufficient to confirm validation, results should be interpreted cautiously.

Furthermore, Posttraumatic growth was positively correlated with PTSD, and negatively correlated with anxiety, which is consistent with previous studies (e.g., Zhou et al., 2018; Roden-Foreman et al., 2018). Indeed, a majority of research shows that, in order to experience growth, individuals must go through an event that is severe enough to "shake, challenge, or sometimes shatter" the way they perceive the world and their place in it (Tedeschi & Calhoun, 2014, p. 506). Therefore, our study further supports the idea that high levels of traumatic stress may be necessary for individuals to experience the onset of positive change. Nevertheless, it is important to note that the literature suggests that "moderate" levels of PTSD will promote the highest levels of PTG (Manning-Jones et al., 2017; Coroiu et al., 2016; McCaslin et al., 2009; Mols et al., 2009). This may partly explain why anxiety was negatively correlated with growth. Indeed, while PTSD and anxiety have conceptual overlap, research shows that anxiety is one of the factors that hinder the process of PTG (Holtmaat et al., 2017; Casellas-Grau et al., 2017). Thus, it is possible that, as PTSD levels increase, anxiety levels increase as well, which ends up having a counter effect on PTG (Ben-Porat, 2015; Achterhof et al., 2018).

While this study allowed us to highlight some important data, it also had its limitations. Indeed, several participants explained that it was not "one" single event that had strongly impacted them, but that it was rather a series of events that were the most impactful, perhaps through an effect of accumulation. Thus, as our survey forced participants to select one single event, responses may have been biased for some individuals. Additionally, according to certain studies, it appears that the type of health professional used in studies may influence the relationship between traumatic stress and PTG (see Manning-Jones et al., 2017). In other words, the use of mixed samples could cause inaccurate results. As our study used a mix of first responders (firefighters, gendarmes, police officers, paramedics, and military personnel), we must acknowledge that our results may have been impacted by our sample choice. Indeed, while individuals chosen for this study were all first responders who are used to working in emergency settings, their organization, responsibilities, roles, and context of action remain different and may play an important part in the way they experience

events, stress, and growth. Thus, perhaps a similar validation should be conducted among a group of first responders from the same field, with a survey that allows participants to respond according to their general experiences as emergency workers, rather than according to one unique event.

In sum, despite the fact that our five-factor model was satisfactory, the factorial structures that were put forward by other translated versions suggest that either growth is experienced differently among diverse cultural groups, or that the original PTGI may be defective. Given the importance of this tool for clinical practitioners, especially for those working alongside trauma victims and emergency personnel, we believe the Posttraumatic Growth Inventory should be reconsidered and improved to better assess the growth process. Indeed, the PTGI can offer clinicians general guidelines for therapy, as it provides specific areas of growth to work on with their patients. Thus, the more accurate the tool is, the better clinicians will be able to define their therapeutic strategies. Researchers using this instrument should therefore be aware of the complexity of the concept of growth, and perhaps aim to refine the understanding of the cultural aspects of PTG.

Chapter 4

PTSD and PTG in French and American Firefighters: A Comparative Study

In the hope of promoting PTG in the aftermath of trauma, authors have been focusing on identifying the factors that may foster PTG. Despite these attempts, the literature shows inconsistencies in predictors of PTG, making it difficult to truly know which variables may be involved in the process of growth. Indeed, authors seem to disagree on the nature of the relationship between PTG and PTSD, time since the event, social support, intrusive rumination, and sociodemographics. Thus, this study aims to clarify these discrepancies through correlation analysis, and verify whether or not the processes involved are the same across two different cultural groups: A group of 409 American firefighters, and a group of 407 French firefighters. Results indicate that, in both samples, PTG is positively related to PTSD, subjective perception of the event, stress experienced during the event, disruption of core-beliefs, and deliberate rumination; and unrelated to social support, core-self evaluations, type of trauma, and socio-demographic variables. However, time since the event and the number of years on the job only predicted PTG in the American sample, while colleague and emotional support only predicted PTG in the French sample. Additionally, Americans reported more PTG, more social support, more positive self-perceptions (self-esteem, self-efficacy), more intrusive rumination, and more negative affect (neuroticism) than French firefighters. These results suggest that the process of growth, as defined by Tedeschi and Calhoun (2004), is relatively stable among firefighters, but that some differences do exist between cultural groups.

Reference:

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1. Background

People who are repeatedly exposed to traumatic events –firefighters, in particular– have a significant risk of developing post-traumatic stress disorder (Breslau, Davis, Andre Ski, & Peterson, 1991; McFarlane, 1988a, 1988b). In 2015, firefighting was deemed the most stressful profession, due to its unpredictability and negative psychological effects (CareerCast, 2015). Additionally, according to Boffa et al. (2018), studies have found that anywhere between approximately 7% and 30% of firefighters meet the criteria for a current diagnosis of PTSD. Not only do these rates confirm the dangerous nature of firefighting operations, they also further indicate that firefighters risk developing psychological disorders, such as PTSD *(*Beaton, Murphy, Johnson, Pike & Corneil, 1999; Wagner, Heinrichs & Ehlert, 1998; Bryant & Harvey, 1995), substance abuse (Beaton *et al.*, 1999; McFarlane, 1989) and depression (Fullerton, Ursano, & Wang, 2004).

However, the literature linking firefighting to trauma shows some inconsistencies. Indeed, while some studies indicate higher rates of PTSD among firefighters (between 18% and 37%; e.g., Bryant & Harvey, 1995; Wagner *et al.*, 1998; Beaton *et al.*, 1999), others suggest surprisingly lower rates of PTSD (between 5% and 13%; e.g., Haslam & Mallon, 2003; Del Ben, Scotti, Chen, & Fortson, 2006), comparable to those in the general population (6.8% according to the *National Center for PTSD*). While some studies show an increased risk for developing long-term psychological disorders, others suggest high levels of resilience among firefighters and a propensity to heal and recover from hardship (Lee et al., 2014). In fact, while studies suggest that nearly all individuals will experience a traumatic event in their life, their reactions to trauma may greatly differ (Calhoun & Tedeschi, 1999). For some, exposure to a PTE (potentially traumatic event) will trigger the development of pathogenic symptoms, such as symptoms of depression, anxiety and post-traumatic stress (e. g., Meyer, Zimering, Daly, Knight, Kamholz, & Gulliver, 2012). For others, these negative symptoms will give rise to positive psychological benefits. Indeed, for some individuals, the distress that stems from traumatic experiences can be "catalysts" for positive change (i.e., *posttraumatic growth; PTG*). These changes may include “improved relationships, new possibilities for one’s life, a greater appreciation for life, a greater sense of personal strength, and spiritual development” (Tedeschi & Calhoun, 2014, p. 504).

1.1 Relationship between PTSD and PTG

Based on what was previously mentioned, are PTSD and PTG intrinsically related? When looking at the literature, some studies support the positive and significant correlation between these two variables (Zhou et al., 2018; Roden-Foreman et al., 2018; Tsai & Pietrzak, 2017; Vloet et al., 2014; Zeligman et al., 2017; Taku et al., 2018), while others find that PTSD is only correlated to certain domains of growth (e.g. spiritual change; see Lurie-Beck et al., 2008), that there is no correlation whatsoever between the two (Brooks et al., 2017; Mairean, 2016; Wu et al., 2015; Klosky et al., 2014; Bitton, 2014; Salsman et al., 2009; Grubaugh & Resick, 2007), or that PTSD positively predicts PTG in only certain professional groups (e.g. psychologists; Manning-Jones et al., 2017). Furthermore, among the studies that do find a positive association between PTSD and PTG, there are contradictions regarding the nature of the relationship between stress and growth. Indeed, some studies suggest that the trauma must be "seismic" enough (extremely severe) in order to foster growth (Tedeschi & Calhoun, 2004; Schneider et al., 2018; Lowe et al., 2013), while others support the idea that it is "moderate" levels of PTSD that will promote the highest levels of PTG (Manning-Jones et al., 2017; Coroiu et al., 2016; McCaslin et al., 2009; Mols et al., 2009). Indeed, McCaslin et al. (2009) explain that "low levels of distress may be insufficient to stimulate growth, and that an overwhelming amount of distress—at the time of the event and following it—may impede the development of growth following traumatic events" (p. 338). Thus, a majority of the studies support the idea that there is a curvilinear relationship between PTSD and PTG (Ben-Porat, 2015; Achterhof et al., 2018; McLean et al., 2013; Levine et al., 2008; Butler et al., 2005). Additionally, some authors suggest that it is low subjective stress that will most likely predict growth (Mairean, 2016; Dong et al., 2015; Nakayama et al., 2017; Nijdam et al., 2018), which is consistent with Martins da Silva et al.'s study (2011), suggesting that the event does not even necessarily have to be perceived as "traumatic" in order to trigger PTG. Given these conflicting findings, we tested the relationships between (1) PTSD and PTG, (2) the level of distress experienced at the time of the event and PTG, and (3) the subjective perception of the event (was it perceived as "traumatic"?) and PTG, in both of our samples.

1.2 Relationship between time and PTG

The relationship between the time elapsed since the event (Tedeschi & Calhoun, 2014) and PTG also raises a debate. Indeed, while several authors suggest that posttraumatic growth is a process that requires time (Tedeschi & Calhoun, 2014; Helgeson et al., 2006; Danhauer et al., 2013), others show in contrast that the time elapsed since the traumatic event is not predictive of growth in samples of breast cancer survivors and veterans with a major combat-related amputation (Prati & Pietrantoni, 2009; Ávila et al., 2017; Benetato, 2011). However, it is possible to hypothesize that the absence of correlation found in these studies are due to the fact that both types of traumas induce strong *mortality reminders* (Martin et al., 2016), as the body is heavily affected by these particular events (mastectomy and amputation). Indeed, prominent scars or body lesions may induce a permanent sense of vulnerability or a constant reminder of the endured trauma that could impede the growth process (e.g., having an increased perception of personal strength). Furthermore, Pan et al. (2016) show in a sample of bereaved parents who had lost their only child that death by illness was more predictive of PTG than death by accident or suicide. A possible explanation for this could be that illness, in contrast with sudden-death type of events, gives more time for the parents to adjust and get used to the idea that death is a possible outcome. In addition, Taku et al. (2009) show that there is in fact a positive correlation between the time since the event and PTG in an American sample, but that no correlation was found between these two variables in a Japanese sample. Similarly, some studies suggest that PTG may increase over time (Danhauer et al., 2013), while others suggest that PTG decreases (Bachem et al., 2018), or rather is a dynamic process that may take different trajectories (e.g., increase, decrease, or remain stable; Tsai & Pietrzak, 2017; Wang et al., 2014; Marshall et al., 2015). Finally, Wu et al. (2019) suggest in their literature review that shorter time since the traumatic event was predictive of higher levels of growth. Given these major discrepancies, we tested the relationship between time and PTG within our two large firefighter samples to promote statistical accuracy.

1.3 Relationship between social support and PTG

The literature also shows that not all authors agree on the functions of social support that promote PTG. Indeed, while several studies suggest that emotional support predicts higher levels of

growth (Mairean, 2016; Pérez-San-Gregorio et al., 2018; Camen et al., 2016; Cormio et al., 2015), others show that emotional support is in fact not correlated with PTG and that instrumental support (or tangible support) is the only social contextual predictor of growth (Nenova et al., 2013; Cormio et al., 2015; Schroevers & Teo, 2008; Pérez-San-Gregorio et al., 2018). A possible explanation for this could be that excessive levels of emotional support may trigger feelings of incompetency or lack of self-efficacy, both of which are important predictors of PTG (Orkibi & Ram-Vlasov, 2018; Cieslak et al., 2016; Mystakidou et al., 2015; Cieslak et al., 2009; Engelkemeyer & Marwit, 2008). Instrumental support, on the other hand, may signal caring by offering a helping hand for various practicalities (e.g., looking after children or providing food), which may reduce cognitive load for individuals and allow them to focus more on their psychological growth and healing (Semmer et al., 2008). Additionally, besides emotional and instrumental support, Mairean's (2016) study shows that positive social interactions, informational support (Casellas-Grau et al., 2018), tangible support, and affectionate support all correlate positively with posttraumatic growth, but that among these 4 forms of social support, only positive social interactions moderated the effect of traumatic stress on PTG. According to Mairean (2016), three explanations are possible: 1) positive social interactions may represent an opportunity for social disclosure in a secure and positive environment; 2) positive social interactions may allow more frequent disclosure; and 3) positive social interactions may promote the use of more effective coping strategies that promote growth. This third point is supported by Zhou et al.'s (2017) study, showing that social support directly and indirectly fosters growth through positive cognitive reappraisal. Thus, it appears that one of the most valuable aspects of social support may be that it provides the opportunity to process the traumatic event through interaction, meaning that instrumental support alone may not be enough to foster PTG. Indeed, what may actually matter the most is the amount of support that is being provided: While various forms of social support are necessary, excessive support of any kind may have a counter effect of growth.

Despite the contrasting data, it seems clear that social support, regardless of the type, plays an important role in the development of positive psychological change. In order to clarify some of the contradictions in this literature, we tested the relationship between social support and PTG among our firefighters. Four types of social support were measured: Supervisor support, colleague support, emotional support and professional support. Lastly, because Americans live in a more "masculine" culture than the French –meaning in a society where weakness is not tolerated and men are expected to be assertive, competitive, and focused on material success (see Hofstede, 2011), we expected French firefighters to report higher levels of social support.

1.4 Relationship between rumination and PTG

Additionally, the role of intrusive rumination in the development of posttraumatic growth remains uncertain. Indeed, while some authors suggest a positive association between intrusive rumination and PTG (Ramos et al., 2018; Hallam et al., 2014; Soo & Sherman, 2015; Taku et al., 2015; Nightingale et al., 2010; Taku et al., 2008), others find no correlation whatsoever between these two variables (Li et al., 2018), or rather a positive association between intrusive rumination and distress (Morris & Shakespeare-Finch, 2011). Similarly, some studies suggest that written assignments, which lead to rumination, will foster growth (Resick & Calhoun, 2001; Stockton et al., 2014), whereas one study shows that writing sessions increase post-traumatic stress and decrease PTG over time (Gallagher et al., 2018). Additionally, some studies show that intrusive rumination only indirectly promote PTG via deliberate rumination (Zhou & Wu, 2016; Wu et al., 2015; Andrades et al., 2017). Given these inconsistencies, we tested the relationships between PTG and intrusive and deliberate rumination in our firefighter samples. By testing the relationship between these variables in two different groups, we hope to increase our chances of clarifying the existing data. Additionally, we tested whether deliberate rumination could be a mediator of the relationship between PTSD and PTG. We then added another variable to our analysis: disruption of core-beliefs. Indeed, studies suggest that an individual's core-beliefs need to be "severely shaken/shattered" in order to trigger rumination processes and, in turn, elicit the development of growth (Tedeschi & Calhoun, 2004). Thus, we hypothesized that the disruption of core-beliefs could be a mediator (or promoter) of deliberate rumination and, therefore, a mediator of PTG as well.

1.5 Relationship between personality and PTG

Personality also plays an important role in the experience of PTG. Indeed, studies show that personality traits of the Big Five including agreeableness, extraversion, openness (Mattson et al., 2018; Taku & Matthew, 2018), and conscientiousness (Owens, 2016; Karanci et al., 2012) are positively correlated with PTG, with openness being the most predictive of positive psychological change (Mattson et al., 2018). Indeed, given the personality traits associated with penness, e.g., imagination and adventurousness, it is reasonable to hypothesize that individuals high in openness may be more prone to adapt to unexpected life events (Costa & McCrae, 1992). In addition to these

traits, the sense of control individuals feel they have over themselves and their environment strongly impacts PTG as well. Indeed, individuals who feel they have control over themselves or the situation they are facing usually feel more capable of managing problems (Lazarus & Folkman, 1984). Additionally, studies show that self-control (or personal mastery) is, on the one hand, a protective factor against PTSD (Smith et al., 2011), and on the other hand, a key determinant of psychological adjustment after adversity (Dekel et al., 2011; Kaye-Tzadok and Davidson-Arad, 2016). Given the large number of studies that assess the relationship between PTG and the personality traits of the Big Five, we wanted to test the link between growth and a different aspect of personality: Core self-evaluations (CSE), which have not been studied in relation to PTG so far. CSEs are a stable personality trait defined by people's fundamental evaluations about themselves, their abilities and their personal control. Individuals who score high in CSE tend to be confident in their own abilities and have more positive views about themselves, while individuals who score low in CSE lack confidence and view themselves in a more negative light. Thus, we hypothesized that firefighters who scored high in CSE would report lower levels of PTSD and higher levels of PTG than firefighters with lower CSE. Additionally, we hypothesized that participants higher in neuroticism would report lower levels of growth. Lastly, as authors have demonstrated that sense of control (Xiu et al., 2018), self-efficacy, and self-worth (Orkibi & Ram-Vlasov, 2018; Cieslak et al., 2016; Mystakidou et al., 2015; Cieslak et al., 2009; Engelkemeyer & Marwit, 2008) are important predictors of PTG, we expected that locus of control, self-esteem, and self-efficacy positively predict PTG.

1.6 Relationship between sociodemographics and PTG

Lastly, according to several studies, sociodemographic characteristics such as gender, age, and relationship status also play an important role in the onset of posttraumatic growth. Thus, we decided to assess the relationships between these sociodemographic variables and PTG in our firefighter samples. More precisely, we tested the relationship between PTG and gender, age, number of years on the job, rank, relationship status, whether participants had kids or not, and kids' age. We first hypothesized that female firefighters would report higher levels of PTG than male firefighters, as it is often found in the literature that women report higher levels of growth than men, specifically on the "relating to others" dimension (Jin et al., 2014; Nakayama et al., 2017; Sharp et al., 2018; Jeon et al., 2015; Val & Linley, 2006). With regard to the relationship between PTG and age,

studies again show contradictions. Indeed, some studies find that younger people tend to report higher levels of growth than older people (Sharp et al., 2018; Boyle et al., 2017), while others support the idea that older people experience the highest levels of PTG (Ullman, 2014; Grace et al., 2015). However, for firefighters in particular, we hypothesized that older participants may report higher levels of growth, as perhaps the more experience firefighters have, the better they are able to cope with trauma and develop positive psychological change. We then hypothesized that ranking may impact the onset of PTG. Indeed, the higher the rank in the fire department, the higher the levels of responsibility. Therefore, it could be expected that firefighters with higher ranking may experience more severe levels of stress which, in turn, could make them more susceptible to PTSD. We then tested the link between PTG and firefighters' relationship status. We expected these two variables to be strongly related, as the literature shows that supportive relationships are indispensable for individuals' experience of growth in the aftermath of trauma (Mairean, 2016). Lastly, we hypothesized that having children may impact the onset of PTSD and PTG. Indeed, the literature shows that being confronted with sick, injured or dying children may be one of the most stressful events for health and emergency professionals (Mairean, 2016). Thus, by a process of projective identification, we expected stress levels to be worse for firefighters who are also parents. Additionally, we imagined that these types of events would be worse for parents of younger children, as they already tend to be more worried and mindful of their child's well-being and safety.

Thus, given the numerous inconsistencies in the literature, this study aims to (1) offer a better intercultural understanding of post-traumatic stress and growth in first responders, particularly firefighters, and (2) test the robustness of the process of PTG. Indeed, by examining whether the growth process remains the same across different cultures, we demonstrate the reliability and validity of the model. More specifically, we decided to test which variables would affect the onset of PTSD and PTG in two different cultural groups: One American group, and one French group. Based on Hofstede's *dimensional model of culture* (2011), we can define "culture" as the "collective mental programming of the human mind which distinguishes one group of people from another" (2011). Hofstede describes countries based on 6 different dimensions: Masculinity, uncertainty avoidance, indulgence, power distance, individualism, and long-term orientation. These dimensions strongly influence patterns of thinking and behaviors. As Americans score differently than the French on all of these dimensions (Hofstede Insights, n.d.), it is indeed possible to expect some differences between samples of European and North American firefighters. In this study, and in both samples, we test the

strength of the relationship between PTG and PTSD, the time elapsed since the event, social support, sociodemographic characteristics, personality, and rumination, with the hopes of clarifying most of the divergences that were put forward.

2. Method

2.1 Participants

Four hundred and nine American firefighters and 406 French firefighters participated in this study, for a total of 815 participants. American firefighters were recruited in 28 different fire stations in Charlotte, North Carolina. French firefighters were recruited in 14 fire stations in France in the departments of Doubs and Belfort. Female firefighters represented 2,7% of all American participants and 13,2% of all French participants.

In the **American sample**, participants ranged in age from 20 to 59 (M=37; SD=8,4). Two hundred sixty-nine reported having children. Children's ages ranged between 0 (unborn) and 32. Participants' number of years on the job ranged from 1 to 45 years (M=15,3; SD=8,2). Three hundred seven were Probationary Firefighters, Firefighter/Paramedic, or Driver Engineer (responsible for the hands-on actions of fire suppression and search and rescue), 94 were Lieutenant or Captain (responsible for managing operations on the scene of an emergency), and 8 were Battalion Chief, Assistant Chief, or Fire Chief (responsible for the efficient operation of the fire department).

In the **French sample**, participants ranged in age from 18 to 64 (M=37; SD=10,7). Two hundred and seventy reported having children. Children's ages ranged between 0 (unborn) and 33. Participants' number of years on the job ranged from 1 to 49 years (M=18; SD=10,1). 184 were "Hommes du rang" (similar to Probationary Firefighters, Firefighter/Paramedic, or Driver Engineer), 187 were "Sous-officiers" (similar to Lieutenant or Captain), and 29 were "Officiers" (similar to Battalion Chief, Assistant Chief, or Fire Chief).

2.2 Measures

Participants completed a 20-minute paper survey. Participants first completed a self-report measure designed to screen for potentially traumatic events. They were then asked to think about

the most stressful event they experienced within the framework of their profession, to describe it, and to answer the rest of the questions with respect to that event. Participants also reported how long ago the event occurred, and completed measures of post-traumatic stress, disruption of core beliefs, post-traumatic growth, intrusive and deliberate rumination, social support at work, and core-self evaluations. Finally, they reported demographic information.

Potentially traumatic events were screened using the *Life Events Checklist for DSM-5* (LEC-5; Weathers et al., 2013). Participants were presented with a list of 17 stressful events, and were asked to indicate whether: (a) it happened to them personally; (b) they witnessed it happen to someone else; (c) they learned about it happening to a close family member or close friend; (d) they were exposed to it as part of their job; (e) they're not sure if it fits; or (f) it doesn't apply to them. Participants were asked to consider their entire life (growing up as well as adulthood) as they went through the list of events. The LEC-5 is intended to gather information about the potentially traumatic experiences a person has experienced; thus, it does not yield a total score or composite score. This scale was used to prime participants to think about the various stressful events they may have encountered in their life, before asking them to describe the most distressful one they've experienced within the framework of their profession.

Post-traumatic stress was assessed using the 17-item *PTSD Checklist for DSM-5* (PCL-C; Blevins et al., 2015). Participants were asked to think about the most stressful event they experienced within the framework of their profession, and to then read each problem listed in the PCL-C and indicate how much they had been bothered by the problem in the past month (e.g., "Repeated, disturbing dreams of the stressful experience"; "Feeling distant or cut off from other people"; "Feeling irritable or having angry outbursts"). All items were rated on a scale ranging from 1 (*not at all*) to 5 (*extremely*).

Disruption of Core beliefs were measured using the 9-item Core Beliefs Inventory described by Cann and colleagues (2010). The items focus on religious and spiritual beliefs, human nature, relationships with other people, meaning of life, and personal strengths and weaknesses. The instructions indicated that participants should reflect upon the event about which they were reporting and indicate the extent to which it led them to seriously examine each core belief (e.g., "The degrees to which I believe things that happen to people are fair."). Items were rated on a scale from 1 (*not at all*) to 5 (*very much*).

Posttraumatic Growth was assessed using the 25-item *Posttraumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996). Participants were shown 25 statements describing positive change and asked to indicate for each statement the degree to which each had occurred in their life as a result of the stressful event they identified earlier. Seven items measured relating to others (e.g., "I have a greater sense of closeness with others"); five items measured new possibilities (e.g., "I established a new path for my life"); four items measured personal strength (e.g., "I know better that I can handle difficulties"); six items measured spiritual change (e.g., "I have a better understanding of spiritual matters"); and three items measured appreciation of life (e.g., "I have a greater appreciation for the value of my own life"). All items were rated on a scale ranging from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change to a very great degree as a result of my crisis*).

Intrusive and Deliberate Event-related rumination was measured using the 20-item Event-Related Rumination Inventory described by Cann and colleagues (2011). The first 10 items assessed intrusive rumination, and began with the stem "*After an experience like the one you reported, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. Indicate for the following items how often, if at all, you had the experiences described during the weeks immediately after the event.*" (e.g., "Thoughts about the event came to my mind and I could not stop thinking about them"). The 10 following items assessed deliberate rumination, and began with the stem "*After an experience like the one you reported, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated during the weeks immediately after the event.*" (e.g., "I forced myself to deal with my feelings about the event"). All items were rated on a scale from 1 (*not at all*) to 5 (*extremely*). Global rumination scores (both combined) and scores for each specific type of rumination were calculated.

Social support at work was measured using the 8-item Karasek social support scale (Karasek et al., 1981). Four of the items measured social support by the supervisor (e.g., "My supervisor helps me successfully complete my tasks"), while four others measured social support by colleagues (e.g., "The colleagues with whom I work show interest in me"). Among these eight items, four focused on professional support (e.g., "The colleagues with whom I work are professionally skilled"), while four focused on emotional support (e.g., "My supervisor pays attention to what I say"). All items were rated on a scale from 1 (*strongly disagree*) to 4 (*strongly agree*).

Core Self-Evaluation was measured using the 12-item Core-Self Evaluation Scale (CSES; Judge et al., 2003). The CSES assesses 4 core self-evaluation traits: (1) *Self-esteem*, or the overall value that one places on oneself as a person, e.g., "Overall, I am satisfied with myself" (Harter, 1990); (2) *generalized self-efficacy*, or an evaluation of how well one can perform across a variety of situations, e.g., "When I try, I generally succeed" (Locke, McClear, & Knight, 1996); (3) *neuroticism*, or the tendency to have a negativistic cognitive/explanatory style and to focus on negative aspects of the self, e.g., "Sometimes when I fail, I feel worthless" (Watson, 2000); and (4) *locus of control*, or beliefs about the causes of events in one's life, e.g., "I determine what will happen in my life" (internal vs. external causes; Rotter, 1966). The CSES uses a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

3. Results

3.1 Relationship between PTG and the time of the event

In order to test the relationship between time and PTSD within both of our firefighter samples, we calculated bivariate Pearson correlations. Our results indicate that time was unrelated to post-traumatic stress in both groups (r = -.03 for the French and r = .04 for the US; see table 2.). However, time since the event was unrelated to PTG in our French sample (r = .029), but significantly correlated with PTG in our American sample (r = .12, p<.05). Nevertheless, the strength of this positive correlation remained weak (r^2 = 1%).

Table 2: PTSD, PTG, core-beliefs, rumination, social support and core self-evaluations: Correlations analysis in French (*n* = 406, lower values) and American firefighters (*n* = 409, upper values)

	Means	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
17. PTSD	23,69	7,57	1	.35**	.37**	.51**	.52**	.36**	-.10*	-.11*	-.080	-.10*	-.088	-.30**	-.30**	.046	-.40**	-.19**
18. PTG	50,00	21,73	.43**	1	.45**	.43**	.30**	.49**	-.018	.017	-.060	.023	-.064	-.090	-.059	-.002	-.15**	-.044
19. Core-beliefs	17,08	6,73	.46**	.60**	1	.40**	.31**	.40**	-.034	-.024	-.042	-.034	-.034	-.18**	-.19**	.026	-.23**	-.12*
20. Rumination (total)	38,14	14,02	.48**	.56**	.49**	1	.92**	.85**	.032	.018	.040	.040	.019	-.24**	-.22**	.058	-.35**	-.15**
21. Intrusive rumination	19,70	8,77	.50**	.30**	.36**	.90**	1	.57**	.015	-.008	.041	.019	.012	-.26**	-.26**	.048	-.34**	-.17**
22. Deliberate rumination	18,57	7,20	.49**	.55**	.52**	.85**	.54**	1	.029	.027	.017	.038	.011	-.16**	-.13**	.052	-.27**	-.095
23. Social support (total)	23,93	3,60	-.045	.078	.015	.042	.022	.053	1	.92**	.90**	.94**	.94**	.26**	.13**	.23**	.15**	.31**
24. Supervisor support	11,34	2,63	-.063	.037	.010	.018	-.005	.035	.88**	1	.65**	.84**	.88**	.24**	.10**	.20**	.15**	.29**
25. Colleague support	12,60	1,77	.001	.10*	.015	.058	.053	.053	.71**	.30**	1	.87**	.81**	.22**	.12**	.20**	.10**	.27**
26. Emotional support	11,91	1,96	-.037	.10*	.045	.049	.019	.059	.93**	.84**	.64**	1	.87**	.24**	.11**	.21**	.14**	.29**
27. Professional support	12,02	1,90	-.047	.040	-.019	.030	.022	.040	.93**	.80**	.69**	.73**	1	.24**	.12**	.20**	.13**	.30**
28. CSE (total)	42,32	5,66	-.21**	-.070	-.13*	-.21**	-.22**	-.16**	.063	.007	.12*	.028	.089	1	.84**	.57**	.84**	.83**
29. Self-esteem	10,94	1,61	-.17**	-.014	-.074	-.15**	-.17**	-.084	.035	-.016	.092	.021	.044	.80**	1	.39**	.64**	.56**
30. Self-efficacy	11,33	1,52	-.042	.030	.042	-.027	-.020	-.020	.058	.007	.11*	.042	.066	.68**	.51**	1	.19**	.34**
31. Neuroticism	10,18	2,34	.28**	-.20**	-.26**	-.31**	-.28**	-.28**	-.018	-.054	.042	-.041	.008	.81**	.57**	.34**	1	.63**
32. Locus of control	9,90	1,96	-.14**	-.008	-.065	-.13**	-.16**	-.070	.11*	.089	.096	.067	.14**	.75**	.43**	.37**	.44**	1

3.2 Relationship between PTG and PTSD

An independent samples t-Test first revealed that there were no significant differences in PTSD levels between French and American firefighters (t (802) = -1,161; NS). However, there was a significant difference in PTG levels between our two groups (t (773) = -3,77; p<.05). Indeed, it appears that American participants report higher levels of growth than French participants (see all mean comparisons in Table 1.). When looking at the different subscales of the PTGI, other t-Tests showed that Americans specifically score higher on relating to others (t (798) = -4,44; p<.001), spiritual development (t (796) = -5,29; p<.001), appreciation of life (t (804) = -3,59; p<.001), and personal strength (t (806) = -2,58; p<.001). No significant differences were found on the new possibilities subscale of the PTGI (t (804) = -1,05; NS).

Table 1. Comparison of mean scores of PTG, PTSD, social support, core self-evaluations, rumination and core-beliefs between French and American firefighters

	FRANCE	SD	US	SD
PTG	50,00	21,74	**56,86**	28,42
PTSD	23,69	7,57	24,42	10,14
Total social support	23,93	3,59	**28**	3,82
Emotional support	11,91	1,96	14,05	2,06
Professional support	12,02	1,90	13,92	2,02
Colleague support	12,59	1,77	14,30	1,96
Supervisor support	11,34	2,63	13,68	2,24
Core self-evaluations	42,31	5,66	46,77	6,38
Self-esteem	10,94	1,61	**11,88**	1,96
Self-efficacy	11,33	1,52	**11,80**	1,69
Locus of control	9,90	1,96	**11,60**	1,99
Neuroticism	10,18	2,34	**11,51**	2,51
Intrusive rumination	19,70	8,77	**21,53**	11
Deliberate rumination	18,56	7,20	18,33	8,33
Core-beliefs	17,08	6,73	**20,30**	8,20

Results then indicate that the PCL-C (PTSD) and PTGI were positively and significantly related in the French (r = .43, p<.01) and American samples (r = .35, p<.01; see all correlations in Table 2.). In other words, post-traumatic stress was positively associated with growth. Furthermore, the level of stress experienced at the time of the event was positively and significantly related to both PTSD and PTG among French (r = .34, p<.01 and r = .34, p<.01, respectively) and American firefighters (for both, r = .22, p<.01). Thus, the more distressed firefighters felt at the time of the event, the more post-traumatic stress and posttraumatic growth they experienced afterwards. Finally, our data show that the subjective perception of the event (e.g., the individual's personal experience, interpretation, and feelings about the event), was also positively related to PTSD (r = .29, p<.01 in the French sample and

r = .15, p<.01 in the American sample) and posttraumatic growth (r = .25, p<.01 in the French sample and r = .11, p<.01 in the American sample), which means that participants reported higher levels of PTSD and PTG when the event was perceived as “traumatic”.

3.3 Relationship between PTG and Social support

We tested the relationships between PTG and four types of social support using the Karasek Social Support Scale: supervisor support, colleague support, emotional support, and professional support. An independent samples t-test first revealed that there was a significant difference in total scores on the Karasek Scale between our French and American samples (t (804) = -15,53; p<.05). Indeed, French firefighters appear to report lower levels of social support than American firefighters. Similarly, another t-test revealed significant differences in scores on all 4 types of social support measured by the scale. More specifically, French firefighters reported lower levels of supervisor support (t (808) = -13,58; p<.001), colleague support (t (805) = -13,00; p<.001) emotional support (t (805) = -15,14; p<.001), and professional support (t (808) = -13,81; p<.001) than Americans. Furthermore, results indicate that supervisor support and professional support were not correlated with PTG in the French (r = .037; p>.05 and r = .040; p>.05 respectively) and the American sample (r = .017; p>.05 and r = -.0,64, p>.05 respectively). However, colleague support and emotional support were both correlated with PTG in our French sample (for both, r = .10, p<.05), but unrelated to PTG in our American sample (r = -.060, p>.05 and r = .023, p>.05, respectively). Finally, global support (all four types combined) was not significantly correlated with growth in either of our groups (r = .078 for the French and r = -.018 for the US).

3.4 Relationship between PTG and personality (the Core-Self Evaluations scale)

An independent samples t-test first showed that there was a significant difference in CSE scores between French and American firefighters (t (793) = -10.4; p<.05). Indeed, the American sample scored higher on the CSE scale than the French sample. More specifically, the US sample scored higher on all 4 subscales of the CSE: Self-esteem (t (805) = -7,43; p<.001), self-efficacy (t (803) = -4,14; p<.001), neuroticism (t (806) = -7,83; p<.001), and locus of control (t (807) = -12,22; p<.001). Additionally, PTG was unrelated to the CSE total score in both groups (r = -.070; NS in the French

sample; r = -.090; NS in the US sample). However, PTSD was negatively but significantly related to the CSE scale (r = -.22, p<.01 in the French sample; r = -.30, p<.01 in the US sample). In other words, high scores on the CSE were associated with lower levels of PTSD. Lastly, we tested the relationship between PTG and each of the 4 subscales of the CSE scale (Self-esteem, Self-efficacy, Neuroticism, and Locus of control). Analyses show that, in both samples, the only subscale that was negatively but significantly related to PTG was Neuroticism (r = -.20, p<.01 in the French sample and r = -.15, p<.01 in the American sample). All three of the other subscales weren't significantly related to growth (see table 2.).

3.5 Relationship between PTG and Rumination/Core-Beliefs

We first note that no significant differences were found in global rumination scores between French and American firefighters (t (791) = -1.53; NS). However, US firefighters (M = 21.5, SD = 11) scored significantly higher on intrusive rumination than French firefighters (M = 19.7, SD = 8.7; t (796) = -2,60; p<.05). No significant differences were noted on deliberate rumination (t (806) = .42; NS). Results then show that, as expected, rumination was positively and significantly related to PTSD in both groups (r = .56, p<.01 in the French sample; r = .51, p<.01 in the American sample). We also note that both intrusive and deliberate rumination were positively and significantly related to PTG. More specifically, intrusive rumination was positively correlated with PTG at r = .30 in our French sample and r = .29 in our American sample (both p<.01), while deliberate rumination was positively correlated with PTG at r = .55 in our French sample and r = .49 in our American sample (both p<.01).

However, as intrusive and deliberate rumination are significantly related in both groups (r = .55, p<.01 in the French sample; r = .57, p<.01 in the American sample), it is possible to hypothesize that intrusive rumination may mostly promote growth via deliberate rumination, as suggested by previous authors (Andrades et al., 2017). We tested this hypothesis with linear regressions, which indicate that, while intrusive rumination and PTG are positively and significantly related, once deliberate rumination is added into the equation, the effect of intrusive rumination on growth disappears in both the French (β=.007, NS) and the American sample (β=.024, NS). However, the effect of deliberate rumination remained significant in both groups (β(French)=.55, p<.001; β(American)=.47, p<.001). Then, we tested whether the relationship between PTSD and PTG could be mediated by deliberate rumination. Linear regressions show that, once deliberate rumination is

included in the equation, the strength of the relationship between PTSD and PTG decreases significantly (β(French)=.21, p<.001; β(American)=.20, p<.001). Lastly, results indicate that, once core-beliefs are added into the equation, the strength of the relationship between PTSD and PTG remains significant but strongly decreases (β(French)=.18, p<.001; β(American)=.21, p<.001). Additionally, once core-beliefs are added into the equation, the strength of the relationship between PTSD and rumination remains significant but strongly decreases as well (β(French)=.31, p<.001; β(American)=.25, p<.001).

3.6 Relationship between PTG and sociodemographics

An independent samples t-Test first showed that there were no significant differences in PTSD and PTG scores between men and women, in either the French (t (395) = .36; NS; t (381) = .34; NS, respectively) or the American sample (t (402) = .47; NS; t (387) = .49; NS, respectively). Furthermore, another t-test showed that there were no significant differences between men and women on the "Relating to others" subscale of the PTGI, in either the French (t (391) = -.69; p>.05) or the American group (t (402) = .72; p>.05). Next, a bivariate Pearson Correlation showed that age was unrelated to PTSD and PTG, in both French (r = .050 and r = .031, respectively) and American firefighters (r = .040 and r = .083, respectively). Similarly, the number of years on the job was not significantly correlated to PTSD among French (r = .028) and American participants (r = .076). However, analyses show that the number of years on the job was unrelated to PTG in our French sample (r = .049), but positively and significantly related to PTG in our American sample (r = .11; p<.05); which means that the more experience American firefighters had, the more growth they experienced. Additionally, a one-way ANOVA showed that no significant differences were found in PTSD scores between our different rank groups (FR: F (2, 397) = .98; NS; US: F (2, 404) =.10; NS). Rank had no significant impact on PTG scores either (FR: F (2, 383) = 1.04; NS; US: F (2, 389) = 2.32; NS). Similarly, relationship status did not have a significant impact on PTSD and PTG, in either our French (F (5, 397) = .32; NS; F (5, 383) = 1.24; NS, respectively) or American sample (F (5, 403) = .94; NS; F (5, 388) = .46; NS, respectively). Lastly, no significant differences were found in PTSD and PTG scores between firefighters who had children and those who didn't, in either the French (t (384) = .18; NS; t (398) = .63; NS, respectively) or the American group (t (387) = -.33; NS; t (402) = -.34; NS, respectively).

Additionally, kids' age was not significantly correlated with PTSD and PTG, in either French (r = .041; NS and r = .025; NS, respectively) or American firefighters (r = .070; NS and r = -.089; NS, respectively).

4. Conclusion

The aim of this study was to test the robustness of the process of PTG in firefighters from two different cultural groups: One American group, and one French group. Indeed, by testing whether the growth process remains consistent across different cultures, we demonstrate the reliability and validity of the model.

Contrary to the studies suggesting that PTG is significantly linked to the type of event experienced, our results first show that, in both groups, the type of event was not correlated to PTG. In other words, different types of critical incidents do not elicit different levels of posttraumatic growth in our samples. We could hypothesize that the level of stress experienced at the time of the event, rather than the characteristics of the event itself, is truly what will determine firefighters' psychological outcome. Indeed, our results clearly show that, in both groups, the level of stress experienced and the subjective perception of the event are strongly and positively correlated to both PTSD and PTG. Thus, the more distressed firefighters felt at the time of the event, the more post-traumatic stress and growth they experienced afterwards (Lazarus & Folkman, 1984). Indeed, the literature suggests that "significant growth may only occur when it is preceded by, or when it occurs together with significant amounts of subjective distress" (Tedeschi, Park & Calhoun, 1998, p.217). Lastly, as firefighters are confronted with stressful events on a regular basis, it is possible that they may experience some kind of desensitization regarding the different situations they encounter. In other words, whether they're confronted with a traffic accident, suicide, or sexual assault, firefighters may have learned how to manage their stress levels so that their performance will not be impeded. Thus, other more prominent factors may be more determinant of whether firefighters will develop PTSD and PTG.

Our study then showed that post-traumatic stress was positively associated with the development of positive psychological change in the aftermath of trauma, which is consistent with a large number of studies (e.g., Zhou et al., 2018; Vloet et al., 2014; Tsai & Pietrzak, 2017) and confirms

our initial hypothesis. However, we do note that American firefighters scored significantly higher on PTG than French firefighters. More specifically, they scored higher on 4 of the subscales of the PTGI: Spiritual development, relating to others, appreciation of life, and personal strength. These differences could be explained by the fact that US firefighters may be more religious than French firefighters. Indeed, the literature shows that Americans report higher and more stable church attendance than European countries (Hatch, 1989). Thus, our US sample may use religious coping as their primary coping mechanism when facing adversity, which explains their higher score on spiritual development. This is consistent with Matsui and Taku's study (2000) showing that Americans scored higher on this subscale in comparison to the Japanese. Additionally, Pargament et al. (2000) suggest in their study that religious coping could have various positive consequences for individuals in their daily lives, such as giving meaning to negative events, providing a sense of control and comfort during difficult times, fostering social relations through the religious community, and helping individuals make major life changes. Thus, being involved with religion could also explain why Americans scored higher on relating to others, personal strength, and appreciation of life: By being a part of a close-knit community, US firefighters may feel more connected to others. Additionally, by providing a sense of control, religion may help individuals feel more confident in the face of adversity which, consequently, will promote feelings of personal strength. Lastly, as religiosity helps give meaning to life experiences, it may also promote the appreciation of life for what it is, despite its various challenges. Moreover, we note that no significant differences were reported in PTSD scores between French and American firefighters. In other words, despite the fact that both groups reported similar levels of distress, one group still reported higher levels of growth. This observation further emphasizes the fact that PTG is not only determined by stress levels, and that cultural background is an important variable to take into consideration when working with trauma-exposed individuals.

In regards to sociodemographic variables, no significant differences were reported in PTG scores between male and female firefighters, in either of our samples. This finding largely contradicts what the literature has been suggesting for years: That women score higher on PTG than men (Jin et al., 2014; Nakayama et al., 2017; Sharp et al., 2018). We could explain this by referring to firefighters' organizational culture (the pattern of shared values, beliefs, and assumptions considered to be the appropriate way to think and act in a given organization), in which "masculinity" plays a major role. Masculinity can be described as the extent to which individuals are motivated by competition, achievement, heroism, assertiveness, and success, above caring for others and quality of life

(Hofstede, 2011). Given this definition, it is possible to hypothesize that all firefighters, whether male or female, necessarily possess “masculine traits” (as defined by Hofstede), as the very nature of their profession is to accomplish heroic deeds. These traits are reinforced by slogans such as “sauver ou périr” (*save or perish*), “courage et dévouement” (*courage and devotion*), or “brotherhood, dedication, devotion, and service”. Thus, as masculine traits are shared and present among both male and female firefighters, it is understandable that PTG may not be influenced by gender in this specific population. Then, age was not correlated with PTSD or PTG in either of our groups. In other words, whether participants were in their 20’s or their 50’s, they obtained similar scores on each of the scales. A possible explanation could be that, no matter how old they are, firefighters are exposed to the exact same challenges on a regular basis. Thus, young firefighters, in contrast to young civilians, may mature more rapidly and, therefore, report similar levels of stress and–growth than older individuals who have already acquired a large panel of life experiences. Similarly, rank was not correlated to PSTD or PTG in either of our groups. The explanation could be similar to the previous one: Firefighters are confronted with the exact same traumatic scenes, no matter the braid that’s on their uniform. Thus, whether firefighters figure at the top or the bottom of the hierarchical scale, trauma does not discriminate and is above all perceived through individuals’ subjective lens. Additionally, the number of years on the job was not correlated to PTSD in either group, but was however positively and significantly correlated to PTG in the American group only. Similarly, time since the event and PTG were only related in the American group as well. Thus, it seems that US firefighters may cognitively process traumatic events over time, while the processing of these events may depend on other variables for French firefighters. Lastly, we expected parents, especially parents of young children, to experience more stress and growth, perhaps because they’d be more prone to identifying with situations that involved children, as these were recognized as the most stressful for firefighters (Mairean, 2016). However, having children, no matter their age, was unrelated to PTG in both groups. A possible hypothesis for this could be that firefighters may quickly acquire the capacity to separate their personal life from their professional one. Indeed, by letting themselves be too affected by the emergency calls they respond to, it would be impossible for them to keep working efficiently in the fire department. We could further hypothesize that the uniform plays a major role in this ability: By putting it on as soon as they enter the fire house and taking it off as soon as they leave, firefighters may use their uniform as a way to mark the barrier between the inside and the outside.

In regards to personality, results show that American firefighters scored higher on the Core self-evaluations scale than French firefighters. More precisely, Americans scored higher on self-esteem, self-efficacy, and locus of control; which means that Americans tend to view themselves as having more personal value, being able to perform well in a variety of situations, and having more control over their environment than the French. The reason why Americans score higher on the locus of control subscale could be explained by referring to the "uncertainty avoidance" dimension of Hofstede's *dimensional model of culture*. Indeed, Hofstede defines uncertainty avoidance as the extent to which an individual feels the need to control their environment. According to the author, Americans score lower on uncertainty avoidance than the French, which means that Americans do not feel the need to "control" their environment as much and may be more open to change and innovation. Thus, by not having this need, Americans may not feel like their environment is as "uncontrollable" as the French, which could give them the impression they exercise more control over it. Additionally, the reason why Americans score higher on self-esteem and self-efficacy could be explained by referring to Hofstede's "indulgence" dimension. Countries with a high indulgence score usually allow and encourage free gratification of people's drives and emotions, while countries with a low indulgence score put more emphasis on suppressing gratification and imposing stricter social norms that regulate people's behaviors. As the French score lower than the Americans on indulgence, we could hypothesize that, by living in a more restrictive society, French firefighters may have less room for feelings of self-fulfillment and personal achievement which, consequently, could result in less self-esteem and self-efficacy. Lastly, and inconsistently with these results, Americans also scored higher on the neuroticism subscale of the CSE, which represents the tendency to experience negative emotions such as anger, depression, anxiety, and helplessness. Thus, while American firefighters view themselves more positively than the French, they also struggle with more negative affect. A possible explanation could be that, as explained by Hofstede, countries who score high on uncertainty avoidance (such as France) allow for more emotional outbursts and expressions of anger than countries who score low on this dimension. Thus, we could hypothesize that, as the French may express these negative feelings more often, they are able to vent and externalize more of their inner struggles than Americans. Then, statistical analysis showed that the Core self-evaluations scale was negatively but significantly related to PTSD in both the French and the American sample, which means that having positive views about oneself constitutes a protective factor against post-traumatic stress. Additionally, results also revealed that total scores on the CSE were unrelated to PTG. However, when looking at the different subscales of the CSE, neuroticism was

significantly correlated to growth and predicted lower levels of PTG in both samples. The other 3 subscales of the CSE were unrelated to PTG, which contradicts the literature suggesting that the sense of control, general self-efficacy, and self-worth are predictors of growth. Finally, despite the fact that Americans score higher on neuroticism, they also report higher levels of growth than the French, which contradicts our initial hypothesis. Thus, our results suggest that personality may not be predictive of PTG in all populations, and that other more prominent variables may come into play in firefighters' experiences of growth.

Our results show that there were no significant differences in total rumination scores between French and American firefighters; however, Americans scored slightly higher on intrusive rumination. A possible explanation could be that, since French culture allows for more expressions of unpleasant feelings (see Hofstede's dimension of "uncertainty avoidance"), French firefighters may have the opportunity to vent negative emotions more frequently, which may reduce the appearance of intrusive thoughts. Then, analysis showed that deliberate rumination was strongly correlated to PTG in both samples, and that, once deliberate rumination was added into the equation, the strength of the relationship between PTG and PTSD decreased significantly. Thus, while PTG is partly explained by PTSD, deliberate rumination plays a strong role in the development of positive psychological change, making deliberate rumination a partial mediator of growth. Additionally, analysis showed that core-beliefs partially mediated the relationship between (1) PTSD and deliberate rumination, and (2) PTSD and PTG. Thus, while PTSD and PTG are strongly related, it becomes obvious that the cognitive processes that follow PTSD (disruption of core-beliefs & rumination) are essential for growth to occur. Lastly, intrusive rumination was only associated to growth when deliberate rumination was included in the equation. Thus, contrarily to what the literature might suggest, intrusive rumination may only promote the development of growth by encouraging individuals to think deliberately about their traumatic event.

Lastly, despite the fact that nearly all studies show that social support plays a major role on stress and growth in the aftermath of trauma, it appears that global social support (all 4 subscales combined) does not predict PTG in firefighters, regardless of cultural background. However, the "colleague support" and "emotional support" subscales of the Karasek scale were positively correlated to PTG in the French sample, but completely unrelated to PTG in the American sample. This could be explained by referring once more to Hofstede's "uncertainty avoidance" dimension: As stated previously, since the French express negative emotions more often, they may benefit more

from the emotional support of their colleagues. However, we do note that this correlation was weak and only existent in one of our groups. A possible explanation could be the harmful effects of "toxic masculinity", in other words, the set of standards our society holds for men, combined with the standards firefighters set for themselves as "soldats du feu" (in English, "fire soldiers"). Indeed, men, and firefighters in particular, are expected to be strong, unafraid, and to have no feelings. These expectations are further accentuated by the famous mottos firefighters live by, such as "Courage et dévouement" (*Courage and dedication*) and "Sauver ou périr" (*Save or perish*). These unrealistic expectations inevitably shape firefighters' behaviors, especially towards help or support seeking. Thus, the lack of relationship between global social support and PTG in our samples could be explained by the fact that this professional field does not encourage firefighters (men and women) to seek for help and support. This hypothesis is further confirmed by the lack of correlation between relationship status and PTG. Indeed, whether participants were in a romantic relationship, divorced, single, or widowed, they showed similar levels of PTSD and PTG, which suggests that having a partner that could provide social support does not influence growth. Therefore, firefighters may turn to other coping strategies when facing adversity. However, if social support were to be encouraged, it seems that peer support and emotional support would be the most predictive of growth among firefighters, as suggested by the positive association between these forms of support and growth in the French sample. Lastly, analysis showed that French firefighters reported significantly lower levels of social support than American firefighters on all 4 subscales of the Karasek support scale (emotional support, professional support, colleague support, supervisor support). This contradicts our initial hypothesis, as we expected US firefighters to seek less for help given their higher score on Hofstede's "masculinity" dimension. A possible explanation could be that, since Americans are used to evolving in a society where weaknesses are suppressed among men, they may not perceive the absence of social support as strongly as French firefighters. Indeed, we could hypothesize that individuals perceive the lack of social support when they actually expect to receive it. Another hypothesis could be that Americans may utilize other forms of social support than the ones that were assessed in this study. In sum, our data suggests that the way social support is perceived and utilized may greatly depend on cultural background.

All in all, despite obvious cultural differences between French and Americans, it seems that the processes that illicit the development of growth remain relatively stable among firefighter populations. Therefore, this means that PTG is a robust concept that stays consistent and valid among

individuals, regardless of their cultural background. Indeed, in both groups, PTG was significantly predicted by PTSD, stress experienced during the event, subjective perceptions of the event, deliberate rumination, and the disruption of core-beliefs. This largely confirms Tedeschi and Calhoun's theory (2004) stating that, in order to experience growth, individuals must feel like their world has been severely challenged, and must cognitively engage to make sense of the event. However, some differences were reported: Time since the event and the number of years on the job only predicted PTG in the American sample, while colleague support and emotional support only predicted PTG in the French sample. Additionally, American firefighters reported more posttraumatic growth, more social support, more positive self-perceptions (self-esteem, self-efficacy), more intrusive rumination, and more negative affect (neuroticism) than French firefighters. These findings can strongly benefit the field of psychology, as they offer a better understanding of the similarities and divergences that exist among firefighter populations, depending on their country of residence. Additionally, this study clarified some of the major contradictions that were identified in the literature (e.g., the role of intrusive rumination). We hope this new data helps future research and offers new tools for clinical practitioners, especially those working alongside trauma victims and emergency personnel.

Chapter 5

PTSD and PTG in French and American Firefighters: Results of a 1-year longitudinal study

The aim of this longitudinal study was to test whether PTG at T2 is predicted by PTSD levels, rumination (intrusive and deliberate), and core-beliefs reported at T1, in two groups of firefighters. Results indicate that, in both French and American firefighters, PTSD, total rumination scores (intrusive + deliberate), and the disruption of core-beliefs at T1 significantly predicted PTG at T2. However, when looking at each type of rumination separately, it appears that deliberate rumination at T1 predicted PTG at T2, but that intrusive rumination at T1 did not. Finally, Structural Equation Modeling (SEM) shows that intrusive rumination is in fact indirectly correlated to PTG via deliberate rumination. All in all, despite the fact that there are important cultural differences between French and Americans (see Hofstede's *dimensional model of culture*, 2011), our longitudinal and comparative study shows that PTG is a stable process in individuals, regardless of their cultural background.

Reference:

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1. Background

Firefighters are exposed to stressful events on a regular basis, making them susceptible to developing post-traumatic stress (PTSD) and/or posttraumatic growth (PTG). Indeed, when confronted with a stressful or traumatizing event, individuals' reactions may greatly differ: Some may be more prone to developing pathogenic symptoms such as intrusive thoughts, hypervigilance or avoidance (PTSD), while others may be more inclined to developing positive psychological changes (PTG). These positive changes may include "improved relationships, new possibilities for one's life, a greater appreciation for life, a greater sense of personal strength, and spiritual development" (Tedeschi & Calhoun, 2014, p. 504). Thus, understanding the factors that may help promote the onset of growth in trauma patients, and particularly in individuals who are repeatedly exposed to stressful events such as firefighters, would strongly benefit clinical practice.

When examining the literature, it appears that the onset of posttraumatic growth is strongly linked to several variables, one of them being post-traumatic stress (PTSD). Indeed, Tedeschi and Calhoun (2004), the pioneers of the concept of growth, explain that, if the event wasn't distressful and "seismic" enough for the individual, then nothing would justify the onset of positive psychological changes. Indeed, according to the authors, psychological changes necessarily "stem" from the disturbance of a person's cognitive schemas, which can only be provoked by intense levels of distress. This disturbance refers to the disruption of core-beliefs.

Core-beliefs can be defined as "the general set of beliefs a person has about the universe, how it works, and the individual's place in it" (Janoff-Bulman, 2006; p.16). In the aftermath of a traumatic event, people's core-beliefs may be "shattered" and, consequently, their vision of themselves and the world they live in might be challenged. Their environment may suddenly feel unsafe and unpredictable. In order to reduce the amount of distress that was triggered by the traumatic event, individuals then tend to engage in a process of reassessment of the world and reconstruction of their cognitive schemas. This cognitive processing is mostly enabled by rumination processes.

Indeed, according to a majority of the studies, rumination is a key determinant of growth, as it represents the individual's attempt to give meaning to the stressful event they experienced. Rumination encompasses two types of repetitive thinking: (1) intrusive rumination, and (2) deliberate rumination. Typically, intrusive rumination is often associated with post-traumatic stress (Cann et al., 2010), as it involves unwanted and uncontrollable thoughts and images about the stressful event, while deliberate rumination is more often associated with growth (Ting et al., 2018), as it involves deliberate and intentional thoughts about the event with the aim of making sense of what happened and reestablishing core-beliefs. This reestablishment may then facilitate the perception of positive psychological changes.

Despite what was previously mentioned, we notice some important inconsistencies with Tedeschi and Calhoun's model of PTG and, more particularly, in regards to the variables that may or may not promote growth. Indeed, while a majority of the research supports the positive and significant relation between PTSD and PTG (Zhou et al., 2018), some authors find that PTSD is only correlated to certain domains of growth (e.g., spiritual change; see Lurie-Beck et al., 2008), that there is no correlation between the two (Brooks et al., 2017), or that PTSD is only associated to PTG in certain professional groups (e.g., psychologists; Manning-Jones et al., 2017). The same inconsistencies appear in the few longitudinal studies that do exist on PTG: While several authors show that PTSD at T1 predicts higher PTG at T2 (Holgersen et al., 2010; Dekel et al., 2012; Lowe et al., 2013), others find that PTSD does not predict PTG whatsoever (Salsman et al., 2009; Chen et al., 2015). Furthermore, among the research that does find a positive correlation between post-traumatic stress and PTG, there are disagreements regarding the nature of the relationship between stress and growth. Indeed, some studies show that the trauma must be extremely severe in order to foster PTG (Tedeschi & Calhoun, 2004; Schneider et al., 2018; Lowe et al., 2013), while others suggest that it is "moderate" levels of PTSD that will foster the highest levels of growth (Manning-Jones et al., 2017; Coroiu et al., 2016; McCaslin et al., 2009; Mols et al., 2009). Lastly, McCaslin et al. (2009) explain that "low levels of distress may be insufficient to stimulate growth, and that an overwhelming amount of distress—at the time of the event and following it—may impede the development of growth following traumatic events" (p. 338). Therefore, part of the existing data supports the idea that there might be a curvilinear relationship between PTSD and PTG (Ben-Porat, 2015; Achterhof et al., 2018; McLean et al., 2013).

Additionally, the role of intrusive rumination in the development of PTG remains unsure. Indeed, as mentioned previously, intrusive thoughts are generally only associated with post-traumatic stress (Morris & Shakespeare-Finch, 2011), as they represent one of the three symptom clusters of the disorder. However, some authors suggest a positive link between intrusive rumination and growth (Ramos et al., 2018; Danhauer et al., 2013). Furthermore, some studies show that intrusive rumination will only indirectly promote PTG via deliberate rumination (Zhou & Wu, 2016; Wu et al., 2015; Andrades et al., 2017). Indeed, some authors hypothesize that intrusive thoughts will cause enough distress to encourage/spur individuals to start thinking deliberately about the event, in an attempt to giving it some meaning.

Given these inconsistencies, further studies are needed to better understand the predictors of posttraumatic growth. Considering their high rate of exposure to stressful events, firefighters are an ideal group of study for this purpose. More precisely, we decided to conduct a longitudinal study with two firefighter samples, one French and one American, the purpose of this comparison being to test the robustness of the process of PTG. Indeed, if the growth process remains stable regardless of cultural background, then posttraumatic growth will appear as a reliable model, contrarily to what certain studies suggest (Taku et al., 2009). More specifically, in this study, we test the strength of the relationship between (1) PTSD at T1 and PTG at T2, (2) rumination (total score, intrusive and deliberate) at T1 and PTG at T2, and (3) core-beliefs at T1 and PTG at T2, in both samples. Furthermore, we test whether the relationship between deliberate rumination at T1 and PTG at T2 could be mediated by intrusive rumination at T1. Lastly, we hypothesize that the existing research may have shown contradictions due to the fact that they may not have controlled for or asked participants about any other impactful events they may have experienced during the time laps between their first and second data collection. Indeed, experiencing another distressing event since T1 could interfere with the posttraumatic growth reported by individuals at T2. Thus, in this study, we control for this variable to optimize our chances of getting relevant results.

2. Method

2.1 Participants

Out of the four hundred and nine American firefighters that answered our T1 survey, eighty-six (21%) answered our T2 survey for this longitudinal study, and out of the four hundred and six French firefighters who participated at T1, one hundred and ten (27%) answered our T2 survey, for a total of one hundred and ninety-six participants.

2.2 Measures

Participants were asked to complete a 15-minute paper survey. They were asked whether they had experienced a distressing event since completing the first survey for this study and to describe it, date it, and report how distressing it was and whether they considered it a "traumatic event". Afterwards, participants were asked to recall the event they had described during T1 and, if they didn't remember it, to think once again about the most stressful event they experienced within the framework of their profession, to describe it, date it, report how distressing it was and whether they considered it a "traumatic event", and to answer the rest of the questions with respect to that event. Participants then completed the Posttraumatic Growth Inventory.

Growth was assessed using the 25-item *Posttraumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996). Participants were asked to indicate for each statement of the PTGI the degree to which the positive change had occurred in their life as a result of the event they identified earlier. Seven items measured *Relating to Others* (e.g., "I have a greater sense of closeness with others"); five items measured *New Possibilities* (e.g., "I established a new path for my life"); four items measured *Personal Strength* (e.g., "I know better that I can handle difficulties"); six items measured *Spiritual Change* (e.g., "I have a better understanding of spiritual matters"); and three items measured *Appreciation of Life* (e.g., "I have a greater appreciation for the value of my own life"). All items were rated on a scale ranging from 0 (*I did not experience this change as a result of my crisis*) to 5 (*I experienced this change to a very great degree as a result of my crisis*).

Post-traumatic stress was assessed using the 17-item *PTSD Checklist for DSM-5* (PCL-C; Blevins et al., 2015). Participants were asked to think about the most stressful event they experienced within the framework of their profession, and to then read each problem listed in the PCL-C and indicate how

much they had been bothered by the problem in the past month. Five items assessed Intrusion (e.g., “Repeated, disturbing dreams of the stressful experience”); seven items assessed Avoidance (e.g., “Feeling distant or cut off from other people”); and five items assessed Hyperarousal (e.g., “Feeling irritable or having angry outbursts”). All items were rated on a scale ranging from 1 (*not at all*) to 5 (*extremely*).

3. Results

3.1 Link between PTSD and PTG

Results first indicate that the PCL-C (PTSD Checklist) at T1 and the PTGI at T2 were positively and significantly related in the French sample ($r = .30$, $p<.001$). However, the latter was not validated in the American sample, but we note a trend that supports our initial hypothesis, as results were not far from reaching statistical significance ($r = .19$, $p<.07$). Thus, we can deduce that there is a general tendency for PTSD at T1 to positively predict PTG at T2.

3.2 Link between rumination and PTG

Results then show that total rumination scores at T1 were positively and significantly related to PTG scores at T2 in the French ($r = .22$, $p<.02$) and the American sample ($r = .22$, $p<.04$). Additionally, deliberate rumination at T1 significantly predicted PTG at T2 among both French ($r = .28$, $p<.003$) and American firefighters ($r = .26$, $p<.02$). However, intrusive rumination at T1 was not related to PTG at T2 in either the French ($r = .13$) or the American group ($r = .14$). Thus, only total rumination scores and deliberate rumination at T1 positively predict growth at T2.

3.3 Link between core-beliefs and PTG

Correlation analysis then show that core-beliefs at T1 were significantly related to PTG at T2 in both the French ($r = .41$, $p<.001$) and the American group ($r = .24$, $p<.029$). In other words, the more the event disrupted participants’ core-beliefs at T1, the more growth they experienced at T2.

3.4 The mediating role of intrusive rumination

Through mediation analysis, results indicate that intrusive rumination at T1 mediates the relationship between deliberate rumination at T1 and PTG at T2 in the French (RMSEA = .08, TLI = .90, and CFI = .90) and the American sample (RMSEA = .09, TLI = .90, and CFI = .91), as the fit indices of the model were satisfactory. Thus, in both groups, intrusive rumination indirectly promotes growth through deliberate rumination.

4. Discussion

While our first cross-sectional study allowed for a better understanding of posttraumatic growth, the purpose of this longitudinal study was to test the robustness of the process of PTG in two culturally different groups: A group of French firefighters, and a group of American firefighters.

Results first show that PTSD and core-beliefs at T1 significantly predicted PTG at T2 in both samples. Thus, our study shows that, the more distressed firefighters felt and the more disrupted their core-beliefs were during T1, the more posttraumatic growth they reported at T2. This confirms the data from eight previous longitudinal studies showing that the challenge of core beliefs and high levels of PTSD strongly promote growth (Su & Chen, 2015; Ramos et al., 2018; Roden-Foreman et al., 2018; Vloet et al., 2014; Tsai & Pietrzak, 2017; Boehm-Tabib, 2016; Tsai et al., 2016; Sawyer et al., 2012), and contradicts the research suggesting that PTG can be found in both PTSD and non-PTSD individuals (Dekel et al., 2011).

Additionally, total rumination scores and deliberate rumination at T1 significantly predicted PTG at T2 in both groups, which confirms the data from two previous longitudinal studies (Su & Chen, 2015; Palacio-González et al., 2017). However, intrusive rumination at T1 was not predictive of growth at T2 in either group, but mediation analysis showed that intrusive rumination at T1 was a mediator of the relationship between deliberate rumination at T1 and PTG at T2, among both French and American firefighters. Thus, it appears that intrusive rumination only promotes the development of growth by eliciting deliberate rumination, which supports the results of a previous longitudinal study (Zhou & Wu, 2016).

5. Limitations and conclusion

Despite our best efforts, this study had a significant rate of dropouts since T1 and both sample sizes decreased significantly. Indeed, keeping our participants invested in this project after a 1-year period was difficult, especially since T2 data collection occurred during the COVID-19 pandemic, and was done online via a link we sent them individually. In contrast, our T1 survey was filled out on paper, in groups, and with our presence, which allowed us to explain the project and answer any questions participants might have. Thus, our statistical analyses could have been impacted by the loss of follow-up data. Additionally, as surveys were filled out individually and remotely, participants could have put in less effort and intention in the completion of their survey. Therefore, some answers may not have reflected exactly how participants felt.

Nevertheless, our study has brought to light valuable results: Posttraumatic growth is a robust and stable process that is independent from cultural background, as data appeared to be similar in both our French and American samples. This observation can be truly beneficial for clinical practitioners working alongside trauma victims and emergency personnel, as it implies that methods for enhancing PTG could be applied to individuals coming from different cultures. Additionally, while this study shows that intrusive rumination can promote growth via deliberate rumination, we believe intrusive rumination could be used as a tool by clinicians to induce deliberate rumination processes in their patients suffering from PTSD. Indeed, focusing on ways of taking advantage of this negative and pathogenic symptom, and transforming it into a constructive train of thought could be one of the most efficient means of helping patients reach personal growth. To conclude, we hope this new data helps future research and encourages therapists to not only focus on the reduction of PTSD symptoms, but to also realize the importance of PTG in overcoming trauma.

1. Objectives of this thesis

Despite the fact that post-traumatic stress has been the focal point of researchers for decades, posttraumatic growth has gained significance in the field of psychology over the last twenty years. Indeed, observation and studies have taught us that negative symptoms weren't the only possible outcome in the aftermath of trauma, but that individuals could also experience positive psychological changes. This finding is incredibly valuable as it gives new perspectives to therapy, especially for clinicians working alongside trauma victims.

However, quite surprisingly, very few studies have taken an interest in emergency workers' PTG, despite the fact that they are the most exposed to stressful and traumatizing events in the framework of their profession. For this reason, one of the goals of this thesis was to further explore the process of growth in a particular group of individuals: Firefighters. Indeed, as firefighters are exposed to stress regularly, we wondered whether trauma and growth were experienced the same way as individuals who are confronted with these types of events much less frequently, maybe once in a lifetime.

Additionally, as mentioned previously, posttraumatic growth has been an understudied concept in France, due to the prominence of the concept of resilience introduced by Boris Cyrulnik in the 1990's. As PTSD is a complex condition for clinical practitioners, promoting the concept of growth in French literature could offer new tools and ways of approaching treatment (Magne, Jaafari, Voyer, 2020). Thus, the second goal of this thesis was to increase awareness about PTG, and support its importance when dealing with traumatized individuals.

The willingness to help PTG gain momentum in France lead to a more specific and concrete objective: Validating a European French version of the *Posttraumatic Growth Inventory* (the PTGI; Tedeschi & Calhoun, 2004). Indeed, we quickly noticed that the original PTGI had been translated and validated in a variety of languages, including Chinese, Japanese, Spanish, Bosnian, German, Portuguese, Hebrew, etc. However, the only existing French version was validated in Canada (Cadell et al., 2015), by and with individuals who speak Canadian French, in a sample that is too small to be truly representative and, thus, insufficient to validate a translated version of the Posttraumatic

Growth Inventory. Using this tool in France could pose linguistic challenges, as Canadian French and European French are significantly different (see Meney, 1994). Thus, another objective for this thesis was to provide a European French version of the PTGI that researchers could use to expand studies on growth in France.

Next, a brief overview of the existing literature on growth indicated that data on PTG was not totally and universally supported by all studies. Indeed, we noticed some important discrepancies between researcher's findings, which made us question whether posttraumatic growth was a stable process in individuals, regardless of their personal characteristics and cultural backgrounds. Thus, another objective for this thesis was to try to clarify some of these contradictions through the elaboration and conduction of a comparative study between two groups of individuals coming from different cultures: A group of French firefighters, and a group of American firefighters. Additionally, data showed that a huge majority of the existing data stemmed for cross-sectional studies, and that very few were longitudinal. Consequently, we also aimed to study the PTG process longitudinally among our two groups, in order to provide the most adequate and pertinent results possible.

2. Discussion of results

One of the main contributions of this thesis is that it offers a better comprehension of the process of posttraumatic growth in a specific group of individuals frequently exposed to traumatizing events: Firefighters. Indeed, while our study showed that PTSD, rumination, and the disruption of core-beliefs significantly predicted PTG –which coincides with Tedeschi and Calhoun's original model, we were confronted to some more surprising and conflicting results. Indeed, global social support was not significantly related to growth in either of our groups, which clashes with a majority of the studies that strongly support the idea that positive psychological changes can only be reached through personal disclosure to a supportive network (Tedeschi & Calhoun, 2004).

Thus, as firefighters evolve in a very specific environment, we could hypothesize that they may benefit from other resources that the general population may not have access to. More specifically, one of the main characteristics that firefighters have is group cohesion. Indeed, firefighters do not face traumatizing events alone, but rather as a team, which may influence their experience of stress: The group may exert a moderating effect that reduces negative repercussions

of stressful events. In other words, group cohesion may provide a sense of confidence that helps these individuals respond to stressful events more adequately, contrarily to individuals who are faced with trauma alone.

Thus, perhaps social support is not significantly linked to PTG in firefighters because the strength of the group is already what constitutes their main (and perhaps unconscious) form of psychological support. Individuals who do not benefit from the strength of such a group may be more in need and inclined to seek support, which could explain why a majority of studies find a positive association between PTG and disclosure to a supportive social environment. Therefore, the saying "unity is strength" may be truer than originally thought, especially in the face of adversity. In sum, while our longitudinal and comparative study did not allow us to put forward any differences in the process of growth between our two cultural groups (France VS USA), it did allow us to highlight differences between emergency personnel and the general population.

This last point brings us to the second main contribution of this thesis: Our study shows that PTG is a stable and reliable process in individuals, regardless of their cultural background. Indeed, based on Hofstede's *dimensional model of culture* (2011), we expected to find major differences between our French and American samples. However, results showed that all variables from Tedeschi and Calhoun's model (2004) (i.e., perceiving the event as traumatic, having one's core-beliefs shattered, and cognitively engaging via rumination to make sense of the event) apart from social support, were all significantly predictive of posttraumatic growth, in both of our samples. Thus, our study validated PTG's original model, which has not always been the case in other research. Therefore, why do other studies suggest that there might be cultural differences in the experience of growth?

It is possible to hypothesize that PTG may indeed be experienced differently by people that come from different cultures, but that the world of firefighting constitutes a culture of its own, which gives a strong common ground to all firefighters of the world regardless of their country. More specifically, as firefighters have to live up to the same demands and obligations, take similar risks, and evolve in identical environments (e.g., predominantly masculine, cohesive, stressful, structured by hierarchy, etc.), there could be a common organizational culture between firefighters. Organizational culture can be defined as the set of beliefs, assumptions, values, attitudes, and ways of interacting that characterize and contribute to the unique social and psychological environment of an organization. This organizational culture may be so strongly and universally shared by

individuals who work in the field of firefighting, that it could possibly explain why no differences were found between French and American firefighters in our study. Thus, perhaps growth is experienced differently in people that come from different cultures, but that these differences simply go unnoticed between our two samples since participants share the cultural norms of their profession.

This brings us to the last point of our discussion: The *Posttraumatic Growth Inventory*. When validating our European French version of the PTGI, we noticed that versions in other languages had a hard time replicating Tedeschi and Calhoun's original scale. Indeed, researchers either had to reorganize item distribution or create new dimensions to have a valid tool to measure growth in their language. Despite the fact that we managed to replicate the original factorial structure of the scale, we cannot ignore the fact that the PTGI seems to pose cultural issues and may not be universally applicable as it is. Indeed, as stated in our introduction, trauma is experienced differently from one culture to the next (Fava & Ruini, 2014), which means that so might posttraumatic growth. Thus, while the PTGI aims to group and assess all of the potential positive psychological changes individuals might experience in the aftermath of trauma, perhaps these changes are not pertinent in some countries, or that some cultures would have other positive changes to add to Tedeschi and Calhoun's list of possibilities.

For instance, while the original scale lists "spiritual" growth as one of the possible positive psychological changes that may arise from trauma, we know for a fact that some cultures are more spiritual and religious than others. Using our samples as an example, data shows that the United States are much more religious, as the country identifies 70.6% of Christians vs. 3.1% of Atheists (according to the *Pew Research Center*). In contrast, France identifies no more than 37% of Christians for 31% of Atheists (according to the *Observatoire de la laïcité*). As these percentages are significantly different, it is possible to assume that the "Spiritual changes" dimension of the PTGI may not be as relevant for France than it is for the US. Thus, perhaps researchers should consider adjusting Tedeschi and Calhoun's scale, so that positive psychological changes are better targeted depending on the individual's country of belonging.

3. Limitations and perspectives for future research

3.1 Limitations

The first limit to this study concerns social-desirability bias, in other words, the tendency to behave or respond to questions in a way that will be viewed favorably by others (Kuncel & Tellegen, 2009). Indeed, it is possible that some participants under-reported what they might consider "bad" responses in our surveys, as post-traumatic stress is still stigmatized in this masculine-prominent field of work. For instance, we noticed that while some described their most stressful event as "non-traumatic", they also reported high levels of PTSD, which is incoherent. Thus, it seems that firefighters may still have a difficult time admitting when an event was traumatizing for them. These few discrepancies could have interfered lightly with the interpretation of our results.

The second limitation to this study concerns attrition bias, or the fact that we lost a lot of participants between T1 and T2, in both of our samples. Indeed, keeping our participants invested in this project after a 1-year period was difficult, especially since T2 data collection was done online via a link we sent them individually. In contrast, our T1 survey was filled out on paper, in groups, and with our presence, which allowed us to explain the project and answer any questions participants might have. Thus, our statistical analyses could have been impacted by the loss of follow-up data. Additionally, as surveys were filled out individually and remotely, participants could have put in less effort and intention in the completion of their survey. Therefore, some answers may not have reflected exactly how participants felt.

Finally, our last limitation for this study concerns the fact that we did not control whether participants were experiencing any stressful events in their personal life during completion of the surveys. Indeed, we only questioned participants about the most stressful events they had experienced in the framework of their profession. However, if they were unfortunately experiencing any troubling event in their personal life (e.g., the loss of a loved one, a divorce, a sick relative, etc.), those types of events could have affected participants' responses about post-traumatic stress and/or growth. Additionally, as our T2 data collection took place during COVID-19, it is possible that some participants were feeling more stressed than usual, which could have also impacted their responses to the survey. Indeed, individuals and firefighters in particular were heavily affected by the pandemic. This could also explain why we observed a substantial loss of participants during T1 and T2. Because of COVID-19, we were unfortunately also unable to conduct a T3 study that would have allowed us

to test mediator effects satisfactorily for this research. Thus, researchers should focus on developing more T3 studies in the future to better grasp the subtle processes that are inherent to growth.

3.2 Practical implications

Very few studies have investigated PTG in first responders, firefighters especially. Thus, the results of our longitudinal study are valuable, as they offer a better understanding of the process of growth in these types of populations. Indeed, this thesis allowed us to clarify important contradictions, such as the relationship between PTG and the subjective perception of the event, post-traumatic stress, severeness of the stress experienced during the event, the disruption of core-beliefs, rumination, social support, and socio-demographic variables. Additionally, our results brought to light surprising data, such as the fact that social support was unrelated to posttraumatic growth in both samples, contrarily to what a majority of the research suggests. Thus, while Tedeschi and Calhoun's model was to a certain extent replicated with our firefighters, we hypothesize that other variables that we have not explored in this study may also come into play, such as collective defense strategies. Indeed, as mentioned previously, firefighters are part of a strong and cohesive community, and face together traumatic and extraordinary events that tighten their bond in a way that no other profession does. Thus, with the establishment of such a strong collective psyche, the group highly participates in firefighters' self-image and identity. Indeed, individual self-protective structures are supported by the strong and cohesive group they are a part of. But how does the group affect individual experiences of trauma and, consequently, of PTG? What implicit and perhaps unconscious processes are put into place by the group to face trauma and gain positive psychological changes from it? We suggest that other studies be conducted to further explore these questions and identify more specific factors that may play a role in firefighters' PTG. Better identifying these factors would benefit therapeutic methods and allow to better target how to help firefighters and first responders in general develop positive psychological changes in the aftermath of trauma. Perhaps a qualitative study with first responders where the topics of trauma and growth are openly discussed would be the first step towards exploring new variables.

Additionally, since it seems that the group is the force vector for firefighters, we think that PTG could be better reached through the use of the group as well. Indeed, studies show that sharing with people who have gone through similar experiences strongly promotes posttraumatic growth, as

it has the positive effect of normalizing the individual's situation and feelings (Palmer, Murphy, & Spencer-Harper, 2016; Richardson, 2016). Palmer et al. (2016) add that the ''support network'' needs to have an in-depth knowledge of the individual's difficulties and traumatic experiences in order to maximize growth, which is highly the case for firefighters and their colleagues. For these reasons, we believe creating and organizing punctual work groups on a regular basis (once a month for example) would strongly benefit firefighters, as these groups would promote experience sharing. Furthermore, since discussing trauma and growth directly with firefighters may be difficult because of the persistent stigma around these subjects, we suggest these questions be addressed through the use of some kind of media, such as photo language. Indeed, photos can sometimes help express what words cannot, and promote individuals' capacities to associate symbols with their feelings and personal experiences. Sharing these experiences through photos within a group can not only help firefighters express their personal struggles, but by doing so, they may also put words on some of their colleagues' experiences and help them better understand their hardship. Consequently, initiating deliberate rumination about trauma will then enhance firefighters' abilities to develop positive psychological change.

Lastly, in order to promote PTG in such as field of work, we believe these matters need to be conveyed by the hierarchical figures of each fire department. Indeed, if trauma remains taboo and stigmatized, growth cannot fully be reached. While changing the mindset of such a community may take some time, creating space and time for these matters (by implementing photo language sessions for example) establishes a sense of normalcy and could reduce firefighters' tendency to isolate themselves with whatever struggle they might be dealing with. Furthermore, protecting first responders' mental health is indispensable for them to perform at their absolute best. In a field of work that is dedicated to saving people in sometimes the most hazardous conditions, it is imperative that fire departments raise awareness not only on the physical dangers of the profession, but also on the psychological ones.

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Appendix

1. Consent form for US firefighters

[Consent to be Part of a Research Study]

Title of the Project: Impacts of stressful events on Firefighters

Principal Investigator: Charlotte Henson, PhD student, University of North Carolina at Charlotte

Co-investigator: Amy Canevello, Faculty Advisor, University of North Carolina at Charlotte

You are invited to participate in a research study. Participation in this research study is voluntary. The information provided is to help you decide whether or not to participate. If you have any questions, please ask.

Important Information You Need to Know

- The purpose of this study is to explore how stressful events impact Firefighters.
- You will be asked to complete a 15-minute paper survey about stressful experiences and their possible consequences in your life. Furthermore, this is a two (2) part study: We will ask you to complete another survey that will also take about 15 minutes, approximately 1 year after completing the first one.
- Thus, if you choose to participate, this study will require a total of 30 minutes of your time.
- Risks from this research include mild emotional discomfort. Indeed, some of the questions we will ask you are personal and sensitive. For example, we will ask you about the types of stressful events you have experienced in your job.
- You will not personally benefit from taking part in this research, but our study results will help us better understand how Firefighters deal with stress.

Please read this form and ask any questions you may have before you decide whether to participate in this research study.

Why are we doing this study?

The purpose of this study is to better understand the experience of firefighters when they are confronted with stressful situations. More specifically, the goal is to investigate what factors may help prevent distress reactions following exposure to a stressful emergency situation.

Why are you being asked to be in this research study.

You are being asked to be in this study because you are a professional Firefighter.

What will happen if I take part in this study?

If you choose to participate in this study, you will complete surveys twice, approximately 1 year apart from each other. Both surveys will be completed on paper at your fire station. Each will take about 15 minutes to complete. The surveys will ask questions about your background (age, relationship status, etc.), the types of events you have experienced on the job as a Firefighter, and factors associated with psychological well-being (stress, social support, self-esteem, etc.). One year after completing the first survey, you will receive the second survey and a return envelope in your mailbox at the fire house so you can complete it and send it back to us. Your total time commitment if you participate in this study will be 15 minutes for the first survey and 15 minutes for the second survey, which represents a total of 30 minutes of your time.

What benefits might I experience?

You will not benefit directly from being in this study. However, others might benefit because it is important to understand how to reduce stress reactions and enhance psychological well-being in Firefighters in order to help design and make available more effective resources for them.

What risks might I experience?

The questions we will ask you are personal and sensitive. For example, we will ask you about the types of stressful events you have experienced in your job as a Firefighter. You might experience some mild emotional discomfort when answering these questions. However, we do not expect this risk to be common. We do not expect that you will experience anymore distress than what you would experience on a typical day.

How will my information be protected?

You will be asked to provide your name and email address on a separate sheet of paper, and you will be attributed an ID number. We will only use your email address in the case where you would have moved to a different location and we were unable to find you at your previous fire house for completion of the second survey.

To protect your privacy (identity), the paper surveys you will be asked to complete are strictly CONFIDENTIAL (only your ID number will appear on your survey). Data from the completed surveys will be stored in a password-protected data base that can be accessed by the research team. Other people with approval from the investigator may need to see the information we collect about you, including people who work for UNC Charlotte. Your name and email address will be locked in a secure location, separate from study data, until the study is completed, then it will be destroyed. No personal information will ever be directly linked to your data. Furthermore, we plan to publish the results of this study. However, to protect your privacy, we will NOT include any information that could identify you. Data will only be published in the form of general statistics, which will protect the confidentiality of the research data.

How will my information be used after the study is over?

After this study is complete, study data may be shared with other researchers for use in other studies or as may be needed as part of publishing our results. The data we share will NOT include information that could identify you.

What are my rights if I take part in this study?

It is up to you to decide to be in this research study. Participating in this study is voluntary. Even if you decide to be part of the study now, you may change your mind and stop at any time.

Who can answer my questions about this study and my rights as a participant?

For questions about this research, you may contact Charlotte Henson (researcher) at the following email address: charlotte.a.henson@gmail.com or Amy Canevello (researcher) at the following email address: acanevel@uncc.edu

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Office of Research Compliance at 704-687-1871 or uncc-irb@uncc.edu.

Consent to Participate

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will receive a copy of this document for your records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I understand what the study is about and my questions so far have been answered. I agree to take part in this study.

_____

Name (PRINT)

_____

Signature Date

24/7 Firefighter & Family Crisis and Support Line - 844-525-FIRE (3473)

_____

Name and Signature of person obtaining consent Date

2. Consent form for French firefighters

[Formulaire de recueil du consentement]

Titre du projet : Stress post-traumatique et croissance post-traumatique chez les sapeurs-pompiers

Principal Investigateur : Charlotte Henson, Doctorante, Université de Franche-Comté à Besançon

Co-investigateur : Didier Truchot, Professeur, Université de Franche-Comté à Besançon

Vous êtes invités à participer à la présente étude de recherche. Votre participation repose entièrement sur la base du volontariat. Les informations ci-après vous aideront à décider si oui ou non vous souhaitez participer. Si vous avez des questions, veuillez vous référer à la fin de ce formulaire où figurent les adresses email des deux chercheurs à l'initiative de cette étude.

Informations importantes :

- L'objectif de cette étude est d'explorer l'impact des événements traumatiques chez les sapeurs-pompiers.
- Il vous sera demandé de compléter un questionnaire papier d'une durée de 15 minutes environ. Ce questionnaire portera sur vos diverses expériences professionnelles en tant que sapeur-pompier et sur leurs possibles conséquences dans votre vie. Notez qu'il s'agit d'une étude qui s'effectuera en 2 parties : Il vous sera demandé de compléter un second questionnaire d'une quinzaine de minutes également un an après avoir rempli le premier. Ce second questionnaire sera rempli par voie informatique.

Pourquoi réalisons-nous cette étude ?

L'objectif de cette étude est de mieux comprendre l'expérience des sapeurs-pompiers lorsqu'ils sont confrontés à une situation d'urgence potentiellement traumatisante. Plus précisément, le but est d'investiguer les facteurs pouvant aider à réduire (ou prévenir) les réactions de stress post-traumatique à la suite d'une exposition à un événement stressant.

Que vous sera-t-il demandé dans les questionnaires ?

Si vous choisissez de participer à cette étude, il vous sera demandé de remplir deux questionnaires à un an d'intervalle. Le premier sera rempli sur papier, le second via un lien informatique. Ces questionnaires comprendront des questions sur les types d'événements que vous avez vécu dans le cadre de votre profession, ainsi que sur les facteurs associés à votre bien-être psychologique (stress, soutien social, estime de soi, etc.).

Comment vos informations seront-elles protégées ?

Lorsque vous compléterez le premier questionnaire de cette étude, il vous sera demandé de nous donner votre adresse email, après quoi il vous sera ensuite attribué un numéro d'identification. Nous utiliserons votre adresse email uniquement lors de l'envoi du second questionnaire afin de vous transmettre son lien informatique.

Afin de protéger votre identité, les questionnaires papiers que vous remplirez seront strictement confidentiels : seuls votre numéro d'identification figurera dessus, tandis que votre adresse email sera conservée sur un document à part. Les réponses récoltées seront stockées dans une base de données protégée par un mot de passe uniquement accessible par le principal investigateur de cette recherche. Votre adresse email, elle, sera conservée dans un lieu sûr, distinct des données des questionnaires, et ce jusqu'à la fin de cette étude. A l'issue de celle-ci, vos données personnelles seront supprimées. Ainsi, aucune de vos informations personnelles ne sera directement mise en lien avec votre questionnaire. De plus, en cas de publication d'articles, AUCUNE information permettant de vous identifier ne sera incluse. Les données seront uniquement publiées sous forme de statistiques, ce qui assurera la confidentialité de cette recherche.

Qui peut répondre à mes potentielles interrogations concernant cette étude ?

Si vous avez des questions concernant cette étude, vous pouvez contacter Charlotte Henson (principal investigateur) via l'adresse email suivante : charlotte.a.henson@gmail.com ou Didier Truchot (co-investigateur) via l'adresse email suivante : didier.truchot@univ-fcomte.fr

Consentement à participer à cette étude :

En signant ce document, vous acceptez de participer à cette étude.

Je certifie avoir pris connaissance du présent formulaire de consentement et je comprends la nature, le déroulé et les implications de ma participation dans cette recherche. J'accepte de participer à cette étude.

_____

Nom & Prénom

_____

Signature Date

_____

Nom & signature de la personne ayant obtenu le consentement Date

3. T1 survey in English

General Instructions:

As you complete the survey, please give the questions your full attention. If a particular question does not make sense to you, just interpret it as best as you can.

There is no right or wrong response to any of these questions. We are sincerely interested in your personal feelings and experiences. Your name will not be directly linked to these data – we strongly encourage you to be as honest as possible. Please do not over think your responses. We want your initial reaction to each question.

Instructions: Listed below are a number of difficult or stressful things that sometimes happen to people. For each event, check one or more of the boxes to the right to indicate in what way you may have been confronted with these situations.

Be sure to consider your entire life (growing up as well as adulthood) as you go through the list of events.

Event	*Happened to me*	*Witnessed it*	*Learned about it*	*Part of my job*	*Not sure*	*Doesn't apply*
1. Natural disaster (for example, flood, hurricane, tornado, earthquake)						
2. Fire or explosion						
3. Transportation accident (for example, car accident, boat accident, train wreck, plane crash)						
4. Serious accident at work, home, or during recreational activity						
5. Exposure to toxic substance (for example, dangerous chemicals, radiation)						
6. Physical assault (for example, being attacked, hit, slapped, kicked, beaten up)						
7. Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb)						
8. Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm)						
9. Other unwanted or uncomfortable sexual experience						
10. Combat or exposure to a war-zone (in the military or as a civilian)						
11. Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war)						
12. Life-threatening illness or injury						
13. Severe human suffering						
14. Sudden violent death (for example, homicide, suicide)						
15. Sudden accidental death						
16. Serious injury, harm, or death you caused to someone else						
17. Any other very stressful event or experience						

For question 17, please specify the event (if any):

……

……

Instructions: Please think about THE MOST STRESSFUL EVENT that you have experienced within the framework of your profession, as you will be asked to answer the rest of the questions with respect to that event.

Briefly describe this event:

……

……

Date of the event (month & year): ……

	Not at all	**A little bit**	**Moderately**	**Quite a bit**	**Extremely**
How distressed were you at the time of the event?	0	1	2	3	4

A trauma can be defined as an event that a person "witnessed, or was confronted with that involved actual or threatened death or serious injury, or a threat to the physical integrity of the self or others" and that "the person responded to it with intense fear, helplessness, or horror"	**Yes**	**No**
Using this definition of trauma, was the event that you indicated above traumatic?	1	0

Instructions: Keeping in mind THE STRESSFUL SITUATION YOU IDENTIFIED on the previous page, please read each problem carefully and circle one of the numbers to the right to indicate how much you have been bothered by the problem **IN THE PAST MONTH.**

	Not at all	***A little bit***	***Moderately***	***Quite a bit***	***Extremely***
Repeated disturbing memories, thoughts, or images of the stressful experience?	1	2	3	4	5
Repeated, disturbing dreams of the stressful experience?	1	2	3	4	5
Suddenly acting or feeling as if the stressful experience were happening again (as if you were reliving it)?	1	2	3	4	5
Feeling very upset when something reminded you of the stressful experience?	1	2	3	4	5
Having physical reactions (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of the stressful experience?	1	2	3	4	5
Avoiding thinking about or talking about the stressful experience or avoiding having feelings related to it?	1	2	3	4	5
Avoiding activities or situations because they remind you of the stressful experience?	1	2	3	4	5
Trouble remembering important parts of the stressful experience?	1	2	3	4	5
Loss of interest in activities that you used to enjoy?	1	2	3	4	5
Feeling distant or cut off from other people?	1	2	3	4	5
Feeling emotionally numb or being unable to have loving feelings for those close to you?	1	2	3	4	5
Feeling as if your future will somehow be cut short?	1	2	3	4	5
Trouble falling or staying asleep?	1	2	3	4	5
Feeling irritable or having angry outbursts?	1	2	3	4	5
Having difficulty concentrating?	1	2	3	4	5
Being "super alert" or watchful or on guard?	1	2	3	4	5
Feeling jumpy or easily startled?	1	2	3	4	5

Instructions: Some events that people experience are so powerful that they 'shake their world' and **lead them to seriously examine core beliefs about the world, other people, themselves, and their future.**

Please reflect upon the **STRESSFUL SITUATION YOU IDENTIFIED** and indicate **the extent to which it led you to seriously examine each of the following core beliefs.**

I seriously examined:	**Not at all**	**A little**	**Somewhat**	**A lot**	**Extremely**
The degrees to which I believe things that happen to people are fair.	1	2	3	4	5
The degrees to which I believe things that happen to people are controllable.	1	2	3	4	5
My assumptions concerning why other people think and behave the way that they do.	1	2	3	4	5
My beliefs about my relationships with other people.	1	2	3	4	5
My beliefs about my own abilities, strengths and weaknesses.	1	2	3	4	5
My beliefs about my expectations for my future.	1	2	3	4	5
My beliefs about the meaning of my life.	1	2	3	4	5
My spiritual or religious beliefs.	1	2	3	4	5
My beliefs about my own value or worth as a person.	1	2	3	4	5

Instructions: Indicate for each of the statements below the degree to which this change occurred in your life **AS A RESULT OF THE EVENT YOU IDENTIFIED**, using the following scale.

Possible Areas of Growth and Change	I did not experience this change	I experienced this change to a:				
		very small degree	small degree	moderate degree	great degree	very great degree
I changed my priorities about what is important in life.						
I have a greater sense of harmony with the world.						
I have a greater appreciation for the value of my own life.						
I developed new interests.						
I have a greater feeling of self-reliance.						
I have a better understanding of spiritual matters.						
I more clearly see that I can count on people in times of trouble.						
I established a new path for my life.						
I have greater clarity about life's meaning.						
I have a greater sense of closeness with others.						
I am more willing to express my emotions.						
I know better that I can handle difficulties.						
I am able to do better things with my life.						
I am better able to accept the way things work out.						

I can better appreciate each day.						
I feel more connected with all of existence.						
New opportunities are available which wouldn't have been otherwise.						
I have more compassion for others.						
I put more effort into my relationships.						
I am more likely to try to change things which need changing.						
I have a stronger religious faith.						
I discovered that I'm stronger than I thought I was.						
I learned a great deal about how wonderful people are.						
I feel better able to face questions about life and death.						
I better accept needing others.						

Instructions: After an experience like the one you reported, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. Indicate for the following items how often, if at all, you had the experiences described during the weeks **IMMEDIATELY AFTER THE EVENT**.

	Not at all	**A Little**	**Somewhat**	**A Lot**	**Extremely**
I thought about the event when I did not mean to.	1	2	3	4	5
Thoughts about the event came to mind and I could not stop thinking about them.	1	2	3	4	5
Thoughts about the event distracted me or kept me from being able to concentrate.	1	2	3	4	5
I could not keep images or thoughts about the event from entering my mind.	1	2	3	4	5
Thoughts, memories, or images of the event came to mind even when I did not want them.	1	2	3	4	5
Thoughts about the event caused me to relive my experience.	1	2	3	4	5
Reminders of the event brought back thoughts about my experience.	1	2	3	4	5
I found myself automatically thinking about what had happened.	1	2	3	4	5
Other things kept leading me to think about my experience.	1	2	3	4	5
I tried not to think about the event, but could not keep the thoughts from my mind.	1	2	3	4	5

After an experience like the one you reported, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated during the weeks **IMMEDIATELY AFTER THE EVENT**.

	Not at all	**A Little**	**Somewhat**	**A Lot**	**Extremely**
I thought about whether I could find meaning from my experience.	1	2	3	4	5
I thought about whether changes in my life have come from dealing with my experience.	1	2	3	4	5
I forced myself to think about my feelings about my experience.	1	2	3	4	5
I thought about whether I have learned anything as a result of my experience.	1	2	3	4	5

I thought about whether the experience has changed my beliefs about the world.	1	2	3	4	5
I thought about what the experience might mean for my future.	1	2	3	4	5
I thought about whether my relationships with others have changed following my experience.	1	2	3	4	5
I forced myself to deal with my feelings about the event.	1	2	3	4	5
I deliberately thought about how the event had affected me.	1	2	3	4	5
I thought about the event and tried to understand what happened.	1	2	3	4	5

Instructions: We are now interested in how you view your co-workers. Please rate the following items on the scale provided.

	Strongly disagree	**Disagree**	**Agree**	**Strongly agree**
My supervisor can easily get his subordinates to collaborate	1	2	3	4
My supervisor helps me successfully complete my tasks	1	2	3	4
The colleagues with whom I work are professionally skilled	1	2	3	4
The colleagues with whom I work help me to successfully complete the tasks at hand	1	2	3	4
My supervisor pays attention to what I say	1	2	3	4
My supervisor feels concerned by the well-being of his subordinates	1	2	3	4
The colleagues with whom I work are friendly	1	2	3	4
The colleagues with whom I work show interest in me	1	2	3	4

Instructions: Below are several statements about you with which you may agree or disagree. Using the response scale below, indicate your agreement or disagreement with each item by circling the number corresponding to your answer in the table below.

	Strongly disagree	***Disagree***	***Neutral***	***Agree***	***Strongly agree***
1. I am confident I get the success I deserve in life.	1	2	3	4	5
2. Sometimes I feel depressed.	1	2	3	4	5
3. When I try, I generally succeed.	1	2	3	4	5
4. Sometimes when I fail, I feel worthless.	1	2	3	4	5
5. I complete tasks successfully.	1	2	3	4	5
6. Sometimes, I do not feel in control of my work.	1	2	3	4	5
7. Overall, I am satisfied with myself.	1	2	3	4	5
8. I am filled with doubts about my competence.	1	2	3	4	5
9. I determine what will happen in my life.	1	2	3	4	5
10. I do not feel in control of my success in my career.	1	2	3	4	5
11. I am capable of coping with most of my problems.	1	2	3	4	5
12. There are times when things look pretty bleak and hopeless to me.	1	2	3	4	5

Your answers to the following items will help us interpret the results of the survey.

1. Your Gender: _____Male _____Female
2. Your Age: _____
3. Your relationship status (check one):

_____In an exclusive dating relationship

_____Married

_____Divorced

_____Widow/Widower

_____Other, please specify: _____

4. Do you have children? ____ Yes ____ No If so, what is the age of your youngest child? _____

5. How long have you been a firefighter (in years)? _____

6. What is your rank as a firefighter (check one)?

_____Probationary firefighter _____ Captain

_____Firefighter/EMT _____Battalion Chief

_____Firefighter/Paramedic _____Assistant Chief

_____Driver Engineer _____Fire Chief

_____Lieutenant

Thank you so much for your time. Expect to hear from us in a year!

4. T1 survey in French

Consignes générales :

En complétant ce questionnaire, nous vous prions d'accorder votre attention aux questions qui vous sont posées. Si une question vous pose problème, veuillez l'interpréter du mieux que vous le pouvez.

Il n'y a pas de bonne ou de mauvaise réponse. Nous sommes sincèrement intéressés par vos expériences et ressentis personnels. Votre nom ne sera pas directement lié à ces données – nous vous encourageons fortement à répondre le plus honnêtement possible.

Consignes : Voici une liste de situations difficiles ou stressantes qui peuvent parfois se produire. Pour chacune d'elle, cochez une ou plusieurs cases à droite pour indiquer de quelle manière vous avez été confronté à ces situations. Soyez certain de considérer votre vie entière (votre enfance ainsi que l'âge adulte) lorsque vous progressez dans la complétion de la liste.

Evènement	*Cela m'est arrivé*	*J'en ai été témoin*	*Je l'ai appris*	*Fait partie de mon travail*	*Incertain*	*Ne s'applique pas*
1. Catastrophe naturelle (par exemple, inondation, ouragan, tornade, tremblement de terre).						
2. Incendie ou explosion.						
3. Accident de transport (par exemple, accident de voiture, accident de bateau, déraillement de train, écrasement d'avion).						
4. Accident grave au travail, à domicile, ou pendant une activité de loisir.						
5. Exposition à une substance toxique (par exemple, produits chimiques dangereux, radiation).						
6. Agression physique (par exemple, se faire attaquer, frapper, gifler, recevoir des coups de pieds, se faire battre).						
7. Voie de fait armée (par exemple, se faire tirer dessus, poignarder, menacer avec un couteau, une arme à feu ou une bombe).						
8. Agression sexuelle (viol, tentative de viol, être obligé d'effectuer tout type d'acte sexuel par la force ou sous les menaces).						
9. Autre expérience sexuelle non désirée ou inconfortable.						
10. Conflit armé ou exposition à une zone de guerre (dans l'armée ou comme civil).						
11. Captivité (par exemple, se faire kidnapper, enlever, prendre en otage, incarcérer comme prisonnier de guerre).						

12. Maladie ou blessure mettant la vie en danger.						
13. Souffrance humaine sévère.						
14. Décès soudain et violent (par exemple, homicide, suicide).						
15. Décès accidentel soudain.						
16. Blessure grave, dommage ou décès que vous avez causé à quelqu'un d'autre.						
17. Toute autre expérience ou événement très stressant.						

Pour la question 17, veuillez préciser de quel événement il s'agit (s'il y en a un) :

……
……

Consignes : Veuillez penser à **L'ÉVÉNEMENT LE PLUS STRESSANT** auquel vous avez été confronté dans le cadre de votre travail. Les questions qui vous seront posées par la suite seront en rapport avec cet évènement. S'il vous est impossible de choisir un évènement en particulier, veuillez répondre en considérant l'intégralité de votre carrière en tant que sapeur-pompier.

Décrivez brièvement cet événement :

……
……

Date de l'événement (mois & année) : ……

	Pas du tout	***Un peu***	***Modérément***	***Plutôt***	***Extrêmement***
A quel point étiez-vous stressé lors de cet événement ?	0	1	2	3	4

Un trauma peut être défini comme un événement auquel une personne est confrontée et qui implique un risque réel ou potentiel de mort ou de blessure grave, ou un risque de porter atteinte à l'intégrité physique de soi ou d'autrui » et auquel « la personne a réagi avec une peur intense, un sentiment d'impuissance, et d'horreur »	Oui	Non
En vous appuyant sur cette définition du trauma, l'événement que vous avez décrit précédemment était-il traumatique ?	1	0

<u>Consignes :</u> En gardant en tête L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ sur la page précédente, veuillez lire chaque problème avec soin et entourer un chiffre à droite pour indiquer à quel point vous avez été perturbé par ce problème **<u>DANS LE MOIS QUI VIENT DE S'ÉCOULER.</u>**

	Pas du tout	***Un peu***	***Parfois***	***Souvent***	***Très souvent***
1. Être perturbé(e) par des souvenirs, des pensées ou des images en relation avec cet épisode stressant.	1	2	3	4	5
2. Être perturbé(e) par des rêves répétés en relation avec cet événement.	1	2	3	4	5
3. Brusquement agir ou sentir comme si l'épisode stressant se reproduisait (comme si vous étiez en train de le revivre).	1	2	3	4	5
4. Se sentir très bouleversé(e) lorsque quelque chose vous rappelle l'épisode stressant.	1	2	3	4	5
5. Avoir des réactions physiques, par exemple, battements de cœur, difficultés à respirer, sueurs lorsque quelque chose vous a rappelé l'épisode stressant.	1	2	3	4	5
6. Eviter de penser ou de parler de votre épisode stressant ou éviter des sentiments qui sont en relation avec lui.	1	2	3	4	5
7. Eviter des activités ou des situations parce qu'elles vous rappellent votre épisode stressant.	1	2	3	4	5
8. Avoir des difficultés à se souvenir de parties importantes de l'expérience stressante.	1	2	3	4	5
9. Perte d'intérêt pour des activités qui habituellement vous faisaient plaisir.	1	2	3	4	5
10. Se sentir distant ou coupé(e) des autres personnes.	1	2	3	4	5
11. Se sentir émotionnellement anesthésié(e) ou incapable d'avoir des sentiments d'amour pour ceux qui sont proches de vous.	1	2	3	4	5
12. Se sentir comme si l'avenir était raccourci ou bouché.	1	2	3	4	5
13. Avoir des difficultés pour vous endormir ou rester endormi(e).	1	2	3	4	5
14. Se sentir irritable ou avoir des bouffées de colère.	1	2	3	4	5
15. Avoir des difficultés à vous concentrer.	1	2	3	4	5
16. Être en état de super-alarme, sur la défensive en permanence.	1	2	3	4	5
17. Se sentir énervé(e) ou sursauter facilement.	1	2	3	4	5

<u>Consignes :</u> Pour certaines personnes, certains événements sont tellement forts qu'ils peuvent parfois « bouleverser leur monde » et **les conduire à réévaluer leurs croyances fondamentales concernant le monde, autrui, eux-mêmes, et leur avenir.**
En gardant en tête **L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ**, veuillez indiquer **<u>à quel degré cet événement vous a conduit à réévaluer chacune des croyances suivantes :</u>**

J'ai sérieusement réévalué :	**Pas du tout**	**Un peu**	**Modérément**	**Beaucoup**	**Extrêmement**
Le degré auquel je crois que les choses qui arrivent aux gens sont justes	1	2	3	4	5
Le degré auquel je crois que les choses qui arrivent aux gens sont contrôlables	1	2	3	4	5

Mes croyances concernant pourquoi les gens pensent et agissent de la manière dont ils le font	1	2	3	4	5
Mes croyances concernant mes relations avec autrui	1	2	3	4	5
Mes croyances concernant mes propres capacités, forces et faiblesses	1	2	3	4	5
Mes croyances concernant mes attentes pour mon avenir	1	2	3	4	5
Mes croyances concernant le sens de la vie	1	2	3	4	5
Mes croyances spirituelles ou religieuses	1	2	3	4	5
Mes croyances concernant ma propre valeur en tant que personne	1	2	3	4	5

Consignes : Veuillez trouver ci-dessous une liste de changements pouvant se produire à la suite d'un événement stressant. Veuillez indiquer à quel degré le changement s'est produit dans votre vie **à la suite de L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ.**

Domaines possibles de croissance et de changement	Je n'ai pas ressenti ce changement	J'ai ressenti :				
		Un très léger changement	Un léger changement	Un changement modéré	Un changement important	Un changement très important
J'ai changé mes priorités par rapport à ce qui est important dans la vie.						
Je me sens davantage en harmonie avec le monde						
J'apprécie davantage ma vie à sa juste valeur.						
J'ai développé de nouveaux centres d'intérêts.						
J'ai davantage le sentiment de pouvoir compter sur moi-même.						
J'ai une meilleure compréhension de ce qui touche à la spiritualité.						
Je vois plus clairement que je peux compter sur les autres dans les moments difficiles.						
J'ai donné une nouvelle orientation à ma vie.						
Je comprends davantage le sens de la vie						
J'ai davantage le sentiment d'être proche des autres.						
J'exprime plus volontiers mes émotions.						
Je sais davantage que je peux gérer les difficultés.						

Je suis capable de faire de meilleures choses dans ma vie.						
Je suis davantage capable d'accepter la tournure que prennent les choses.						
J'arrive davantage à apprécier chaque jour.						
Je me sens davantage connecté au monde qui m'entoure						
De nouvelles opportunités s'offrent à moi, ce qui n'aurait pas été le cas autrement.						
J'ai plus de compassion pour les autres.						
Je m'investis davantage dans mes relations.						
Je suis plus enclin à essayer de changer les choses qui ont besoin d'être changées.						
Mes croyances religieuses sont plus fortes.						
J'ai découvert que j'étais plus fort/forte que je ne le pensais.						
J'ai vraiment appris à quel point les gens sont merveilleux.						
Je me sens davantage capable de faire face aux questions qui portent sur la vie et la mort						
J'accepte mieux d'avoir besoin des autres.						

Consignes : A la suite d'un événement tel que celui que vous avez décrit, les gens ont parfois, mais pas toujours, des pensées récurrentes de cet événement qui leur viennent en tête. Veuillez indiquer la fréquence à laquelle vous avez vécu les expériences décrites dans le tableau ci-dessous au cours des semaines qui ont **IMMEDIATEMENT SUIVIES L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ.**

	Pas du tout	**Un peu**	**Modérément**	**Beaucoup**	**Extrêmement**
J'ai pensé à l'événement sans que cela ne soit intentionnel	1	2	3	4	5
Des pensées concernant l'événement me sont venues en tête et je ne pouvais pas arrêter d'y penser	1	2	3	4	5
Des pensées concernant l'événement m'ont distrait ou m'ont empêché de me concentrer	1	2	3	4	5

Je ne pouvais pas empêcher des images ou des pensées concernant l'événement de me venir en tête	1	2	3	4	5
Des pensées, des souvenirs, ou des images de l'événement me sont venus en tête même lorsque je n'en avais pas envie	1	2	3	4	5
Des pensées concernant l'événement m'ont fait « revivre » mon expérience	1	2	3	4	5
Des rappels de l'événement ont ravivé des pensées concernant mon expérience	1	2	3	4	5
Je pensais automatiquement à ce qui s'était passé	1	2	3	4	5
D'autres choses m'ont reconduit sans cesse à penser à mon expérience	1	2	3	4	5
J'ai essayé de ne pas penser à l'événement, mais ne pouvais pas empêcher ces pensées d'entrer dans mon esprit	1	2	3	4	5

Consignes : A la suite d'un événement tel que celui que vous avez décrit, les gens passent parfois **délibérément et intentionnellement** du temps à penser à l'expérience qu'ils ont vécue. Veuillez indiquer la fréquence à laquelle vous avez **délibérément passé du temps** à penser aux problèmes indiqués ci-dessous au cours des semaines qui ont **IMMEDIATEMENT SUIVIES L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ.**

	Pas du tout	**Un peu**	**Modérément**	**Beaucoup**	**Extrêmement**
Je me suis demandé(e) si je pouvais trouver du sens à l'expérience que j'ai vécue	1	2	3	4	5
Je me suis demandé(e) si des changements s'étaient produits dans ma vie à la suite de cette expérience	1	2	3	4	5
Je me suis forcé(e) à penser à mes sentiments concernant l'expérience	1	2	3	4	5
Je me suis demandé(e) si j'avais appris quelque chose de cette expérience	1	2	3	4	5
Je me suis demandé(e) si cette expérience avait changé mes croyances concernant le monde qui m'entoure	1	2	3	4	5
Je me suis demandé(e) ce que l'expérience signifiait pour mon avenir	1	2	3	4	5
Je me suis demandé(e) si mes relations avec autrui avaient changé à la suite de cette expérience	1	2	3	4	5
Je me suis forcé(e) à gérer mes sentiments concernant l'expérience	1	2	3	4	5
Je me suis délibérément demandé comment l'événement m'avait affecté	1	2	3	4	5
J'ai pensé à l'événement et j'ai essayé de comprendre ce qui s'était passé	1	2	3	4	5

Consignes : Nous sommes désormais intéressés par la manière dont vous percevez vos collègues. Veuillez indiquer le degré avec lequel vous êtes d'accord ou en désaccord avec les propositions suivantes.

	Fortement en désaccord	**En désaccord**	**D'accord**	**Fortement d'accord**
Mon supérieur réussi facilement à faire collaborer ses subordonnés	1	2	3	4
Mon supérieur m'aide à mener ma tâche à bien	1	2	3	4
Les collègues avec qui je travaille sont des gens professionnellement compétents	1	2	3	4
Les collègues avec qui je travaille m'aident à mener les tâches à bien	1	2	3	4
Mon supérieur prête attention à ce que je dis	1	2	3	4
Mon supérieur se sent concerné par le bien-être de ses subordonnés	1	2	3	4
Les collègues avec qui je travaille sont amicaux	1	2	3	4
Les collègues avec qui je travaille me manifestent de l'intérêt	1	2	3	4

Consignes : Ci-dessous figurent plusieurs propositions vous concernant avec lesquelles vous pourriez être d'accord ou en désaccord. Veuillez indiquer votre degré d'accord ou de désaccord avec chacune de ces propositions en entourant le chiffre correspondant à votre réponse dans le tableau ci-dessous.

	Fortement en désaccord	***En désaccord***	***Neutre***	***En accord***	***Fortement en accord***
13. Je suis sûr(e) d'obtenir le succès que je mérite dans la vie.	1	2	3	4	5
14. Il m'arrive parfois de me sentir déprimé(e).	1	2	3	4	5
15. Quand j'essaie quelque chose, en général, je réussis.	1	2	3	4	5
16. Il m'arrive parfois, quand j'échoue, de me sentir inutile et sans valeur.	1	2	3	4	5
17. Je mène à bien mes tâches avec succès.	1	2	3	4	5
18. Il m'arrive parfois d'avoir le sentiment de ne pas avoir de contrôle sur mon travail.	1	2	3	4	5
19. D'une manière générale, je suis content(e) de moi.	1	2	3	4	5
20. Je suis rempli(e) de doutes sur ma compétence.	1	2	3	4	5
21. Je décide de ce qui se passe dans ma vie.	1	2	3	4	5
22. Je n'ai pas le sentiment d'avoir le contrôle de ma réussite professionnelle.	1	2	3	4	5
23. Je suis capable de faire face et de surmonter la plupart de mes problèmes.	1	2	3	4	5
24. Il y a des moments où les choses me semblent plutôt sombres et sans espoir pour moi.	1	2	3	4	5

Enfin, vos réponses aux questions ci-dessous nous aideront à interpréter les résultats de ce questionnaire :

1. Votre sexe : _____ Homme _____ Femme
2. Votre âge : ____
3. Votre statut : _____ En couple
   _____ Marié(e)
   _____ Divorcé(e)
   _____ Veuf/Veuve
   _____ Autre, spécifier : _____

4. Avez-vous des enfants ? ___Oui ___Non Si oui, quel âge à votre plus jeune enfant ? ____
5. Depuis combien de temps êtes-vous sapeur-pompier (en nombre d'années) ? _____
6. Quel est votre grade ? _____

Merci infiniment de nous avoir accordé votre temps. Vous aurez de nos nouvelles dans un an !

5. Follow-up email with T2 survey for US firefighters

Dear participant,

One year ago, you completed a survey about the impact of stressful events on firefighters. This email is to inform you that it is now time for you to complete the second and last survey for this study. Due to logistical considerations, we have decided it would be easier to send you an online version of the survey, instead of sending it to you via mail. Once you click the survey link below, please start by re-entering the ID# that was given to you one year ago: **001**

Click the link or copy and paste:

https://unccpsych.az1.qualtrics.com/jfe/form/SV_9tXtFYldOibqd0h

If you have any questions or concerns, please feel free to contact me.

Thank you again for your participation!

Charlotte Henson, PhD student in Psychology, UNC Charlotte

6. Follow-up email with T2 survey for French firefighters

Cher(e) participant(e),

Il y a 1 an, vous avez complété un questionnaire portant sur les événements stressants que peuvent rencontrer les sapeurs-pompiers. Cet email vous est envoyé pour vous informer qu'il est maintenant temps de compléter le second et dernier questionnaire pour cette étude (durée : environ 10min). Une fois que vous aurez cliqué sur le lien ci-dessous, commencez par entrer le numéro d'identification (ID#) qui vous a été attribué il y a un an : **001**

Cliquez le lien ou copier-coller :

http://uncc.qualtrics.com/jfe/form/SV_3PMECO89xolg11z

Si vous avez des questions, n'hésitez pas à me contacter.

Merci encore pour votre participation !!

Charlotte Henson, Doctorante en Psychologie, Université Bourgogne – Franche-Comté

7. T2 survey in English

General Instructions:

As you complete the survey, please give the questions your full attention. If a particular question does not make sense to you, just interpret it as best as you can. There is no right or wrong response to any of these questions. We are sincerely interested in your personal feelings and experiences.

Please enter the ID# that was given to you in the preceding email: ……

Instructions: Please rate how you have viewed your co-workers **OVER THE COURSE OF THE PAST YEAR**.

	Strongly disagree	Disagree	Agree	Strongly agree
My supervisor can easily get his subordinates to collaborate	1	2	3	4
My supervisor helps me successfully complete my tasks	1	2	3	4
The colleagues with whom I work are professionally skilled	1	2	3	4
The colleagues with whom I work help me to successfully complete the tasks at hand	1	2	3	4
My supervisor pays attention to what I say	1	2	3	4
My supervisor feels concerned by the well-being of his subordinates	1	2	3	4
The colleagues with whom I work are friendly	1	2	3	4
The colleagues with whom I work show interest in me	1	2	3	4

	Yes	No
Have you experienced a distressing event **over the course of the past year**, since completing the first survey for this study? **(If not, please move on to the next page)**	1	0

If so, briefly describe this event:

…….....
.....

Date of the event (month & year): ……..

	Not at all	A little bit	Moderately	Quite a bit	Extremely
How distressed were you at the time of the event?	0	1	2	3	4

A trauma can be defined as an event that a person "witnessed, or was confronted with that involved actual or threatened death or serious injury, or a threat to the physical integrity of the self or others" and that "the person responded to it with intense fear, helplessness, or horror"	**Yes**	**No**
Using this definition of trauma, was the event that you indicated above traumatic?	1	0

When you completed Part 1 of this study last year, we asked you to identify the most stressful event that you had experienced at work. We would like you to think about that stressful event as you answer the following set of questions.

Note: If you did NOT identify a single distressing event when you completed the questionnaire last year, please answer these questions with respect to your career, more generally.

If possible, please briefly describe the event you described 1 year ago:
……
……

If you don't recall the event you described last year, please describe the MOST STRESSFUL EVENT of your professional career (otherwise, please move on to the next question):
……
……

Date of the event (month & year): ……

	Not at all	A little bit	Moderately	Quite a bit	Extremely
How distressed were you at the time of the event?	0	1	2	3	4

A trauma can be defined as an event that a person "witnessed, or was confronted with that involved actual or threatened death or serious injury, or a threat to the physical integrity of the self or others" and that "the person responded to it with intense fear, helplessness, or horror"	**Yes**	**No**
Using this definition of trauma, was the event that you indicated above traumatic?	1	0

Instructions: Please keep in mind the MOST STRESSFUL EVENT you described 1 year ago when answering the following questions. If you don't recall the event you described 1 year ago, please keep in mind the MOST STRESSFUL EVENT of your professional career that you described previously.

Reminder: If you did NOT identify a single distressing event when you completed the questionnaire last year, please answer these questions with respect to your career, more generally.

Instructions: Keeping in mind THE STRESSFUL SITUATION YOU IDENTIFIED IN THE FIRST SURVEY, please read each problem carefully and circle one of the numbers to the right to indicate how much you have been bothered by the problem **IN THE PAST MONTH:**

	Not at all	A little bit	Moderately	Quite a bit	Extremely
Repeated disturbing memories, thoughts, or images of the stressful experience?	1	2	3	4	5
Repeated, disturbing dreams of the stressful experience?	1	2	3	4	5
Suddenly acting or feeling as if the stressful experience were happening again (as if you were reliving it)?	1	2	3	4	5

Feeling very upset when something reminded you of the stressful experience?	1	2	3	4	5
Having physical reactions (e.g., heart pounding, trouble breathing, or sweating) when something reminded you of the stressful experience?	1	2	3	4	5
Avoiding thinking about or talking about the stressful experience or avoiding having feelings related to it?	1	2	3	4	5
Avoiding activities or situations because they remind you of the stressful experience?	1	2	3	4	5
Trouble remembering important parts of the stressful experience?	1	2	3	4	5
Loss of interest in activities that you used to enjoy?	1	2	3	4	5
Feeling distant or cut off from other people?	1	2	3	4	5
Feeling emotionally numb or being unable to have loving feelings for those close to you?	1	2	3	4	5
Feeling as if your future will somehow be cut short?	1	2	3	4	5
Trouble falling or staying asleep?	1	2	3	4	5
Feeling irritable or having angry outbursts?	1	2	3	4	5
Having difficulty concentrating?	1	2	3	4	5
Being "super alert" or watchful or on guard?	1	2	3	4	5
Feeling jumpy or easily startled?	1	2	3	4	5

Instructions: Keeping in mind THE STRESSFUL SITUATION YOU IDENTIFIED IN THE FIRST SURVEY, indicate for each of the statements below the degree to which this change occurred in your life **OVER THE COURSE OF THE PAST YEAR**, using the following scale.

Possible Areas of Growth and Change	I did not experience this change	I experienced this change to a:				
		very small degree	small degree	moderate degree	great degree	very great degree
I changed my priorities about what is important in life.						
I have a greater sense of harmony with the world.						
I have a greater appreciation for the value of my own life.						
I developed new interests.						
I have a greater feeling of self-reliance.						
I have a better understanding of spiritual matters.						
I more clearly see that I can count on people in times of trouble.						
I established a new path for my life.						
I have greater clarity about life's meaning.						
I have a greater sense of closeness with others.						
I am more willing to express my emotions.						
I know better that I can handle difficulties.						
I am able to do better things with my life.						
I am better able to accept the way things work out.						
I can better appreciate each day.						
I feel more connected with all of existence.						
New opportunities are available which wouldn't have been otherwise.						
I have more compassion for others.						
I put more effort into my relationships.						

I am more likely to try to change things which need changing.						
I have a stronger religious faith.						
I discovered that I'm stronger than I thought I was.						
I learned a great deal about how wonderful people are.						
I feel better able to face questions about life and death.						
I better accept needing others.						

Instructions: After an experience like the one you reported, people sometimes, but not always, find themselves having thoughts about their experience even though they don't try to think about it. **Keeping in mind THE STRESSFUL SITUATION YOU IDENTIFIED IN THE FIRST SURVEY**, indicate for the following items how often, if at all, you had the experiences described **OVER THE COURSE OF THE PAST YEAR**.

	Not at all	A Little	Somewhat	A Lot	Extremely
I thought about the event when I did not mean to.	1	2	3	4	5
Thoughts about the event came to mind and I could not stop thinking about them.	1	2	3	4	5
Thoughts about the event distracted me or kept me from being able to concentrate.	1	2	3	4	5
I could not keep images or thoughts about the event from entering my mind.	1	2	3	4	5
Thoughts, memories, or images of the event came to mind even when I did not want them.	1	2	3	4	5
Thoughts about the event caused me to relive my experience.	1	2	3	4	5
Reminders of the event brought back thoughts about my experience.	1	2	3	4	5
I found myself automatically thinking about what had happened.	1	2	3	4	5
Other things kept leading me to think about my experience.	1	2	3	4	5
I tried not to think about the event, but could not keep the thoughts from my mind.	1	2	3	4	5

After an experience like the one you reported, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. **Keeping in mind THE STRESSFUL SITUATION YOU IDENTIFIED IN THE FIRST SURVEY**, indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated **OVER THE COURSE OF THE PAST YEAR**.

	Not at all	A Little	Somewhat	A Lot	Extremely
I thought about whether I could find meaning from my experience.	1	2	3	4	5
I thought about whether changes in my life have come from dealing with my experience.	1	2	3	4	5
I forced myself to think about my feelings about my experience.	1	2	3	4	5
I thought about whether I have learned anything as a result of my experience.	1	2	3	4	5
I thought about whether the experience has changed my beliefs about the world.	1	2	3	4	5
I thought about what the experience might mean for my future.	1	2	3	4	5

I thought about whether my relationships with others have changed following my experience.	1	2	3	4	5
I forced myself to deal with my feelings about the event.	1	2	3	4	5
I deliberately thought about how the event had affected me.	1	2	3	4	5
I thought about the event and tried to understand what happened.	1	2	3	4	5

Thank you so much for your time.

8. T2 survey in French

Consignes générales :

En complétant ce questionnaire, nous vous prions d'accorder votre attention aux questions qui vous sont posées. Si une question vous pose problème, veuillez l'interpréter du mieux que vous le pouvez. Il n'y a pas de bonne ou de mauvaise réponse. Nous sommes sincèrement intéressés par vos expériences et ressentis personnels.

Veuillez entrer le numéro ID qui vous a été donné dans l'email précédent : ……

Consignes : Veuillez indiquer la manière dont vous avez perçu vos collègues et supérieurs AU COURS DE L'ANNEE QUI VIENT DE S'ECOULER.

	Fortement en désaccord	**En désaccord**	**D'accord**	**Fortement d'accord**
Mon supérieur réussi facilement à faire collaborer ses subordonnés	1	2	3	4
Mon supérieur m'aide à mener ma tâche à bien	1	2	3	4
Les collègues avec qui je travaille sont des gens professionnellement compétents	1	2	3	4
Les collègues avec qui je travaille m'aident à mener les tâches à bien	1	2	3	4
Mon supérieur prête attention à ce que je dis	1	2	3	4
Mon supérieur se sent concerné par le bien-être de ses subordonnés	1	2	3	4
Les collègues avec qui je travaille sont amicaux	1	2	3	4
Les collègues avec qui je travaille me manifestent de l'intérêt	1	2	3	4

	Oui	**Non**
Avez-vous vécu un événement stressant au cours de l'année qui vient de s'écouler, depuis que vous avez compléter le premier questionnaire de cette étude ? (Si non, veuillez passer à la page suivante)	1	0

Si oui, décrivez brièvement cet événement :

……

……

Date de l'événement (mois & année) : ……

	Pas du tout	Un peu	Modérément	Plutôt	Extrêmement
A quel point étiez-vous stressé lors de cet événement ?	0	1	2	3	4

Un trauma peut être défini comme un événement auquel une personne est confrontée et qui implique un risque réel ou potentiel de mort ou de blessure grave, ou un risque de porter atteinte à l'intégrité physique de soi ou d'autrui » et auquel « la personne a réagi avec une peur intense, un sentiment d'impuissance, et d'horreur »	Oui	Non
En vous appuyant sur cette définition du trauma, l'événement que vous avez décrit précédemment était-il traumatique ?	1	0

Lorsque vous aviez complété le premier questionnaire de cette étude il y a 1 an, nous vous avions demandé de décrire l'événement le plus stressant que vous aviez vécu dans le cadre de votre travail. Veuillez garder cet événement en tête lorsque vous répondrez aux questions suivantes.

Note : Si vous n'aviez pas décrit d'événement en particulier lors du premier questionnaire, veuillez répondre aux questions suivantes en considérant votre carrière de manière plus générale.

Si possible, décrivez brièvement l'événement que vous aviez décrit il y a 1 an :
……
……

Si vous ne vous rappelez pas de l'événement que vous aviez décrit il y a 1 an, veuillez décrire L'EVENEMENT LE PLUS STRESSANT que vous ayez vécu dans le cadre de votre travail (sinon, veuillez passer à la question suivante) :

……
……

Date de l'événement (mois & année) : ……

	Pas du tout	Un peu	Modérément	Plutôt	Extrêmement
A quel point étiez-vous stressé lors de cet événement ?	0	1	2	3	4

Un trauma peut être défini comme un événement auquel une personne est confrontée et qui implique un risque réel ou potentiel de mort ou de blessure grave, ou un risque de porter atteinte à l'intégrité physique de soi ou d'autrui » et auquel « la personne a réagi avec une peur intense, un sentiment d'impuissance, et d'horreur »	Oui	Non

En vous appuyant sur cette définition du trauma, l'événement que vous avez décrit précédemment était-il traumatique ?	1	0

Consignes : Veuillez garder en tête <u>L'EVENEMENT LE PLUS STRESSANT que vous avez décrit il y a 1 an</u> en répondant aux questions suivantes. Si vous ne vous rappelez pas de l'événement que vous avez décrit il y a 1 an, <u>veuillez garder en tête L'EVENEMENT LE PLUS STRESSANT que vous avez décrit sur la page précédente.</u>

Rappel : Si vous n'aviez pas décrit d'événement en particulier lors du premier questionnaire, veuillez répondre aux questions suivantes en considérant votre carrière de manière plus générale.

Consignes : En gardant en tête **<u>L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ il y a 1 an</u> (ou l'événement que vous avez décrit sur la page précédente)**, veuillez lire chaque problème avec soin et entourer un chiffre à droite pour indiquer à quel point vous avez été perturbé par ce problème **<u>DANS LE MOIS QUI VIENT DE S'ÉCOULER.</u>**

	Pas du tout	***Un peu***	***Parfois***	***Souvent***	***Très souvent***
18. Être perturbé(e) par des souvenirs, des pensées ou des images en relation avec cet épisode stressant.	1	2	3	4	5
19. Être perturbé(e) par des rêves répétés en relation avec cet événement.	1	2	3	4	5
20. Brusquement agir ou sentir comme si l'épisode stressant se reproduisait (comme si vous étiez en train de le revivre).	1	2	3	4	5
21. Se sentir très bouleversé(e) lorsque quelque chose vous rappelle l'épisode stressant.	1	2	3	4	5
22. Avoir des réactions physiques, par exemple, battements de cœur, difficultés à respirer, sueurs lorsque quelque chose vous a rappelé l'épisode stressant.	1	2	3	4	5
23. Eviter de penser ou de parler de votre épisode stressant ou éviter des sentiments qui sont en relation avec lui.	1	2	3	4	5
24. Eviter des activités ou des situations parce qu'elles vous rappellent votre épisode stressant.	1	2	3	4	5
25. Avoir des difficultés à se souvenir de parties importantes de l'expérience stressante.	1	2	3	4	5
26. Perte d'intérêt pour des activités qui habituellement vous faisaient plaisir.	1	2	3	4	5
27. Se sentir distant ou coupé(e) des autres personnes.	1	2	3	4	5
28. Se sentir émotionnellement anesthésié(e) ou incapable d'avoir des sentiments d'amour pour ceux qui sont proches de vous.	1	2	3	4	5
29. Se sentir comme si l'avenir était raccourci ou bouché.	1	2	3	4	5
30. Avoir des difficultés pour vous endormir ou rester endormi(e).	1	2	3	4	5
31. Se sentir irritable ou avoir des bouffées de colère.	1	2	3	4	5
32. Avoir des difficultés à vous concentrer.	1	2	3	4	5
33. Être en état de super-alarme, sur la défensive en permanence.	1	2	3	4	5
34. Se sentir énervé(e) ou sursauter facilement.	1	2	3	4	5

Consignes : En gardant à l'esprit L'ÉVÉNEMENT STRESSANT QUE VOUS AVEZ IDENTIFIÉ il y a 1 an, veuillez indiquer à quel degré les changements suivants se sont produits dans votre vie **AU COURS DE L'ANNEE QUI VIENT DE S'ECOULER.**

Domaines possibles de croissance et de changement	Je n'ai pas ressenti ce changement	J'ai ressenti :				
		Un très léger changement	Un léger changement	Un changement modéré	Un changement important	Un changement très important
J'ai changé mes priorités par rapport à ce qui est important dans la vie.						
Je me sens davantage en harmonie avec le monde						
J'apprécie davantage ma vie à sa juste valeur.						
J'ai développé de nouveaux centres d'intérêts.						
J'ai davantage le sentiment de pouvoir compter sur moi-même.						
J'ai une meilleure compréhension de ce qui touche à la spiritualité.						
Je vois plus clairement que je peux compter sur les autres dans les moments difficiles.						
J'ai donné une nouvelle orientation à ma vie.						
Je comprends davantage le sens de la vie						
J'ai davantage le sentiment d'être proche des autres.						
J'exprime plus volontiers mes émotions.						
Je sais davantage que je peux gérer les difficultés.						
Je suis capable de faire de meilleures choses dans ma vie.						
Je suis davantage capable d'accepter la tournure que prennent les choses.						
J'arrive davantage à apprécier chaque jour.						
Je me sens davantage connecté au monde qui m'entoure						
De nouvelles opportunités s'offrent à moi, ce qui n'aurait pas été le cas autrement.						

J'ai plus de compassion pour les autres.						
Je m'investis davantage dans mes relations.						
Je suis plus enclin à essayer de changer les choses qui ont besoin d'être changées.						
Mes croyances religieuses sont plus fortes.						
J'ai découvert que j'étais plus fort/forte que je ne le pensais.						
J'ai vraiment appris à quel point les gens sont merveilleux.						
Je me sens davantage capable de faire face aux questions qui portent sur la vie et la mort						
J'accepte mieux d'avoir besoin des autres.						

Consignes : A la suite d'un événement tel que celui que vous avez décrit, les gens ont parfois, mais pas toujours, des pensées récurrentes de cet événement qui leur viennent en tête. Veuillez indiquer la fréquence à laquelle vous avez vécu les expériences décrites dans le tableau ci-dessous AU COURS DE L'ANNEE QUI VIENT DE S'ECOULER.

	Pas du tout	**Un peu**	**Modérément**	**Beaucoup**	**Extrêmement**
J'ai pensé à l'événement sans que cela ne soit intentionnel	1	2	3	4	5
Des pensées concernant l'événement me sont venues en tête et je ne pouvais pas arrêter d'y penser	1	2	3	4	5
Des pensées concernant l'événement m'ont distrait ou m'ont empêché de me concentrer	1	2	3	4	5
Je ne pouvais pas empêcher des images ou des pensées concernant l'événement de me venir en tête	1	2	3	4	5
Des pensées, des souvenirs, ou des images de l'événement me sont venus en tête même lorsque je n'en avais pas envie	1	2	3	4	5
Des pensées concernant l'événement m'ont fait « revivre » mon expérience	1	2	3	4	5
Des rappels de l'événement ont ravivé des pensées concernant mon expérience	1	2	3	4	5
Je pensais automatiquement à ce qui s'était passé	1	2	3	4	5
D'autres choses m'ont reconduit sans cesse à penser à mon expérience	1	2	3	4	5
J'ai essayé de ne pas penser à l'événement, mais ne pouvais pas empêcher ces pensées d'entrer dans mon esprit	1	2	3	4	5

Consignes : A la suite d'un événement tel que celui que vous avez décrit, les gens passent parfois **délibérément et intentionnellement** du temps à penser à l'expérience qu'ils ont vécue. Veuillez indiquer la fréquence à laquelle vous avez **délibérément passé du temps** à penser aux problèmes indiqués ci-dessous AU COURS DE L'ANNEE QUI VIENT DE S'ECOULER.

	Pas du tout	**Un peu**	**Modérément**	**Beaucoup**	**Extrêmement**
Je me suis demandé(e) si je pouvais trouver du sens à l'expérience que j'ai vécue	1	2	3	4	5
Je me suis demandé(e) si des changements s'étaient produits dans ma vie à la suite de cette expérience	1	2	3	4	5
Je me suis forcé(e) à penser à mes sentiments concernant l'expérience	1	2	3	4	5
Je me suis demandé(e) si j'avais appris quelque chose de cette expérience	1	2	3	4	5
Je me suis demandé(e) si cette expérience avait changé mes croyances concernant le monde qui m'entoure	1	2	3	4	5
Je me suis demandé(e) ce que l'expérience signifiait pour mon avenir	1	2	3	4	5
Je me suis demandé(e) si mes relations avec autrui avaient changé à la suite de cette expérience	1	2	3	4	5
Je me suis forcé(e) à gérer mes sentiments concernant l'expérience	1	2	3	4	5
Je me suis délibérément demandé comment l'événement m'avait affecté	1	2	3	4	5
J'ai pensé à l'événement et j'ai essayé de comprendre ce qui s'était passé	1	2	3	4	5

Merci infiniment de nous avoir accordé votre temps.