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REPORT **R-786**

Predictors of Posttraumatic Stress Disorders in Police Officers

Prospective Study

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Predictors of Posttraumatic Stress Disorders in Police Officers

Prospective Study

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Abstract

Occupational health and safety and specific objectives of project – The purpose of this research project was to arrive at a better understanding of the development of posttraumatic stress disorder (PTSD) following a work-related accident by studying the associated risk and protective factors. The project originated with a request from the police, as officers are often exposed to traumatic events (TEs). The researchers worked on the hypothesis that peri- and posttraumatic factors could better explain the development of PTSD and workers' ability to cope with TEs than pretraumatic factors. This study is original in that it focuses on little-researched protective factors, distinguishes three types of factors (pre-, peri- and posttraumatic) and concerns Quebec police officers. It is innovative in that it includes both men and women and has not only a *retrospective* component, but also an additional *prospective* analysis essential to a better understanding of the predictors of PTSD. While this research report concentrates on the findings of the *prospective* analysis, it also makes connections with the data presented in the *retrospective* research report [1].

Method – Eighty-three officers of the Service de Police de la Ville de Montréal (SPVM) and other police departments in Quebec participated voluntarily in a repeated-measures *prospective* study (quasi-experimental design). They had all been involved in a major traumatic event between May 2006 and May 2010. They were assessed, on average, between 5 and 15 days, 1 month, 3 months and 12 months after the event. The same measurement instruments as for the retrospective study — semistructured interviews and self-reports—were used to determine whether or not the police officer was suffering from PTSD and to evaluate various predictors associated with PTSD development. These instruments were chosen for their psychometric and clinical properties and because they offer appropriate testing of the research hypotheses. Multivariate statistical analysis was conducted to identify more specifically the main predictors at work and the strength of their impact on PTSD.

Findings – The *prospective* study findings show that 3% of police officers suffered from clinical PTSD, while 9% experienced partial PTSD. In contrast, data from the *retrospective* study show that 7.6% of the officers in the sample had clinical PTSD, whereas 6.8% were affected by partial PTSD. In the *prospective* component, the regression analysis results indicate that posttraumatic risk factors (i.e., the symptoms of acute stress disorder [ASD] and depression) are the main predictors. Pretraumatic (emotional stress-management techniques) and peritraumatic (peritraumatic distress and dissociation) risk factors, though less critical, are still significant. We did not observe any protective factors associated negatively with PTSD symptoms. The results of multiple logistic regression analysis from the *retrospective* study suggest that peritraumatic risk and protective factors (i.e., dissociation and social support during the event) are the chief predictors. The results of the retrospective study descriptive analyses show that officers resorted to a variety of ways and strategies to cope with a critical event at work. The officers said that what particularly helped them after a TE was to talk to colleagues about it, make use of support services and have time off. Their advice to other officers who are exposed to a critical event is to talk about it and to see a psychologist, and the majority of them are open to receiving this kind of support service if needed.

Conclusions – The low rate of PTSD among police officers assessed in the study contrasts with initial expectations. It suggests that they are resilient, despite the fact that they represent a population with a high risk of experiencing TEs in the course of their work. The study findings corroborate a number of elements found in the literature on various populations, including the police. Since the factors associated with the development of PTSD in police officers (i.e., dissociation, emotional and physical reactions, ASD, symptoms of depression, emotional stress-management techniques) can potentially be mitigated or prevented, specific, tailored measures could be developed to target these factors with a view to achieving better results in the prevention of PTSD. The factors associated with coping following trauma (i.e., hardiness, social support) can be developed or strengthened through preventive strategies that should generally be incorporated into police training programs. The findings of this study could enhance training given as part of the police officer assistance program (PAPP) of the SPVM and other police departments. They also underscore the importance of taking a preventive approach, which is already the case at the SPVM. The approach could also be adopted by the employee assistance programs of other police forces.

Foreseeable impact – This study, the first of its kind in Quebec, could serve as a benchmark for further research using a sample of Quebec police officers. The knowledge gained should help screen for and prevent PTSD. In addition, police departments should be able to use the study recommendations to develop strategies that foster the development of TE protective mechanisms and reduction of the risk factors involved. The study could have a significant impact on other occupational groups at high risk of exposure to TEs, such as firefighters, ambulance attendants, first responders and social workers.

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1. INTRODUCTION

Police officers, due to the nature of their work, are continually exposed to incidents characterized by unpredictability, danger to their personal safety and close contact with death (e.g., traffic accidents, shootings, suicides, homicides). An analysis of data from Quebec's Commission de la santé et de la sécurité du travail (CSST)[1] shows that police officers are one of the occupational groups most often exposed to violence in the workplace [2]. Workplace violence and traumatic events (TE) can have a profound impact on a person's psychosocial functioning and even lead to posttraumatic stress disorder (PTSD) [3-5]. Significant posttraumatic stress reactions are seen in close to 30% of women and slightly over 15% of men who are victims of violence at work [2]. These figures indicate that posttraumatic stress is the most frequent effect for all workers. As the same authors note [2], research in the field must aim to reduce the risks and consequences of this problem in the occupational groups most affected, which include police officers.

The purpose of this study, which originated with a request for assistance from the police officer assistance program (PAPP) of the Service de Police de la Ville de Montréal (SPVM)[2] and the SPVM labour-management joint committee, was to identify the predictors of PTSD to promote more effective prevention. The study reflects the objectives of the Association paritaire pour la santé et la sécurité du travail, secteur "affaires municipales" (APSAM).[3] This labour-management health and safety organization, which seeks to develop ways to protect health, ensure safety and physical integrity and foster greater responsibility by the police community, is becoming increasingly aware of the psychosocial risks of police work. Indeed, it is determined to tackle the issue of the trauma to which police officers are exposed in performing their duties [6]. As a result, APSAM also lent its support to the research.

Before we go any further, it is important to explain that PTSD is a reaction to a traumatic event (a stressor). The victim has experienced, witnessed or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others. In addition, the person's response generally involves intense fear, helplessness or horror [7]. Police officers work in hazardous environments in which they are liable to experience TEs.[4] At the SPVM, approximately 9 major events (i.e., an event involving at least four officers) and over 50 traumatic individual and specific critical incidents are reported every year (SPVM joint committee, personal communication, June 6, 2003).

1 CSST: Quebec occupational health and safety board.

2 SPVM: City of Montreal police department.

3 APSAM: Joint labour-management association for occupational health and safety, municipal affairs sector.

4 The term "traumatic event" (TE) is used throughout this report to refer to any event with the potential to traumatize. A TE does not necessarily lead to posttraumatic reactions. A critical incident or major event, to use police jargon, is considered to be an event that could potentially be traumatic.

2. BACKGROUND

The lifetime prevalence rate of PTSD for groups with a high risk of experiencing a TE is generally estimated to be between 30% and 45% [8], while for the general population, it is between 7% and 8% [9, 10]. Police officers are a high-risk population for exposure to TEs and subsequent development of PTSD. While some studies report higher rates of PTSD prevalence for police than for the general population (13%–35%; [11-14]), others note similar prevalence rates for the two populations (6%–9%; [15-19]). Some police forces do not appear to be any more at risk of developing PTSD than the general population, even if their officers are more frequently exposed to TEs. None of these studies evaluated Canadian or Quebec police officers specifically. As a result, there is no data at present on PTSD prevalence in the Canadian or Quebec police populations. However, of CSST-compensated injuries between 2000 and 2002, the number of posttraumatic stress cases was four times higher for police officers than for all Quebec workers taken together [20].

PTSD causes persistent avoidance behaviour with respect to stimuli associated with the event, as well as a general numbing of reactions, sustained symptoms of neurovegetative activation, constant reliving of the traumatic event and a significant deterioration in ability to function (i.e., problems at work and in interpersonal relationships) [7]. Psychologically, the suffering caused by PTSD can be so severe that it can trigger anxiety disorder, depression, psychotropic drug abuse, divorce and even suicide [21, 22]. Physically, the impact of a traumatic experience can result in increased use of health care services and medication. At work, this psychological disorder can have far-reaching consequences, with exorbitant costs for the individual and the organization: reduced performance at work and absenteeism, sharp increase in compensation payments and insurance claims to the CSST or other government agencies [23, 24].

While experiencing a TE is a necessary condition for developing PTSD, it is not a sufficient condition. Whether or not an individual can resume a normal life after a TE often depends on the presence or absence of various factors that influence posttraumatic reactions. For instance, risk factors increase the probability that exposure to a TE will have a long-term impact on the individual's psychological well-being. They are associated with the development, maintenance or exacerbation of posttraumatic symptoms. In contrast, protective factors make coping easier following a TE by preventing posttraumatic symptoms or reducing their intensity [25]. More extensive knowledge of the various predictors of posttraumatic symptoms will help prevent development of PTSD in police officers and provide more appropriate treatment to those who have it. Preventing PTSD in police officers is essential, as they are constantly exposed to TEs that have the potential to cause posttraumatic reactions [26].

This research project, which is the second, *prospective*, part of the study, seeks to clearly identify the risk and protective factors that influence the development of PTSD following a traumatic event, with a view to preventing the disorder in a police population. Current knowledge about PTSD predictors is set out below. The factors involved can be divided into three distinct categories: pretraumatic factors (characteristics that existed before the trauma), peritraumatic (specific circumstances at time of and immediately after the TE) and posttraumatic (characteristics that develop following the trauma). While the list of factors is not exhaustive, the most relevant predictors, and those for which there is significant empirical evidence of their involvement in posttraumatic reactions, are examined briefly in the following sections. A more

comprehensive review of risk and protective factors is provided in the book chapter by Martin, Germain and Marchand [27].

2.1 Pretraumatic Risk Factors

2.1.1 *In General Population*

In various population groups, personal and family psychiatric and psychological histories (e.g., substance abuse, dependency, depression, anxiety) or past trauma (e.g., physical or sexual abuse) are risk factors for the development of PTSD [28-31]. As well, having strong fundamental beliefs that the world is good, just and logical and believing in one's worth and personal invulnerability could make a person more susceptible to increased pathological symptoms following a TE [32]. Having such beliefs proven unfounded by a traumatic experience and encountering problems coming to terms with the experience raise the probability that the victim will develop and continue to suffer from PTSD symptoms [32].

Women appear to be more vulnerable than men to developing PTSD [30, 33, 34] and to suffering from it as a chronic condition [31]. However, the TEs experienced by women differ from those suffered by men. Women are more likely to be victims of sexual assault, whereas men are more often the targets of physical assaults [9, 33]. The event itself, rather than gender, may be associated with greater vulnerability. However, even when the type of trauma experienced is controlled for, women seem to be more vulnerable than men to the development of PTSD [9, 35]. In contrast, other studies have not found any association between gender and PTSD [36-38]. So far, a range of sociodemographic data (e.g., age, gender, ethnic group, level of education) have been studied as possible predictors. The findings of these studies have not been conclusive. This would seem to be due, in part, to the fact that sociodemographic data often involve concomitant or confounding variables that can themselves influence or even explain people's vulnerability or resilience. To take just one example, a low level of education may be associated with other variables, such as low socioeconomic status. It is therefore not easy to determine the predictive force of sociodemographic data, as findings vary from one study to the next [27].

2.1.2 *In Police Population*

Among police officers, greater exposure to TEs at work over the last year, along with an accumulation of traumatic experiences or stressors in the workplace, predisposes them to the development of posttraumatic reactions [14, 39-42]. Other studies have shown that for young officers, less experience increases the probability that they will develop PTSD symptoms following a TE. This is likely due to the fact that young officers have not developed sufficient coping strategies to deal with the high level of stress associated with police work [17, 43]. The impact of past personal traumas (e.g., during childhood) also seems to be a significant factor in predicting short- and long-term posttraumatic symptoms in police [44, 45]. Some authors have noted, in a prospective study of police officers, that family psychopathological history (mood and anxiety disorders and substance abuse) is a vulnerability factor in the development of PTSD following a traumatic experience [46]. In addition, police officers who reported higher levels of organizational stress had more serious posttraumatic symptoms at the time of the study [40, 47-49]. When it comes to sociodemographic factors such as age, gender, social standing, marital

status and level of education, the findings of various studies are mixed. However, being of Hispanic origin is a risk factor associated with more serious posttraumatic symptoms, even after controlling for other sociodemographic data and the frequency and severity of exposure to critical incidents [50, 51]. Contrary to the general population, women police officers do not appear to be any more at risk of developing PTSD than their male coworkers [13, 43, 50, 52]. Neurotic personality traits, involving sensitivity to negative stimuli, and dissociative traits, found in people who tend to experience a state of dissociation when exposed to a TE, are associated with more-intense PTSD symptoms among police officers [17, 49, 53, 54]. Moreover, having an external locus of control (i.e., constantly perceiving events to be caused by external forces beyond one's control) seems to be related to the development of posttraumatic symptoms. Police officers who repress their emotions, have trouble expressing them and those who tend to show their anger more have a higher risk of developing posttraumatic stress reactions [15, 55]. Sensitivity to anxiety (i.e., being afraid of the consequences associated with the physical symptoms of anxiety) is also a PTSD risk factor for police [12]. Lastly, from a psychobiological standpoint, one study has suggested that hypersensitivity to threatening situations, high reactivity of the sympathetic nervous system when confronted with an explicit, imminent threat, and a failure to cope with repeated aversive stimuli (slower habituation) are prospective predictors of the severity of posttraumatic symptoms in novice police officers [56].

2.2 Peritraumatic Risk Factors

2.2.1 *In General Population*

In some population groups, those who experience strong negative emotional reactions (e.g., fear, guilt, shame, anger, disgust, sadness) or strong physical reactions of anxiety (e.g., palpitations, trembling, dizziness, sweating, hot flushes or shivering) during and immediately after the TE are more vulnerable to the development of PTSD [57-60]. More recently, researchers have been increasingly focusing on a more global construct, called peritraumatic distress. It refers to the negative emotional responses and physical reactions of anxiety experienced during or immediately after a TE [61]. Among the victims of an industrial disaster, peritraumatic distress was found to be a predictor of PTSD [62]. One of the key components of peritraumatic distress is the notion of loss of control (i.e., of one's emotions, of one's sphincter, bladder or bowels), which is directly associated with the development of posttraumatic symptomatology [63]. In addition, many studies suggest that peritraumatic dissociation (i.e., detachment, lack of emotional reactivity, sense of derealization, depersonalization, etc.) is a vulnerability factor in the emergence of posttraumatic stress symptoms [57, 58, 62, 64-66]. Dissociative reactions generally occur in a situation where peritraumatic distress is high, although some people can experience intense distress without dissociating [61, 67]. Lastly, the meta-analyses conducted by Ozer et al. [68], Breh and Seidler [69] and Lensvelt-Mulders et al. [70], which cover, respectively, 35, 59 and 68 empirical studies, confirm that peritraumatic dissociation is a high risk factor in the development of PTSD.

A study of traffic accident victims shows that an initial feeling of fright at the time of the event substantially increases the risk of developing PTSD [71]. Fright is a reaction that shares some of the characteristics of peritraumatic dissociation. In fact, fright essentially involves a complete absence of emotion, of thought or words, or the feeling of being frozen during part of the event.

Another study, of patients who had suffered a heart attack, shows that fright is associated with posttraumatic symptoms three months after the event [72]. TE severity has also been associated with the development of PTSD [37, 59, 73, 74]. On the other hand, the findings of the various studies are mixed, as in a study of survivors, the severity of the TE was not a predictor of posttraumatic symptoms [75]. Some researchers measure the severity of the TE by considering the objective characteristics associated with the event. Of these characteristics, the duration of the event, for instance, influences the posttraumatic stress reactions [76, 77]. Thus, the longer the exposure to the TE, the more severe the PTSD symptoms [78]. At the same time, incidents involving the discovery of injured and deceased people are more likely to cause the development of PTSD [79], just as, in clinical experience, unexpected or deliberate events that put the individual's life in danger or that are physically or psychologically degrading are likely to. Events that result in bodily injuries are associated more with the development of PTSD than traumatic experiences that do not cause such injuries [80, 81].

2.2.2 *In Police Population*

Among police officers, peritraumatic distress, peritraumatic dissociation and emotional and physical reactions during trauma are predictors of PTSD [15, 17, 18, 43, 46, 50, 51, 53, 54, 61, 82]. A number of studies have shown that exposure to death during the TE, the existence of a threat to human life or to the personal safety of the officer or the officer's partner, and the severity of the exposure are risk factors in the development of PTSD [15, 17, 19, 43, 82-84]. However, one study indicates that the perception of proximity to death is not associated with the development of PTSD [85]. Certain types of TE—such as witnessing gunshots that put one's own life or a coworker's life in danger, witnessing child abuse, death, including homicide victims, or victims of serious traffic accidents—seem to have a major impact on the development of posttraumatic symptoms in the police population [42, 44]. Lastly, one study has noted that police officers who perform what are for them unusual tasks during major events (e.g. doing what a firefighter would usually do) have a higher risk of developing PTSD than those who carry out their usual police duties [19].

2.3 Posttraumatic Risk Factors

2.3.1 *In General Population*

Among accident victims, depressive symptoms [75], additional stressors that arise following the TE (e.g., job loss, financial or legal problems, illness or death of a family member or friend) [86, 87] and acute stress disorder (ASD) [62, 88-90] are indicators for the future development of PTSD. Ingram et al. [91] have shown that a social network that offers little or no support is associated with poor posttraumatic adjustment.

2.3.2 *In Police Population*

Among police officers, the limited amount of time granted by the employer to recover from the TE, the general dissatisfaction with the organizational support offered and the lack of support outside of work after the TE seem to be factors that predict the development of posttraumatic symptoms [15]. Physical injury from the TE, depressive symptoms and post-TE negative life

events appear to be posttraumatic risk factors in the development of PTSD in police officers [12, 48, 54, 85]. Officers who report having used avoidance-based stress-management techniques to cope with the TE tend to experience greater posttraumatic symptomatology [17, 49, 51, 92, 93]. In addition, among police officers, psychological debriefing after the event either has no effect on PTSD symptoms [94] or may cause more symptoms [95, 96].

2.4 Pretraumatic Protective factors

2.4.1 *In General Population*

People can use a variety of *behavioural or cognitive stress management strategies* [97]. Among the usual stress management strategies, there are problem-focused coping strategies (efforts aimed to change the situation by using a problem-solving strategy) and emotion-focused strategies (efforts aimed to change the negative interpretation of the situation and to soothe negative emotions through strategies such as avoidance or daydreaming) [97]. Individuals tend to use the same stress management method throughout their lives, which means that the use of stress management strategies is considered to be a relatively stable pretraumatic characteristic. Persian Gulf War returnees who did not have PTSD symptoms tended to use more problem-focused coping strategies and fewer strategies based on avoidance and daydreaming than their colleagues with PTSD [98]. A stress-resilient or stress-resistant personality copes better after a TE [99]. In fact, an individual with that kind of hardiness assesses stressful events appropriately and shows an ability to cope with them when they arise [100]. More specifically, this personality type is characterized by an aptitude for engagement in the community and a strong feeling of control that enables the person to make decisions and assume responsibility for them. It is also related to flexibility, optimism, good self-esteem, ability to face challenges, the capacity to attribute events appropriately and to make sense of events experienced [101, 102]. Furthermore, a feeling of self-efficacy (i.e., having high expectations of one's own effectiveness in performing various activities and solving problems) is associated with less psychological distress and fewer posttraumatic symptoms in victims of natural disasters [103] and firefighters [104, 105]. People with a high sense of self-efficacy expect to be successful, solve problems, overcome challenges and be able to handle stressful situations.

2.4.2 *In Police Population*

Some studies have found that past experience and appropriate training—that is, having faced stressful situations in the past or having being trained to know how to react to them—are protective factors that help police officers to deal with posttraumatic stress reactions [17, 19, 106, 107]. For individuals at high risk of being involved in a TE, experience may help them feel better equipped to handle what may arise, more in control and less stressed by their work. Appropriate training helps officers to understand and feel comfortable in a well-defined role, reducing their uncertainty about what to do in a given situation and making them more efficient at work [108]. However, other studies of police officers have found that experience and training are not significant protective factors [15, 109]. Furthermore, hardiness, especially the engagement aspect, has been associated with fewer PTSD symptoms among female officers [11, 18, 57]. The findings of the various studies that have examined the use of stress-management

strategies (emotion-focused coping and problem-focused coping) have been inconclusive about which one might be beneficial to police officers who have been exposed to a TE [17, 92, 110].

2.5 Peritraumatic Protective Factors

To our knowledge, there are no documented peritraumatic protective factors and predictors for PTSD in various populations. However, the first, retrospective, part of this research project revealed a new peritraumatic protective factor in the scientific literature on the police population: peritraumatic social support. It has been shown that officers who benefit from the support of their coworkers during or immediately after a TE are less at risk of developing PTSD symptoms [18].

2.6 Posttraumatic Protective Factors

In a number of different populations, appropriate or positive social support after the TE seems to reduce the effects of the stress [111-114]. Family, friends, partner and coworkers are mentioned as major sources of support [101]. In addition, a psychological debriefing, which is a short, early intervention immediately following a TE, can also be effective in supporting the individuals involved in these incidents and, in some cases, can help prevent the development of PTSD [26]. However, these findings are increasingly being contested in the scientific community. Indeed, more and more guidelines, including those of the National Institute for Clinical Excellence (NICE) [115], the Australian Centre for Posttraumatic Mental Health (ACPMH) [116] and the American Psychiatric Association (APA) [117], do not recommend the use of debriefing.

Among police officers, those who perceive greater availability of social support [40, 51, 82], greater satisfaction with the support received [85] and greater emotional support from coworkers and supervisors have fewer posttraumatic symptoms. Officers who perceive a certain openness from their coworkers when they express their emotions and those who feel at ease talking about their traumatic experiences and the emotional impact caused by them in the workplace experience fewer PTSD symptoms [94, 118]. Moreover, positive social support from coworkers [18] and supervisors is reportedly one of the types of support that has the most impact among police officers [52]. Being able to make sense of the traumatic event and feeling that one has the resources required to deal with it—which is also known as a sense of coherence—help reduce PTSD symptoms in police officers [40]. Lastly, providing early intervention, such as psychological debriefing, to police officers after a TE has been shown to have no effect on posttraumatic symptoms [94] and may even give rise to more symptoms [15, 95, 96].

2.7 Influence of Various Predictors in Population

Two recent meta-analyses of PTSD predictors in different populations (civilian and military) highlight interesting findings about the influence of these predictors on the development of PTSD. Brewin et al.'s meta-analysis [86] examines 14 risk factors considered in 77 studies and notes that the most significant risk factors for the subsequent development of PTSD are peritraumatic factors (e.g., severity of TE) and posttraumatic ones (e.g., inadequate social support and subsequent stressful events), as opposed to pretraumatic factors. Ozer et al. [68] also suggest, in their meta-analysis of 7 predictors from 68 studies, that peritraumatic (e.g., perception of threat to life, dissociation and emotional reactions) and posttraumatic factors (e.g., perceived

social support) are more important than pretraumatic factors in explaining the origin of PTSD. Overall, the two meta-analyses reveal findings that are more or less equivalent to those obtained for the police population. They also indicate that the predictive power of the various predictors is not uniform and that the extent of the effect of each predictor may depend on the population in question or other factors. For example, Brewin et al. [86] report that the following predictors are significantly more important in military populations than among civilians: young age at time of trauma, low level of education, minority status, trauma severity and lack of social support.

2.8 Limitations and Scope of Current Knowledge

An increasing number of studies are seeking to identify PTSD predictors more accurately in order to gain greater insight into the development of PTSD and be able to devise prevention strategies. This is a first step in the advancement of current knowledge. However, much of the research in this field suffers from significant methodological shortcomings.

For instance, most of the studies use self-reports, or instruments having restricted psychometric properties, as well as divergent instruments, which considerably limits the interpretation of results and makes it difficult to compare studies. For example, some studies seek to measure symptoms and arrive at a diagnosis of PTSD strictly on the basis of questionnaires or interviews designed by the researchers. As a result, in a high number of cases, the measurement instruments or clinical interviews do not have the psychometric properties required to eliminate sources of error and variations or inconsistency in results stemming from factors related to the instrument itself. Whenever possible, it is essential to use not only the same measurement instruments from one study to the next, but also validated, consistent questionnaires and structured interviews having clinical criteria that have been determined by a large number of past studies (SCID-I, CAPS, MPSS, etc.). Moreover, most studies are retrospective. They do not provide as accurate analysis of the impact of predictors as prospective studies do because they are subject to recall bias. To address these shortcomings, researchers should consider conducting prospective and longitudinal studies. They allow evaluation of the development of the PTSD and the mechanisms that come into play during the period following the TE. However, these studies still need to be conducted over a sufficiently long period of time (e.g., one year or more) to ensure a representative sampling with respect not only to average level of exposure to stressful events, but also to posttraumatic symptoms usually shown by police officers. Some studies measure symptoms and reactions following a TE, but do not specifically assess the diagnosis of ASD and PTSD. Moreover, many retrospective studies assess only the *current* diagnosis of PTSD even though the event itself may have taken place several years earlier. In fact, the individual may have suffered from PTSD during the months following the TE, but has now recovered from it. Studies that assess only current PTSD overlook valuable information. Moreover, the risk factors for developing chronic PTSD (i.e., PTSD that has been present for over three months) could differ substantially from those for acute, non-chronic PTSD. Rarely do studies take this fact into consideration, however. Furthermore, studies that assess a diagnosis of both current PTSD and lifetime PTSD often neglect to distinguish whether the PTSD diagnosis is related to the TE that is the subject of the study, or rather whether it is related to some other trauma that occurred in childhood or adulthood [36]. A number of other studies have also examined the associations between various factors and PTSD using simple regressions or correlations only, transversely but

not prospectively. The disadvantage of this type of analysis is that it cannot establish the causal mechanisms involved, nor identify the best predictors of PTSD.

A variety of different populations—soldiers, accident victims, disaster victims, etc.—have been studied so far, which has broadened our knowledge base. However, few studies have focused on populations at high risk of experiencing TEs, except for soldiers. It is clear that insufficient work has been done on populations at high risk of developing posttraumatic reactions, such as front-line emergency workers (e.g., police officers). Risk and protective factors form a dyad and must be studied jointly in order to gain a better understanding of PTSD development. However, most of the literature has concentrated on risk factors rather than protective factors. Moreover, only rarely have studies explored risk factors in a police population. Even rarer are studies that have assessed protective factors that facilitate recovery following exposure to a TE among police officers. Yet learning more about these factors to prevent PTSD in a high-risk population is absolutely essential.

To sum up, a significant amount of work has been done in the field of trauma, but the findings have been inconclusive. There is currently no consensus about the significance and predictive power of certain factors that influence PTSD symptoms. These ambiguous findings can be explained by the many methodological shortcomings of PTSD research, such as the lack of rigour of many studies, interference between variables, the difficulty of isolating some variables and the retrospective character of most studies. All these weaknesses significantly limit interpretation of the connections found between predictors and PTSD. Further research in this field is required due to the lack of studies on police populations, the fact that many aspects have yet to be explored and because of our limited knowledge on the subject. Our research is an effort in this direction and aims to learn more about protective factors. Indeed, this current project is a high priority, as it was initiated by a request from the PAPP and the SPVM joint committee and is supported by APSAM. Furthermore, it covers both men and women, and women are a population that has not been studied much in the literature. It will therefore be possible to compare findings with respect to gender and determine whether there are any differences in this regard.

2.9 General Purpose of Research

The purpose of this research project is to address the problem concerning the lack of studies with police populations, the lack of prospective studies and the methodological shortcomings that currently exist in the literature, and to expand our knowledge about the predictors of PTSD in police. This study is the second, *prospective*, part of the research program. In addition, in discussing the findings, this research report also seeks to establish certain relationships or draw comparisons with the data produced by the first, *retrospective*, part of the research program. It therefore addresses the overall objective of the research project, which is to gain a better understanding of the development of PTSD in police officers and of the factors involved. More specifically, the study assesses the risk factors that increase police officers' vulnerability to developing PTSD, as well as the protective factors that make it easier for them to cope following a traumatic event.

2.10 Research Hypotheses

Based on data from the literature on various populations, police in particular, and from the *retrospective* part of this research project, the hypotheses of this *prospective* study are as follows:

1. The development of PTSD symptoms and ability to cope following a TE can be better explained by peri- and posttraumatic factors than by pretraumatic ones.

2. The development of PTSD symptoms can be explained, mainly by the following risk factors: dissociative reactions, severity of the event and perception of negative social interactions.

3. The ability to cope following a traumatic event is chiefly tied to a perception of positive social support. As data on protective factors among police officers are scarce, with the exception of support, the impact of the following factors will be examined on an exploratory basis: stress management strategies, hardiness, and years worked as a police officer before the traumatic event.

4. On a descriptive and exploratory basis, for information purposes, we intend to track not only the extent of the prevalence of PTSD and changes in PTSD symptoms over time, but also the distinctive, predictive power, if any, of the risk and protective factors that have an influence on the development of PTSD at different times.

3. RESEARCH METHODS

3.1 Procedure

Police officers were informed of the study through articles published in police brotherhood and police department newsletters. The project was also presented on numerous occasions to senior managers of the SPVM's various divisions, police assistance program officials and the labour-management joint committee. At these meetings, we outlined the project and provided literature and notices to be posted in workplaces, explaining the main points of the study and how to contact the research coordinator following a traumatic event. Overall, most referrals came from police officers themselves (e.g., participants, supervisors, lieutenants and commanders), from the corporate operations division and from the PAPP. Moreover, the fact that a number of major events were covered by newspapers and television enabled the research team to target certain units specifically, to ask them to take part in the study. Several SPVM officers involved in TEs between May 2006 and May 2010 agreed to participate in the prospective study (n = 72). A number of officers from other police departments (e.g., Longueuil, Saint-Jean-sur-Richelieu, Régie intermunicipale de police de la Rivière-du-Nord) were also recruited for the study (n = 11) to ensure that the sample size was large enough to test our hypotheses.

Police officers interested in taking part in the study were asked to contact the project coordinator, who conducted initial screening of participants by telephone. During the telephone interview, officers were informed about what the study entailed, the use of various measurement instruments and data confidentiality. Officers who were still interested in taking part and who met the study criteria were given an initial appointment. They were also urged to suggest to their police partners and other coworkers that they, too, take part in the study if they were involved in the same TE. Participant assessments were held in places where officers felt comfortable, either on the campus of the Université du Québec à Montréal, at the neighbourhood police station or at home. Before starting the assessment, participants were asked to read and sign the consent form. The form stated the purpose of the study—stress reactions following a TE—but did not mention any research hypotheses in order to avoid raising participants' expectations. Participants were assessed at four different times: from 5 to 15 days after the TE (time 1), then 1 month (time 2), 3 months (time 3) and 12 months (time 4) after the event.

The inclusion criteria were more or less the same as for the retrospective study. All the officers had recently been exposed to a TE as defined by PTSD diagnostic criterion A. Under this criterion, the person has experienced, witnessed or been confronted with an event that involved actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others. Furthermore, in order to be considered traumatic, the event must have provoked a response that involved intense fear, helplessness or horror. If the police officer did not feel these emotions during the traumatic event, but reported a response of anger, guilt or shame, the research team deemed that the event still qualified as being traumatic. The other inclusion criteria were the ability to speak and read either French or English and being capable of undergoing a semistructured clinical interview and answering questions. The exclusion criteria were a psychotic state, an organic mental disorder, signs of suicidal intent and any serious illness that, in the evaluator's judgment, could entail a risk for the participant. As it turned out, no participant was excluded from the study for the above-mentioned reasons.

3.1.1 *Police Officers Involved in TEs*

Eighty-three police officers (63 men and 20 women) from the SPVM and other police forces volunteered for the study. Their mean age was 32.6 years (standard deviation = 7.7), their mean number of years of schooling or education was 15.6 (standard deviation = 1.9), and 54% of them were married or in a common-law relationship. All officers were currently in active service, and the mean number of years of policing experience was 8.6. Table 1 gives the sociodemographic characteristics of the officers who took part in and completed the study.

Table 1 – Sociodemographic characteristics of police officers exposed to a traumatic event (*N* = 83)

Sociodemographic data	%	*M (SD)*
Gender		
Male (*n* = 63)	76	
Female (*n* = 20)	24	
Age at time of study (*N* = 83)		32.6 (7.7)
Marital status		
Single (*n* = 32)	39	
In relationship (*n* = 45)	54	
Separated or divorced (*n* = 6)	7	
Number of children		
One (*n* = 9)	11	
Two (*n* = 16)	19	
Three or more (*n* = 9)	11	
Number of years of schooling or education (*N* = 83)		15.6 (1.9)
Ethnic origin		
Caucasian	92	
Ethnic minority	8	
Afro-Canadian	5	
Asian	2	
Hispanic	1	
Number of years of experience (*N* = 83)		8.6 (7.3)
Number of hours worked per week (*N* = 83)		35.4 (3.2)

Note: *M* = mean; *SD* = standard deviation

3.2 Measurement Instruments Used

Measurement instruments were chosen for their psychometric and clinical properties and because they were suited to ensure appropriate verification of the research findings and to address the methodological shortcomings of earlier studies. The vast majority of these instruments have been validated in English and French. The French versions of the instruments were used, and the interviews were conducted in French.

3.2.1 *Diagnostic Measurement of PTSD and Other Mental Disorders*

The modules of the *Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I)* [119] were used to assess the presence or absence of current or past mental disorders. The following disorders were evaluated: anxiety disorders, including acute stress disorder (ASD) and PTSD, substance- or alcohol-abuse disorders, and major depressive disorder.

For PTSD, full or partial diagnosis was assessed. A diagnosis of partial PTSD was assigned to subjects who did not have sufficient symptoms to satisfy the conditions for full PTSD, but did have at least one symptom under criterion B, C or D, or at least one symptom under criterion B and two symptoms under criterion D, as set out in DSM-IV [7]. This procedure for arriving at a diagnosis of partial PTSD follows the method used by Schnurr [36]. A diagnosis of subclinical PTSD was also evaluated. This diagnosis was attributed when a participant did not meet the conditions for full or partial PTSD, but had at least one symptom that is listed under criterion B, C or D of DSM-IV [7].

The assessments were administered by trained, qualified assessors. The SCID-I was chosen because it is widely used, and its validity is well recognized for the diagnosis of psychiatric disorders. Most studies of the psychometric properties of the SCID-I were conducted using the previous version (SCID-I, DSM-III-R). Nonetheless, the properties of the older version also apply to the current one (SCID-I, DSM-IV), as the modules are virtually identical [120]. The earlier version had good concomitant validity with clinician judgment ($\kappa = 0.69$) [121], as well as good convergent validity with other PTSD measurements, such as the Impact of Event Scale [122]. For inter-rater reliability, kappa values of 0.87 [112] and 0.77 [123] have been reported. The few studies that have been done with the current version of the SCID-I have reported reliability coefficients comparable to, if not greater than, those of the earlier version [120]. For this study, independent assessors came to inter-rater agreements on a certain number of randomly selected SCID-I interviews (ASD and PTSD module) at each measurement time: time 1 (44%; $n = 35$), time 2 (44%; $n = 36$), time 3 (49%; $n = 39$) and time 4 (50%, $n = 38$). Perfect agreement ($\kappa = 1.0$) was seen for the diagnoses of PTSD and ASD.

3.2.2 *Measurement of Pretraumatic Factors*

An ad hoc questionnaire was used to gather *sociodemographic data* (i.e., gender, age, level of education, ethnic origin, marital status and number of children) and information about *work-related characteristics* (i.e., rank, number of hours of work per week and number of years of police experience) for each officer at the time of the TE. The questionnaire also served to assess an officer's use of medical and psychological services in the 3 months prior to the TE, and the number of stressful events and their intensity (e.g., moving, legal problems, financial problems) experienced in the 12 months leading up to the TE.

A number of *SCID-I* modules can be used to evaluate whether a person was suffering from PTSD or other medical disorders before the TE. Family psychological history was assessed by means of the following question: "Have any members of your family ever had psychological problems?" If so, participants were asked to indicate what their relationship was with that person and specify what kind of problems the person had.

The *Coping Inventory for Stressful Situations (CISS)* [124] is used to measure how people react to situations they perceive as threatening. It is a 48-item measure of stress management ability that refers to three main coping styles: emotion-oriented, task-oriented and avoidance. The items are self-assessed on a five-point Likert scale where 1 signifies "not at all," and 5 "very much." A study of the French version of the instrument has shown solid internal validity [125]. The coefficients for the Emotion (0.86), Task (0.87) and Avoidance (0.83) scales indicate that the three dimensions are homogeneous. At the same time, the three scales are relatively independent [125].

The *Life Events Checklist*, part of the *Clinician-Administered PTSD Scale* (*CAPS*; [126]), is a 17-item self-report measure designed to assess traumatic events that may have occurred in childhood or adulthood (e.g., combat-related experiences, accidents, disasters, serious illness, sexual abuse). Respondents indicate whether they have experienced, witnessed or learned about each event. We also asked each participant how each event affected them psychologically, which allowed us to distinguish merely stressful events (i.e., an event that meets only diagnostic criterion A1 for PTSD, as defined in DSM-IV) from true traumatic events (i.e., an event that meets PTSD criteria A1 and A2 in DSM-IV). The French version of the questionnaire has been validated with Quebec students [126]. The instrument possesses good internal consistency, with a coefficient of 0.89 and test-retest reliability of 0.97.

The French version [127] of the *15-Item Dispositional Resilience (Hardiness) Scale* (*DRS*; [128]) is a self-report scale designed to measure a person's capacity to withstand stress. The instrument consists of 15 items spread equally among three subscales, corresponding to the three dimensions of a resilient personality: commitment, control and challenge. The items are rated on a four-point Likert scale where 0 = not at all true, and 3 = completely true. The English version possesses an alpha coefficient of 0.84 for the overall score and 0.71 to 0.78 for the subscales [128]. The French version of the DRS was validated with a French-speaking adult sampling from Quebec [127]. The internal consistency reliability coefficient is 0.66 for the overall assessment, while the corresponding coefficients for the commitment, control and challenge subscales are 0.48, 0.48 and 0.69. Test-retest reliability is 0.71.

The *World Assumptions Scale* [129] is a self-report questionnaire that measures individuals' fundamental beliefs about the world and their personal values. It contains 32 items, which are rated on a six-point Likert scale, with 1 meaning "strongly disagree" and 6 "strongly agree." No validation study has been done of the original version of the questionnaire, nor of the translated French version. On the other hand, analyses of the French version conducted with a clinical sample of 30 victims and 35 people from the general community have shown that the instrument has good psychometric properties [130].

The *Self-Efficacy Scale* [131] is a self-report questionnaire that measures one's general efficacy expectations unrelated to specific situations or behaviour. It consists of 30 items, but 7 of them are not used in computing the total score. The basic premise underlying the development of this instrument is the observation that personal expectations about control are major determinants of behavioural change, and individual differences in past experiences and attribution of success produce distinct degrees of generalized self-efficacy expectations. This instrument can therefore be useful in assessing the process of adaptation to the client's needs over the course of clinical treatment. It is also an indicator of progress, as expectations about self-efficacy should change

over the course of treatment. The scale has two self-efficacy subscales: a general one (17 items) and a social one (6 items). The instrument has good internal consistency, with an alpha of 0.86 for the general subscale, and 0.71 for the social subscale. No test-retest reliability has been reported. The instrument also has good criterion validity, as well as good construct validity.

3.2.3 *Measurement of Peritraumatic Factors*

Traumatic event severity was assessed by means of an ad hoc interview that takes into account the objective and subjective characteristics of the event, such as the degree of involvement in the event (i.e., direct involvement, direct or indirect witnessing); whether or not someone was injured or died as a result of the subject's involvement, the duration of the event; its uncontrollability, unforeseeable or unexpected nature; whether one's life or physical integrity was threatened; whether there was verbal aggression, physical aggression, pain or physical injury; contact with the injured or the dead; use of firearms or other kinds of weapons during the event. Points were assigned for each characteristic measured. The total number of items varied between 4 and 32. A higher score reflects greater severity of exposure to the event.

The *Peritraumatic Dissociative Experiences Questionnaire–Self-Report Version (PDEQ-SRV)* [132] is a 10-item instrument that assesses dissociative reactions experienced during and immediately after a traumatic event. The items evaluate depersonalization, derealization, amnesia, out-of-body experience, change in perception of time and body image. Items are rated on a five-point Likert scale, where 1 signifies "not at all true," and 5 "extremely true." The total score ranges from 10 to 50. This instrument has good reliability and validity coefficients [133]. It also has good convergent, discriminant and predictive validity [134]. The French version of the questionnaire was validated with a student population [135] and showed the same psychometric properties as the English version. It thus possesses good internal consistency, with a coefficient of 0.85 and test-retest reliability of 0.88.

The effect of fright was assessed when the participant answered yes to one or more of the following questions:

- Were you stupefied or in a state of shock to the point where you couldn't feel anything?
- Did you, for a moment, experience a complete absence of emotion?
- Were you unable to think or to speak?
- Did you feel like you were frozen?

The *Initial Subjective Reaction Emotional Scale of the Potential Stressful Events Interview* [136] is a self-report instrument for assessing emotional responses during and immediately after a traumatic event (e.g., fear, confusion, sadness, shame, surprise, anger). The 15 items are rated on a four-point Likert scale, where 1 means "not at all," and 4 "completely." The total item score ranges from 15 to 60. A principal component analysis has shown that 4 of the 15 items are sufficiently reliable, corresponding to the fear, dissociation, guilt and anger subscales. Internal consistency coefficients vary between 0.62 and 0.79. The convergent validity, discriminant validity and reliability of the questionnaire are satisfactory [136].

The *Initial Subjective Reaction Physical Scale of the Potential Stressful Events Interview* [136] is a 10-item self-report scale that assesses peritraumatic physical reactions at the time of a

traumatic event. It measures 10 symptoms associated with panic attacks, such as sweating, breathlessness, dizziness, heart palpitations and hot flushes. Items are rated on a four-point Likert scale, where 1 signifies "not at all," and 4 "completely." The total score ranges from 10 to 40. The instrument has good internal consistency, with a coefficient of 0.86 [59].

Two questions were developed by the research team to assess the *perception of the quality of the positive support received from coworkers and superiors* during or immediately after the traumatic event. The first question read: "In your opinion, did your coworkers offer you adequate support during or immediately after the event?" The second question was worded the same way, but assessed the perception of the positive support received from superiors or supervisors. Items are rated on a five-point Likert scale, where 1 means "not at all," and 5 "completely."

The research team also developed some specific questions ad hoc to assess *confidence in one's ability to act effectively during the event*, *confidence in having been trained adequately to deal with such an event*, *confidence in having sufficient experience as a police officer to deal with such an event* and *the level of control perceived during the event*.

3.2.4 *Measurement of Posttraumatic Factors*

Acute stress disorder (ASD) was assessed in the first month following the traumatic event using the *SCID-I*.

The *Modified PTSD Symptom Scale (MPSS)* [137] is used to assess the frequency and severity of posttraumatic symptoms experienced over the last two weeks. It consists of 17 items that measure PTSD symptoms on two Likert scales, one for frequency (number of times per week) and the other for severity (level of disturbance). The frequency items are rated on a four-point Likert scale (0 = not at all; 1 = once per week or less/a little/once in a while; 2 = 2 to 4 times per week/some/half the time; 3 = 5 or more times per week/a lot/almost always). Responses for the severity scale are on a five-point Likert scale (0 = not at all disturbing, to 4 = extremely disturbing). The overall score combines the sum of the scores obtained on the frequency and severity scales. The total score can therefore range from 0 to 119. The English version has internal consistency of 0.91, specificity of 83.8% and concurrent validity of 0.92 with the SCID. Validated with a Quebec clinical sample [138], this instrument possesses excellent internal consistency: 0.92 for the frequency scale, and 0.95 for the severity scale. Temporal stability is 0.98 for the two scales.

The *Perceived Support Inventory* (*PSI)* [139] is a self-report consisting of two subscales: (1) *Perceived Supportive Spouse Behaviours* [140] measures an individual's perception of the frequency of positive social support received from the person's most significant other. It contains 11 items divided between 2 factors to measure tangible and emotional support, both general and specific to the problems experienced by the participant. The Quebec version possesses very good internal consistency (0.87) and a coefficient of convergent validity with the Social Provisions Scale of r = 0.44 [141]; (2) *Perceived Negative Spouse Behaviours* [140] measures a person's perception of the frequency of negative behaviours and social interactions from his or her most significant other. It has 13 items split between 2 factors to measure either withdrawal/avoidance or criticism. The Quebec version has very good internal consistency (0.84) and a coefficient of convergent validity with the Social Provisions Scale of r = -0.43 [141]. For the two subscales of

the *Perceived Support Inventory*, perceptions of the frequency of behaviour are measured using a four-point Likert scale ranging from 1 (never responded that way) to 4 (often responded that way). Respondents are asked to indicate their perception of supportive behaviours since the traumatic event or since the last time an assessment was done.

Our own questionnaire *Soutien organisationnel [Organizational Support]* was used to gauge tangible assistance to police officers after the event. When answering the questionnaire, officers had to indicate whether, following the traumatic event or since the last measurement was done, they had benefited from paid leave, arrangements or changes in their assigned duties, compensation, consultations with a psychologist, consultations with a member of the police brotherhood, consultations with a police resource person or psychological debriefing. The questionnaire also assessed officers' sense of appreciation for the work they do, their feeling of being effective in their work and to what extent media coverage of the event had affected them. The questionnaire was administered at all assessment times.

The *Group Environment Scale [142]* serves to measure three specific dimensions of the social environment: relationships, personal growth, and the maintenance and change system in the group. The 90 items on the questionnaire are divided into 10 subscales, with three dimensions. The scale possesses acceptable internal consistency, test-retest reliability ranging from 0.67 to 0.87 for the subscales and excellent stability over time. Its construct validity is also good. For the purposes of this study, we used only three of the subscales (group cohesion, leader support, and expressiveness), which are all part of the relationship dimension. Each subscale has 9 items, which take the form of true or false statements. The total score for each subscale can therefore range from 0 to 9, where a higher score represents, respectively, better group cohesion, better leadership or better expressiveness on the part of the group members.

The *Beck Depression Inventory-II (BDI)* [143] determines whether or not a person has had symptoms of depression over the last two weeks, and if so, how severe they are. It is a 21-item self-report questionnaire. Each question is answered on a four-point Likert scale, from 0 to 3. The total overall score can therefore range from 0 to 63. The instrument has been validated for Quebec women and men [144]. The internal consistency coefficient is 0.82. Rest-retest reliability for a three-month interval is 0.75. Construct validity is also good. A psychometric study of French-speaking university students [145] revealed good concurrent validity when the instrument is compared with other instruments for measuring depression. The questionnaire was administered at all assessment times.

The ad hoc questionnaire on *use of medical and psychological services [Recours aux services médicaux et psychologiques]* documents the use of health care services before and after the event, in an effort to determine the impact of a traumatic event on participants' mental and physical health. All consultations with general practitioners, medical specialists, psychologists, psychiatrists or alternative medical practitioners were recorded, regardless whether or not the consultation had to do with TE-related symptoms or problems. The questionnaire was administered at T1 to measure the use of medical and psychological services in the three months before the traumatic event, at T3 to measure services received in the three months following the TE and at T4 to measure care received in the last three months. The existence or absence of pain and physical injuries stemming from the TE was documented, as well as officers' perception of

the severity of their pain/injuries. Participants also indicated whether or not they had received medical services in connection with their pain/injuries.

Table 2 provides an overview of the different variables measured for the study.

Table 2 – Main variables measured at different assessment times

Variables assessed	Measurement instruments	Assessment times			
		T1	T2	T3	T4
Pretraumatic variables					
Sociodemographic variables Gender, age, level of education, ethnic origin, marital status, number of children	Ad hoc questionnaire	X			
Work-related variables Rank, years' experience, hours worked per week	Ad hoc questionnaire	X			
Number of stressful events in year preceding TE (e.g., moving house, legal problems, financial problems)	*Life Stress Event Scale*	X			
PTSD history	*Structured Clinical Interview for DSM-IV (SCID-I)*		X		
Psychological history	*Structured Clinical Interview for DSM-IV (SCID-I)*		X		
Family psychological history	Ad hoc question	X			
Use of medical and psychological services in 3 months preceding TE	Ad hoc questionnaire	X			
Coping strategies	*Coping Inventory for Stressful Situations (CISS)* [124]	X	X	X	X
TEs experienced as a child or adult	*Life Events Checklist of Clinician-Administered PTSD Scale (CAPS)* [126]		X		

Hardiness (stress-resistant personality)	*French version of Dispositional Resilience (Hardiness) Scale (DRS)* [128]		X		
Beliefs about the world and personal values	*World Assumptions Scale* [129]	X	X	X	X
Sense of self-efficacy	*Self-efficacy Scale* [131]	X	X	X	X
Peritraumatic variables					
Objective and subjective severity of TE	Ad hoc questionnaire	X			
Initial dissociative reactions	*Peritraumatic Dissociative Experiences Questionnaire – Self-Report Version (PDEQ-SRV)* [132]	X			
Fright	Ad hoc questions	X			
Initial emotional reactions	*Initial Subjective Reaction Emotional Scale of the Potential Stressful Events Interview [136]*	X			
Initial physical reactions	*Initial Subjective Reaction Physical Scale of the Potential Stressful Events Interview [136]*	X			
Perception of support from coworkers and superiors	Ad hoc question	X			
Confidence in ability to intervene effectively	Ad hoc question	X			
Confidence in training to deal with event	Ad hoc question	X			
Confidence in having sufficient experience as a police officer to deal with event	Ad hoc question	X			
Perceived level of control during event	Ad hoc question	X			
Posttraumatic variables					
Acute stress disorder	*Structured Clinical Interview for DSM-IV (SCID-I)* [119]	X	X		

PTSD diagnosis (clinical and partial)	*Structured Clinical Interview for DSM-IV (SCID-I)* [119]		X	X	X
Frequency and severity of PTSD symptoms	*Modified PTSD Symptom Scale (MPSS)* [137]		X	X	X
Perception of positive social support from significant others	*Perceived Supportive Spouse Behaviours of the Perceived Support Inventory (PSI)* [139]	X	X	X	X
Perception of negative social interactions with significant others	*Perceived Negative Spouse Behaviours of the Perceived Support Inventory (PSI)* [139]	X	X	X	X
Organizational support received	Ad hoc questionnaire	X	X	X	X
Social climate of group	*Group Environment Scale* [142]	X	X	X	X
Symptoms of depression	*Beck Depression Inventory-II (BDI)* [143]	X	X	X	X
Use of medical and psychological services in last 3 months	Ad hoc questionnaire			X	X
Number of stressful events experienced since last time of assessment (e.g., moving, legal problems, financial problems, etc.)	*Life Stress Event Scale*		X	X	X

3.3 Study Design and Variables

This study was based on a repeated-measures *prospective* research protocol and therefore followed a quasi-experimental design. The dependent variables—the diagnosis of PTSD (clinical and partial) and the severity of symptoms—were measured at each assessment time. The independent variables consisted of the assessment time, and the pretraumatic, peritraumatic and posttraumatic risk and protective factors. The pretraumatic factors examined were sociodemographic characteristics, police experience, age at the time of the TE, coping strategies, hardiness, fundamental beliefs, history of personal and family mental problems, and previous stressful and traumatic events. The peritraumatic factors were the severity of the event, fright, initial emotional and physical stress reactions, dissociative reactions and the perception of the supportiveness of coworkers and superiors during or immediately after the event. The posttraumatic factors studied were the number of ASD symptoms, symptoms of depression, and perception of social support (i.e., positive support and negative social interactions, organizational support, group environment, use of medical and psychological services).

Table 3 – Research protocol for repeated-measures prospective study

Variables	***Assessment times***			
	T1 (5 to 15 days after event)	T2 (1 month)	T3 (3 months)	T4 (12 months)
Independent variables	X	X	X	X
Dependent variables		X	X	X

3.4 Sample Size

The sample size required for this prospective study was established by taking into account the main statistical analyses, i.e., multivariate linear regression, planned for testing our research hypotheses. To determine the sample size required to test the null hypothesis of the relative risk in a prospective study, we used the procedure described by Lemeshow, Hosmer, Klar and Lwanga [146]. For type I errors of 0.05, type II errors of 0.20, and a minimum effect size of p = 0.5, the one-sided test required a sample of 94 police officers exposed to a critical incident. Since we estimated we would face an attrition rate of approximately 10%, we planned to recruit 103 participants. Nevertheless, owing to various problems, we were initially able to recruit only 83 participants, or 90% of our initial objective. The main reason why we had trouble recruiting the optimal number of officers was that we were dependent on the number of critical incidents that occurred during the study period, and it turned out that fewer major incidents happened than in previous years.

3.5 Ethical Considerations

Study participants read and signed an informed consent form. They were individually informed that their participation was voluntary and that they could withdraw from the study at any time without prejudice. In addition, each participant was given a copy of the consent form. To respect participant confidentiality and anonymity, all the questionnaires were coded and kept in a locked filing cabinet in the possession of the research coordinator. All the questionnaires will be destroyed five years after the end of the research project. In addition, resources were made available to officers if they needed them. The research project was approved by the ethics committee of the psychology department of the Université du Québec à Montréal (UQÀM).

4. FINDINGS

4.1 Participation Rate

Figure 1 shows the steps in the recruitment process: the number of police officers who contacted us and the number who were lost to attrition over time. Eighty-nine officers contacted us in connection with a traumatic event between 2006 and 2010. A total of seven participants withdrew from the study, two at T2 and five at T3. Four of the seven officers lost to attrition said they did not have enough time, two said they were not interested and had been given external assignments. Another participant never returned our calls.

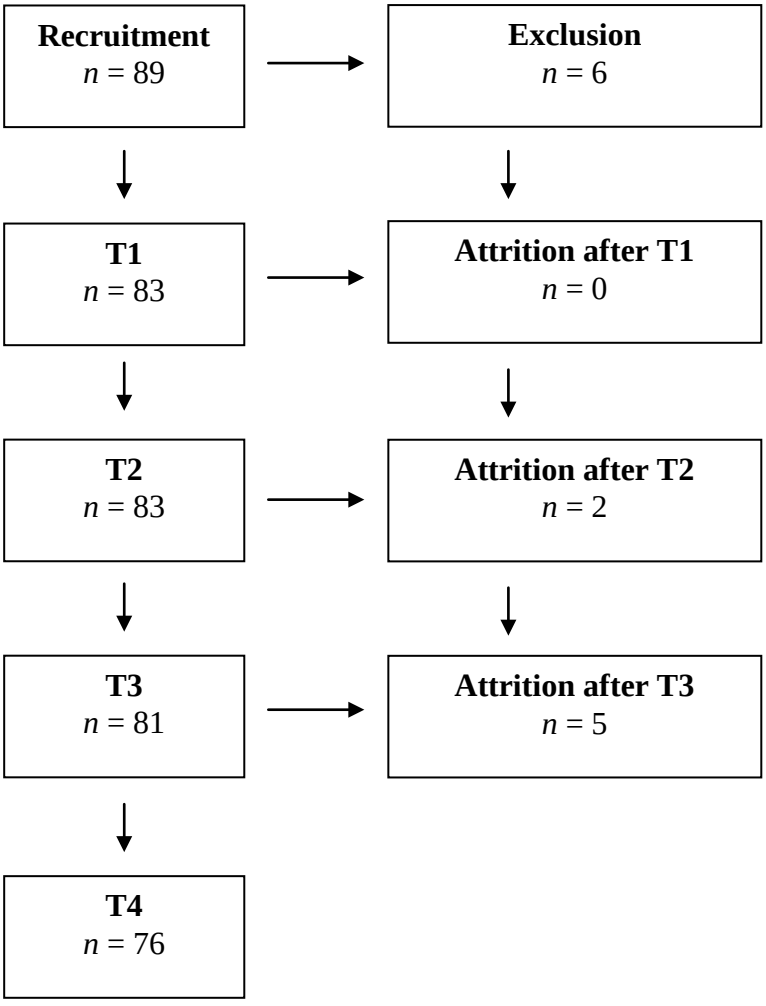

Figure 1 – Number of participants at each time of assessment

Caution is called for in analysing and interpreting the study results because the sample was not necessarily representative of SPVM members who have experienced a TE in the last four years. The sample does not include all police officers who experienced a major event, nor is it a random probability sample of those officers. As a result, we were unable to draw definitive conclusions about the entire police population. Formally, therefore, results of the study apply only to the study respondents.

4.2 Quantitative Data

4.2.1 *Statistical Analysis*

The statistical analyses of the quantitative data were performed to ensure the study population was described adequately and to test the research hypotheses. The significance level was set at 0.05, and one-tailed tests were used. Factor distributions are described in terms of means or percentages. Prediction analyses for the development of PTSD symptoms were based on linear regression models. Detailed information about the analyses is provided in Section 4.3 on predictive data.

4.2.2 *Description of Officers Involved in TEs*

The sociodemographic data on police officers involved in TEs are presented in Table 1. Age, gender, marital status, number of children, years of schooling and years of experience are analysed as potential predictors of PTSD.

Figure 2 provides information on the ranks of the officers who took part in the study following a TE. They are divided into the following categories: (1) “neighbourhood police officer”: this category includes regular officers, constables, tactical response officers, and officers involved in identification work; (2) “senior neighbourhood police officer”: this category includes the same types of officers as in category 1, but with more experience and more qualifications; some of them are occasionally asked to carry out senior command duties; (3) “neighbourhood sergeant or captain”: this category includes sergeants and supervisors; (4) “intervention officer”: these officers belong to one of the SPVM’s tactical response teams. They provide specialized support to neighbourhood police stations (equipment and special training for crowd control, dealing with barricaded individuals, mobilization for disappearances or security perimeters, operational support, responding to requests for backup from neighbourhood police stations in high-priority situations, etc.); (5) “other”: this category includes investigators, detective sergeants and sergeants. Close to 78% of officers were in the “neighbourhood officer” and “senior neighbourhood officer” categories, while 22% fell into the “neighbourhood sergeant or captain,” “intervention officer” and “other” categories.

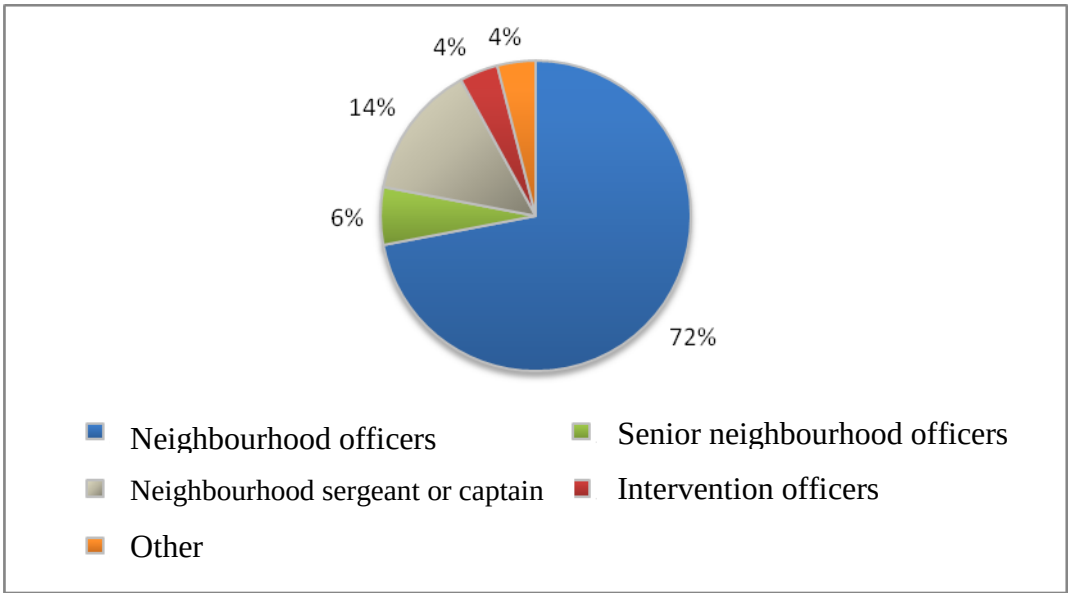

Figure 2 – Ranks of police officers (*N* = 83), by category

4.2.3 *Description of TE*

Exposure to a traumatic event means that the person has experienced, witnessed or been confronted with an event that involves actual or threatened death, a serious injury, or a threat to the physical integrity of oneself or others. Figure 3 illustrates the various ways in which police officers can experience a TE. Most TEs involve a threat to the life of the officer or others. The events most frequently mentioned by officers are being threatened with a firearm, being threatened with death or fearing for one's life, getting caught in a situation that could put one's life in danger, and seeing a person who has been badly beaten or is seriously injured. More specifically, 64% of the officers said they drew their guns, 11% fired shots and 28% used another weapon during an incident. In the TEs described, 39% of officers experienced shootings, 14% riots, 10% family incidents with child deaths, 10% car chases, 4% fatal car crashes and 24% other kinds of TEs. Note that in Figure 3, the characteristics of a TE experienced by an officer are not mutually exclusive. For instance, an officer may have felt threatened by a firearm and have witnessed a death in the course of the same event.

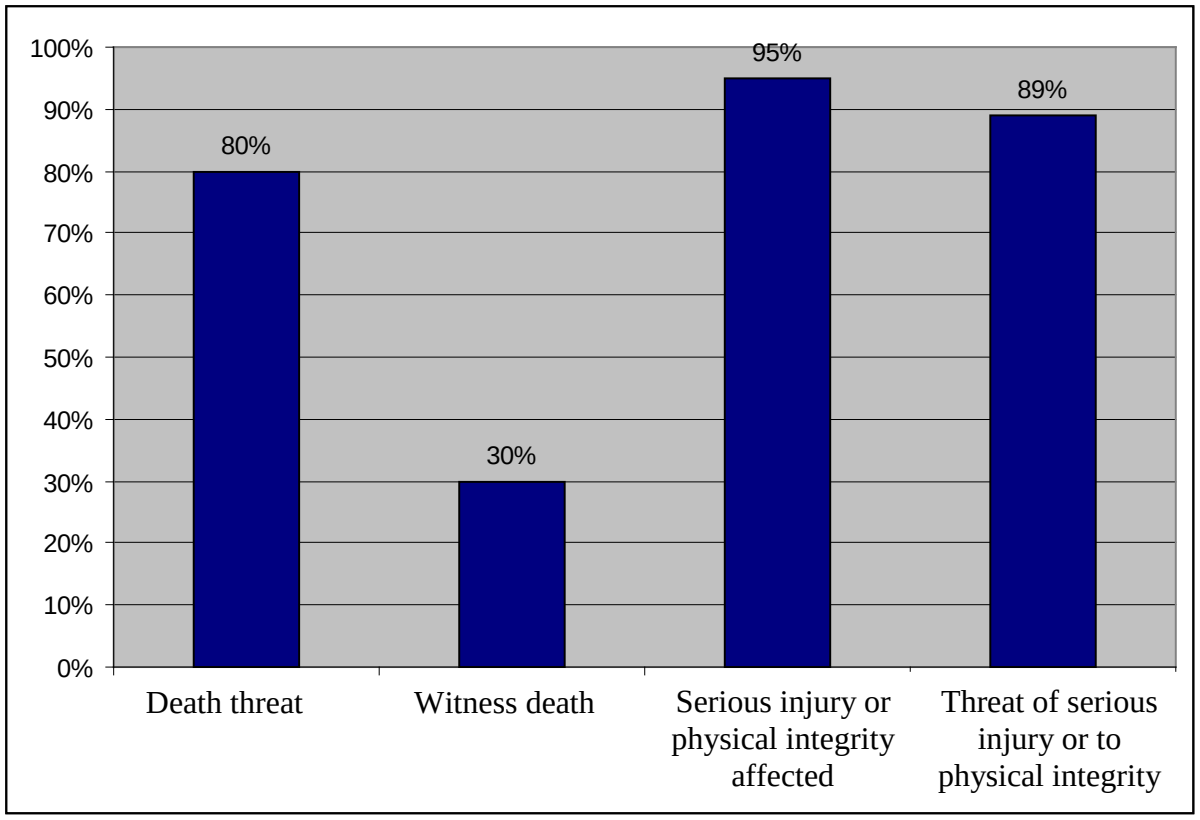

Figure 3 – Characteristics of traumatic events (*N* = 83)

According to DSM-IV-TR diagnostic criterion A for PTSD, an event is regarded as traumatic if the response of the person exposed to the event involved at least one of the following three emotions: intense fear, helplessness or horror. In our study, the emotion most frequently reported was helplessness, for 80% of officers, followed by intense fear, mentioned by 59% of them. Only a small minority of officers (21%) said they had felt horror. To the three emotions specified in diagnostic criterion A for PTSD, the research team added three others: anger, guilt, and shame, as well as another reaction, fright, which involves a lack of emotion. Of the participants in our study, 58% reported they had experienced anger during a TE, 2% shame, 17% guilt and 8% fright. Only 2.4% of the officers said they had not experienced any of the three emotions specified in the DSM-IV-TR. However, they did report having experienced anger and guilt in connection with the event. Figure 4 shows the proportion of participants who had felt at least one of the six emotions or fright during the traumatic event. Note that in Figure 4 the percentages total more than 100% because each participant could report more than one emotion.

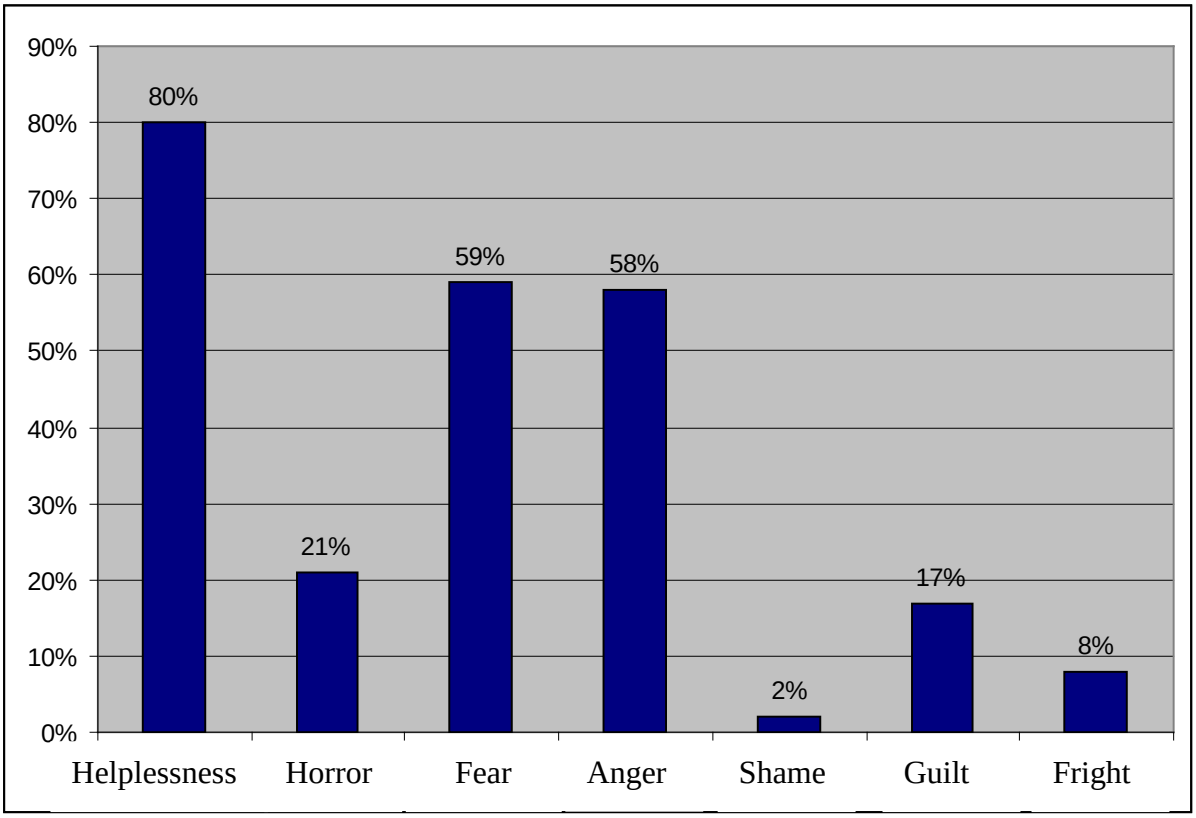

Figure 4 – Emotions experienced during or immediately after TE (*N* = 83)

4.2.4 *Prevalence of ASD and PTSD*

In the first month following the traumatic event, 9% of participants developed clinical acute stress disorder (see Table 4). Four of the 7 participants having clinical ASD subsequently developed either clinical (n = 2) or partial (n = 2) PTSD. Three percent of participants were diagnosed with clinical PTSD in connection with the TE at 1 month, while 9% had partial PTSD. Four percent had partial PTSD at 3 months and at one year. Close to 7% of the sample had already experienced clinical PTSD prior to the work-related TE for which they were taking part in this research project. Following the work-related TE, complete or partial PTSD remission was observed over time (rate declining from 12% to 4%). Repeated-measures analysis of variance can reveal the effect of time on the remission of symptoms, that is, a significant decline in the severity of symptoms as measured by total *MPSS* (*Modified PTSD Symptom Scale*) scores ($p < .05$). Post-hoc analyses showed a significant reduction in symptoms between T2 and T3, and that decline was maintained between T3 and T4. As an indication, note that all MPSS scores (frequency and severity) were below the clinical threshold and, on average, remained relatively low (T2 = 7; T3 = 4; T4 = 3). A diagnosis of partial PTSD applies when a subject does not present sufficient symptoms to meet all the conditions of clinical PTSD, but does have at least one symptom under criteria B, C or D, or at least one symptom under criterion B and two under

criterion D of DSM-IV [7]. Individuals having a clinical diagnosis were distinct from those having a partial diagnosis. Including those with a diagnosis of partial PTSD in our analyses allowed us to take into consideration individuals with strong posttraumatic reactions, but who are generally omitted from or disregarded in empirical studies.

Table 4 – ASD and PTSD diagnoses of participants, at each time of assessment

Diagnoses	Time of assessment				
	T0 (*n* = 83)	**T1 (*n* = 83)**	**T2 (*n* = 83)**	**T3 (*n* = 81)**	**T4 (*n* = 76)**
	%	**%**	**%**	**%**	**%**
PTSD before work-related TE					
Clinical and partial diagnosis	18	–	–	–	–
Clinical diagnosis	7	–	–	–	–
Partial diagnosis	11	–	–	–	–
ASD following work-related TE					
Clinical diagnosis	–	9	10	–	–
PTSD following work-related TE					
Clinical and partial diagnosis	–	–	12	4	4
Clinical diagnosis	–	–	3	0	0
Partial diagnosis	–	–	9	4	4

4.3 Predictive Data

4.3.1 *Prediction of PTSD Symptoms*

Given that there were no clinical diagnoses of PTSD at T3 and T4 and only a few diagnoses of partial PTSD, no prediction analysis was done on the data. Prediction analyses and correlations were carried out on MPSS scores at T2, T3 and T4.

4.3.1.1 Missing-Data Handling Procedure

Occasionally, data for symptom scale scores were missing for some participants at one of the assessment times. The missing data were replaced using an algorithm that took into account both the longitudinal mean for each individual and the group mean at each time of assessment. Under 5% of the data were replaced. Since the study was not a comparison of different treatments, the

last-score-carried-forward replacement method, which is used as an intent-to-treat procedure, was not satisfactory, as it overestimated the symptoms at T3 and T4.

4.3.1.2 Statistical Analysis Models

The hierarchical linear regression analyses for predicting PTSD symptoms were performed independently for each time of assessment (at T2, T3 and T4). For these analyses, predictors were grouped into three major categories: (a) sociodemographic and pretraumatic variables, (b) peritraumatic variables and (c) posttraumatic variables. The sociodemographic variables were gender, age at time of study, marital status, ethnic origin, years in a relationship, number of children, years of education, years of police experience, hours worked per week, quality of relations with coworkers, general level of satisfaction with support provided by police department, shifts worked and history of stressful events. The pretraumatic variables considered were number of stressful events in the year preceding the TE, clinical or partial diagnosis of PTSD prior to the work-related TE that is the subject of our study, clinical diagnosis of past psychiatric problems, family history of psychological problems, stress coping strategies, beliefs about the world, self-efficacy, hardiness, history of stressful events and use of medical and psychological services in the three months preceding the TE. The peritraumatic variables examined were perceived control over the event, confidence in the effectiveness of handling of event, severity of event, initial emotional reactions, initial physical reactions, dissociation, satisfaction with support received from coworkers and from superior during or immediately after TE. Finally, the posttraumatic variables considered were number of clinical symptoms of ASD at T1, symptoms of depression, stressful events experienced after the TE, level of support (positive and negative) received between TE and T1, whether the officer was given time off, whether changes were made to the officer's assigned duties, whether the officer consulted the SPVM brotherhood, whether the officer consulted a police resource person, whether the officer consulted an assistance program (PAPP) psychologist, whether the officer was debriefed, strength of feeling of being appreciated in performance of duties, and strength of feeling of being effective at work, satisfaction with support received from coworkers, satisfaction with support received from supervisor, use of medical and psychological services, beliefs about the world, hardiness, perception of cohesion of work team and of leadership provided by team leader, self-efficacy, coping inventory for stressful situations, satisfaction with support provided by police department and negative impact of media coverage.

The analysis of the predictors of PTSD symptoms was a two-phase process: identifying the best predictors and developing prediction models. To identify the best predictors of symptoms, correlations were established between the different predictors and the level of symptoms at each of the three times of assessment. Table 5 shows the data obtained for variables that had a statistically significant correlation with total MPSS scores at T2, T3 or T4. The results are presented by category of pre-, peri- and posttraumatic variable.

Prediction models for PTSD symptoms were then developed independently for T2, T3 and T4. Variables that were not statistically correlated to the dependent variable (as identified at the preceding stage) were not taken into consideration for the regression model. This procedure had the advantage of limiting the analysis to variables relevant to the modelling and avoiding artificially increasing the total quantity of explained variance of the models. In fact, the statistical noise resulting from the addition of several variables had little correlation to the dependent

variable. All the analyses were conducted on the basis of the original variables. However, when some variables had abnormal distributions, standardized versions of them were produced by mathematical transformation, and the analyses were also done in parallel on these transformed variables. Only the analyses with the original variables are presented in this report, in order to facilitate interpretation of the results. On the other hand, a check was made to ensure that the effects presented as being statistically significant remained so when the transformed variables were used. If a difference was seen in this respect, it has been noted in this report. This helps to ensure that the effects presented are not the result of methodological artifacts. For these parallel analyses on standardized variables, (a) the three dependent variables—number of children, dissociation score and depression score at T1—were transformed by a quad root, (b) the scores on the initial emotional reactions scale and the number of clinical ASD symptoms at T1 were transformed by a square root, and (c) the emotion scale of the stress-coping strategies questionnaire, the adverse impact of media coverage between the TE and T1, and the effect of negative support between the TE and T1 were transformed by a natural logarithm. The other variables did not need to be transformed for the analyses.

For each of the three dependent variables (i.e., the overall score on the frequency and severity of MPSS symptoms at T2, T3 and T4), modelling was carried out in three successive stages. Stage 1 covered only the pretraumatic variables (also including the sociodemographic variables), stage 2 introduced the peritraumatic variables into the stage 1 model, and stage 3 inserted the posttraumatic variables into the stage 2 model. The models were optimized by adding the variables one at a time and, at each stage, retaining only those that had a statistically significant effect. When more than one variable within the same stage had a significant effect, the one that added the most to the model was introduced first. The others were added only if they contributed a statistically significant quantity of explained variance to the model. To ensure that the models from the three successive stages remained nested one in the other, the variables introduced at the previous stage were kept, even if the introduction of a new variable caused their level of statistical significance to drop below the significance level ($p = .05$). Tables 6, 7 and 8 present the predictive models for PTSD symptoms at T2, T3 and T4 respectively.

Table 5 – Description of variables statistically correlated to MPSS scores at T2, T3 and T4

Times of assessment	*M*/%	T2	T3	T4
Pretraumatic variables		***r***	***r***	***r***
Stress coping strategies (emotion scale)	27.1	0.58	0.43	0.40
Self-efficacy (social scale)	21.8	-0.23	-0.24	-0.27
Number of children	0.8	ns	0.27	ns
Peritraumatic variables				
Objective and subjective severity of event	18.9	ns	ns	0.25
Duration of event (min.)	84.0	0.37	ns	ns
Initial physical reactions scale	14.2	0.42	0.43	0.35
Initial emotional reactions scale	24.9	0.49	0.49	0.46
Dissociation	15.4	0.49	0.37	0.40
Posttraumatic variables				
Number of clinical symptoms of ASD at T1	2.9	0.64	0.61	0.46
Beck depression inventory at T1	4.2	0.67	0.60	0.50
Negative support between TE and T1 (critical scale)	4.6	0.30	0.28	ns
Positive support between TE and T1	30.5	0.26	0.28	ns
Adverse impact of media coverage between TE and T1	1.8	0.42	0.38	0.31
Consulted SPVM brotherhood between TE and T1	28.2%	0.45	0.37	0.30
Consulted PAPP psychologist between TE and T1	20.5%	0.44	0.45	0.37

Note: *M* = mean; *r* = Pearson coefficient significant at $p < .05$; ns = not significant.

Table 6 – Predictive model for PTSD symptoms at T2 (*n* = 71)

Variables introduced into model	Stage 1	Stage 2	Stage 3
	β / *p*	β / *p*	β / *p*
Stress coping strategies (emotion scale)	0.58 / ***	0.50 / ***	0.23 / *
Initial physical reactions scale	N/A	0.23 / *	0.09 / ns
Beck depression inventory at T1	N/A	N/A	0.52 / ***
Characteristics of model	**Values of model indicators**		
Proportion of total explained variance	0.34	0.39	0.53
Proportion of added explained variance	0.34	0.05	0.15
p value of proportion of added variance	***	*	***

Note: β = standardized beta; *p* = *p* value of beta; N/A = not applicable.
* = $p < .05$, ** = $p < .01$, *** = $p < .0001$; ns = not significant.

Table 7 – Predictive model for PTSD symptoms at T3 (*n* = 69)

Variables introduced into model	Stage 1	Stage 2	Stage 3
	β / *p*	β / *p*	β / *p*
Stress coping strategies (emotion scale)	0.43 / ***	0.31 / **	0.15 / ns
Initial physical reactions scale	N/A	0.34 / **	0.14 / ns
Number of ASD symptoms	N/A	N/A	0.45 / ***
Characteristics of model	**Values of model indicators**		
Proportion of total explained variance	0.18	0.28	0.40
Proportion of added explained variance	0.18	0.10	0.12
p value of proportion of added variance	***	**	***

Note: β = standardized beta; *p* = *p* value of beta; N/A = not applicable.
* = $p < .05$, ** = $p < .01$, *** = $p < .0001$; ns = not significant.

Table 8 – Predictive model for PTSD symptoms at T4 (*n* = 72)

Variables introduced into model	Stage 1	Stage 2	Stage 3
	β / *p*	β / *p*	β / *p*
Stress coping strategies (emotion scale)	0.40 / ***	0.22 / ns	0.06 / ns
Initial emotional reactions scale	N/A	0.31 / *	0.23 / ns
Beck depression inventory at T1	N/A	N/A	0.33 / **
Characteristics of model	**Values of model indicators**		
Proportion of total explained variance	0.16	0.22	0.28
Proportion of added explained variance	0.16	0.06	0.06
p value of proportion of added variance	***	*	**

Note: β = standardized beta; *p* = *p* value of beta; N/A = not applicable.
* = $p < .05$, ** = $p < .01$, *** = $p < .0001$; ns = not significant.

4.3.1.3 Interpretation of PTSD Symptom Predictive Models at T2, T3 and T4

Regarding pretraumatic variables, the bivariate analyses and the prediction models (stage 1) highlight the importance of taking into account the level of use of emotional strategies for coping with stress when predicting the level of severity of symptoms, independent of times of assessment. The more individuals tend to use emotional strategies to cope with stress, the more they tend to develop PTSD symptoms later on. That relationship explains between 16% and 34% of the variance with respect to the severity of PTSD symptoms, taking into consideration the three times of assessment. Other variables, such as the social self-efficacy scale, have some predictive value, but no other pretraumatic variable contributes anything statistically significant beyond the variance explained by the level of use of emotional coping strategies.

With respect to peritraumatic variables, the bivariate analyses suggest that the predictors which have a substantial impact on the severity of PTSD symptoms are, for all the assessment times, the scales that evaluate the extent of reactions at the time of the TE (i.e., physical reactions, emotional reactions and dissociation). Two other characteristics of a TE—its severity and its duration—are also related to the severity of PTSD symptoms, but to a lesser degree.

When peritraumatic variables are added to the use of emotional coping strategies in the prediction models (stage 2), the analyses confirm the importance of taking into account the extent of the reactions during the trauma in order to improve the predictive power of the models. The model optimization procedure favoured physical reactions for predicting PTSD symptoms at T2 and T3, and emotional reactions at T4, but these results should not be seen as contradictory. The scores obtained with the physical reaction, emotional reaction and dissociation measurement instruments are strongly intercorrelated and are all very good predictors of PTSD symptoms, at all assessment times. The fact that the optimization procedure favoured one of the three variables

over the other two does not mean that the other two are irrelevant. In this case, caution is called for, and the three variables should be regarded as complementary aspects of the extent of the reaction at the time of the trauma. What can be said is that the analyses demonstrate that after the level of use of emotional coping strategies, the reactions at the time of the trauma do seem to be a good predictor of the tendency to develop PTSD symptoms later on. This relationship explains between 5% and 10% of the variance in PTSD symptoms (depending on assessment times) beyond what is already explained by the use of emotional coping strategies. No other peritraumatic variable adds anything statistically significant to the variance explained by the extent of the reactions at the time of the TE and by the level of use of emotional coping strategies.

When it comes to the posttraumatic variables, the bivariate analyses clearly show the strong relationships between the symptom scales at T1 (ASD and BDI) and the severity of PTSD symptoms at T2, T3 and T4, with correlations varying between 0.46 and 0.67. Moreover, the adverse impact of media coverage and whether or not the person consulted the SPVM brotherhood or an assistance program (PAPP) psychologist between the TE and T1 are also good predictors of PTSD symptoms at T2, T3 and T4, with correlations varying between 0.30 and 0.45. Finally, the level of positive support and of criticism that the person perceives among those around him between the TE and T1 are also predictors of PTSD symptoms, but to a lesser degree, and only at T2 and T4, with correlations varying between 0.26 and 0.30.

When the posttraumatic variables are added to the pre- and peritraumatic variables in the prediction models (stage 3), the analyses confirm the importance of taking symptom scales at T1 into account in order to improve the predictive power of the models. The model optimization procedure favoured the level of depression for predicting PTSD symptoms at T2 and T4, and the number of ASD symptoms for predicting PTSD symptoms at T3, but, as for the peritraumatic variables, these results should not be seen as contradictory. The two scales that measure distinct symptoms at T1 (ASD and BDI) are very much intercorrelated and are both very good predictors of PTSD symptoms at all times of assessment. These two variables can therefore be regarded as two complementary aspects of the severity of symptoms at T1. It can consequently be concluded that the analyses show that after the level of use of emotional coping strategies and the extent of reactions at the time of the traumatic event, the severity of ASD symptoms and that of symptoms of depression at T1 are good predictors of a tendency to develop PTSD symptoms later on. This relationship explains between 6% and 15% of the variance in PTSD symptoms (depending on assessment times) beyond what is already explained by the use of emotional coping strategies and by the extent of reactions at the time of the trauma. No other posttraumatic variable adds anything statistically significant beyond the variance explained by the extent of the reactions to the trauma and by the level of use of emotional coping strategies. It can therefore be assumed that the relationships between PTSD symptoms and the other posttraumatic variables could simply be the result of the impact of the severity of depressive and acute stress symptoms at T1 on these variables.

5. DISCUSSION

The purpose of this project is to address the lack of research concerning police officers, the lack of *prospective* studies, certain methodological shortcomings in studies that have been done, and to advance our knowledge about the predictors of PTSD in police officers. This study is the second, *prospective*, part of the research program. In the discussion below, however, we will not restrict ourselves to the results of the *prospective* study, but will also establish certain relationships or draw comparisons with the findings of the first, *retrospective,* part of the research [1].

Here is a short summary of the method followed in the *retrospective* study. A total of 169 officers from the Service de Police de la Ville de Montréal (SPVM) took part in the study on a voluntary basis. Of those 169, a total of 132 were exposed to at least one TE at work and completed the retrospective study (transversal and correlational design). A person who has been exposed to a TE is defined as someone who has experienced, witnessed or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others. When an officer reported having experienced several TEs, the interview mainly focused on the one that had disturbed the officer the most. Only one assessment meeting was held to gather information. Semistructured interviews and questionnaires were used to determine whether the officer was suffering from PTSD and to evaluate various predictors associated with the development of PTSD. Multivariate statistical analyses were carried out to determine more precisely the chief predictors involved and the strength of their impact on PTSD emergence and development. Table 9 lists the main results of the retrospective study and compares them with those of the prospective study.

We will interpret the results on the basis of the hypotheses proposed in Part II, comparing them with the results from Part I and with previous studies. We will also suggest some ideas for future research and discuss the clinical implications of the results from both the *retrospective* and *prospective* parts of the study. Note that the overall objective of this research project was to gain a better understanding of the development of PTSD in police officers and the factors associated with it. More specifically, the research consisted in assessing officers to determine the risk factors that increase their vulnerability to developing PTSD, as well as the protective factors that help them cope following a potentially traumatic event.

5.1 Quantitative Data

In this *prospective* part of the study, 100% of the officers had experienced a recent TE while on duty and 3% had suffered clinical PTSD, while 9% were diagnosed with partial PTSD. Caution needs to be exercised in comparing results, as the recruitment process was not the same in the two parts of the study. The r*etrospective* part had a category for officers involved in a TE and one for officers not involved (hence the 84%), whereas for the *prospective* study, having experienced a TE was a selection criterion. That is why 100% of the officers in Part II of the study experienced a TE. Caution is also required when considering prevalence rates, as there are significant differences in the basis of comparison. In the *retrospective study*, 7.6% of the officers were diagnosed with clinical PTSD related to the worst event of their career (event chosen

specifically for the purpose of detailed analysis), whereas in the *prospective study*, only the TE for which the officer was recruited for the study was considered.

Nevertheless, these two estimates are close to those obtained in other studies of police officers, which reported prevalence rates of between 6% and 9% [15-19]. As a comparison, the prevalence rates of PTSD in the general population are between 7% and 8% [9, 10]. These figures are therefore very similar to our results. Some studies have reported PTSD prevalence rates for police that are higher than for the general population (13%–35%) [11-14]. However, they had methodological shortcomings that this research program (*retrospective and prospective parts*) is seeking to address. There are also organizational differences that could explain the discrepancies. Despite the fact that officers from the SPVM and other police forces are involved repeatedly in TEs, they do not appear to suffer from a higher rate of PTSD than other members of the community. It is possible that the officers in our two samples simply have very effective coping strategies and recovery ability. How else can these low rates of PTSD be explained in a population at high risk of experiencing a TE? First, it may be that the selection criteria applied when officers are hired identify those candidates most fit for police work [107]. Officers are also given rigorous training to prepare them for handling stressful situations, which can inoculate them against stress to a certain degree [106, 132]. Furthermore, they build up experience in dealing with hostile situations on a daily basis [106]. A self-selection mechanism may also play a role, with those unable to handle the occupational stress moving into a different line of work early in their careers [15]. An alternative explanation for the low level of symptoms among police officers could lie in the fact that many police forces have employee assistance programs that provide free mental health services for officers who need them. Since 1990, most of the officers in our study have had access to the PAPP (i.e., the SPVM's police officer assistance program overseen by a joint union-management committee), which is a free, confidential service that promptly organizes consultations with psychologists. Moreover, one aspect of the PAPP's mandate is to develop prevention programs. Since 1990, the PAPP has been providing training in several areas, including "human management during critical incidents," to raise supervisors' awareness of PTSD and other possible reactions in officers involved in this kind of event. The training is offered to all newly promoted supervisors and essentially focuses on prevention. In 1997, the PAPP set up a suicide prevention program. It is possible to speculate that the low level of posttraumatic symptoms observed in this study may in part be due to the many primary, secondary and tertiary prevention programs developed by the PAPP, to the training given to officers, and to the selection criteria applied at hiring. Nonetheless, caution needs to be exercised in estimating PTSD prevalence and in suggesting reasons to explain our study's lower-than-estimated level, as it is possible that our sample was not representative of the SPVM police population in terms of sociodemographic data and other variables that were not controlled for.

Some studies have indicated that women are more susceptible than men to experiencing posttraumatic reactions [30, 33, 34]. Interestingly, in our *retrospective* study, no female officer met the diagnostic criteria for clinical ASD or partial or clinical PTSD after a TE. Women made up 14.4% of the sample for the retrospective study, compared with 24% of the sample for the prospective one. Even though some studies have suggested that being female is a risk factor, others have not found any association between gender and PTSD [36-38]. At present, it is hard to draw any clear, valid conclusions about the impact of gender on posttraumatic reactions.

According to some studies, acute stress disorder seems to be a major predictor of future development of PTSD [88, 89, 147]. Harvey and Bryant [147] reported that 63% of individuals suffering from clinical ASD would go on to develop PTSD. In our *retrospective* study, 100% of the participants who had clinical ASD later developed clinical or partial PTSD. In contrast, in our prospective study, only 56% of the officers with ASD went on to develop PTSD. ASD seems to be a precursor to the development of PTSD. So, having ASD or, as in the *prospective* study, some of the symptoms of ASD, would appear to be a major factor to consider when screening police officers who have experienced a TE and who are at high risk of developing PTSD, as well as when deciding what specific services to offer these individuals as part of a follow-up program. Note, however, that in the *retrospective* study, the majority (79%) of the participants who developed PTSD had not had ASD beforehand. In the *prospective* study, in contrast, this proportion was just 33%. In other words, almost two thirds of the participants who developed PTSD had had ASD previously. In addition, only 33% of the participants in the prospective study developed PTSD without having had ASD. This was not the case in the retrospective study, however, in which 21% of participants who developed PTSD met the diagnostic criteria for clinical ASD, while 88% of those without ASD did not develop PTSD later on. In the prospective study, it would appear that ASD had predictive power (i.e., the probability of developing PTSD when ASD is already present).

5.2 Predictive Data

5.2.1 *PTSD Predictors*

Overall, the results of the *prospective* study show that after the level of use of emotional coping strategies, the extent of peritraumatic distress (physical and emotional reactions) and dissociation at the time of the TE, the number of ASD symptoms and the severity of depression at T1 seem to be the best predictors of the tendency to develop PTSD symptoms following a TE. Note that these were all risk factors in this part of the study, as there were no protective factors that stood out in particular. These results are partially consistent with those obtained in the *retrospective* study. Indeed, the results of Part I (retrospective) indicate that the development of clinical and partial PTSD is associated with protective factors such as being hardy, one's perception of the social support of coworkers during and after the event, the actual positive support of coworkers after the TE, risk factors, such as physical and emotional reactions, and dissociation during and immediately after the event. Moreover, peritraumatic risk and protective factors (dissociation and social support during or immediately after the event) seemed to be the strongest predictors in the *retrospective* part. Table 9 provides an overview of the main risk and protective factors involved in the development of PTSD, as observed in this study.

Table 9 – Summary of main predictors, according to retrospective and prospective parts of study

Main factors associated with PTSD	
Part I: Retrospective	**Part II: Prospective**
Pretraumatic • Hardiness (stress-resistant personality)(PF)	**Pretraumatic** • Stress coping strategies: focused on emotions(RF)
Peritraumatic • Dissociation* (RF) • Physical and emotional reactions(RF) • Positive support from coworkers during and immediately after TE* (PF)	**Peritraumatic** • Dissociation* √ (RF) • Physical* and emotional* reactions(RF)
Posttraumatic • Positive support from coworkers after TE(PF)	**Posttraumatic** • Number of symptoms of acute stress disorder and depression* (RF)

RF: Risk factor for developing PTSD (shown in red).
PF: Protective factor against possible development of PTSD (shown in blue).
* Risk or protective factors that are noticeably different from other significant predictors.
√ In the prospective part of the study, the scores assessed for risk factors such as physical reactions, emotional reactions and dissociation are strongly intercorrelated and are all very good predictors of PTSD symptoms, at all times of assessment. The fact that the optimization procedure favoured one of the three variables (physical reactions) over the other two does not mean that the other two are irrelevant.

Our first hypothesis regarding the *prospective* part of the study—that is, that the development of PTSD symptoms and the capacity to cope following a TE would be better explained by certain peritraumatic and posttraumatic factors than by pretraumatic factors—was partially confirmed. The results suggest that posttraumatic risk factors are the biggest predictors, compared with pre- and peritraumatic factors, at all three times of assessment. The number of ASD symptoms and the severity of depression symptoms were not only associated significantly with PTSD, they were also the strongest predictors. The results of the *retrospective* part of the study suggest that peritraumatic risk and protective factors are the biggest predictors of PTSD, compared with pre- and posttraumatic factors. Indeed, dissociation (RF) and positive social support from coworkers, during and immediately after the event (PF), were significantly associated with PTSD.

Our second hypothesis regarding the *prospective* part of the study—that is, that the development of PTSD symptoms is explained chiefly by the following risk factors: dissociative reactions, severity of the event and perception of negative social interactions—was also partially confirmed. A strong correlation was found between emotional and physical reactions and dissociation, which were both linked to the prediction of PTSD. In contrast, the perception of negative social interactions did not turn out to be a predictor, even though negative support between the TE and T1 (Critical Scale) and positive support between the TE and T1 were significantly correlated at both MPSS times of assessment. Moreover, for the *retrospective part*, peritraumatic dissociation (RF) and positive social support (PF) from coworkers during and

immediately after the event are the predictors that have the most impact on posttraumatic reactions, which partially confirms our second hypothesis.

Overall, these results substantiate those of previous studies where peritraumatic and posttraumatic predictors are among the most reliable predictors of PTSD [58, 59, 68, 86]. The severity of the event does not seem to be a significant predictor. In the research program, event severity was measured by means of a researcher-designed interview that took into account the objective and subjective characteristics associated with the event. In the *retrospective* study, no significant difference was noted in the severity of the event experienced by officers with (clinical or partial) PTSD and by asymptomatic officers. Both groups reported having experienced events of similar severity. In the *prospective* study, the objective and subjective severity of the event correlated barely or not at all with the MPSS. It therefore seems that factors other than event severity are involved in the development of PTSD. Like our results, other studies have not found any association between event severity and PTSD [75, 148, 149]. It should be noted that TE severity remains a complex and controversial concept because there is still no consensus about the dimensions that should be included in the construct or about the way that the concept should be measured [27]. In their meta-analysis, Brewin et al. [86] point out that when it is a question of gauging the severity of trauma in the general population, the measurements of the construct are fairly heterogeneous. This heterogeneity diminishes the validity and reliability of the construct itself. Until TE severity has been examined more closely by the scientific community, it will be impossible to draw definitive conclusions about its predictive value.

Our third hypothesis regarding the *prospective* part of the study—that is, that coping in the aftermath of a traumatic event can chiefly be explained by the perception of positive social support—was not confirmed. None of the protective factors measured in this part—positive social support, adequate coping strategies, hardiness, years of policing experience, etc.—turned out to be significant. Positive support between the TE and T1 was correlated with MSPP, but did not stand out as a predictor. However, the third hypothesis whereby posttraumatic predictors, more specifically social support after the event, are negatively associated with PTSD (PF) was partially confirmed in the *retrospective* part of the study. It has been recognized that positive social support from coworkers reduces the likelihood of developing PTSD. However, positive social support or negative social interactions with a significant other, in the *prospective* part, were not significantly associated with PTSD. As for the impact of pretraumatic protective factors in the *retrospective* part, only the factor “hardiness” was significantly associated with less PTSD. This result is consistent with the findings of earlier studies on military personnel [150-152].

Other factors (i.e., age at time of study and at time of trauma, years of schooling, personal beliefs about the world and values, coping strategies and fright) were included in the regressions as potential predictors of PTSD. However, they did not stand out as being significantly associated with PTSD. Furthermore, the existence of prior individual and family psychiatric problems, a past diagnosis of PTSD in the aftermath of an event at work or outside of work, and the existence of stressful situations before the occurrence of the TE at work are not predictors of PTSD. Our results are consistent with those from the meta-analyses by Ozer et al. [68] and Brewin et al. [86] indicating that the magnitude of the effect of the pretraumatic factors is low, but not that of the effect of posttraumatic factors.

Overall, the significant results from our study (both the *retrospective* and the *prospective* parts) confirm the findings reported in the literature regarding PTSD predictors. In addition, the best (peri- and posttraumatic) predictors of PTSD in police officers were identified: emotional and physical reactions (RF), dissociation (RF), and positive social support from coworkers during and after the event (PF), as well as ASD (RF) and immediate posttraumatic symptoms of depression (RF). That said, pretraumatic factors like hardiness (PF) and emotion-focused coping strategies (RF) are also PTSD predictors.

5.2.2 *Peritraumatic Distress and Dissociation*

According to many researchers, peritraumatic distress, that is, experiencing intense negative physical and emotional reactions during and immediately after the TE, is a strong predictor of the development of posttraumatic symptoms [17, 18, 46]. In this study (both the *retrospective* and the *prospective* parts), peritraumatic distress, measured by both physical and emotional reactions, stands out as a major predictor. Interestingly, peritraumatic distress is increasingly being regarded by current research as a potential mediating variable in the prediction of PTSD symptoms, in connection with several pretraumatic variables (e.g., family psychiatric history [46] and psychobiological predictors [45]). However, further studies on this topic are needed to corroborate the mediating relationships.

In addition, peritraumatic dissociation is also a leading predictor (sometimes, the strongest predictor) of the development of PTSD among police officers [17, 18, 43, 53]. In our study (the *prospective* part), peritraumatic dissociation, like peritraumatic distress, stands out as one of the strongest predictors of PTSD. These findings substantiate those of earlier research on police [43, 50, 51, 54] and other trauma victim populations [58, 65, 75, 153]. Our results are also consistent with data from the meta-analysis by Ozer et al. [68], which identified peritraumatic dissociation as the strongest predictor of the development of PTSD, with an effect size of 0.35, or the equivalent of a proportion of explained variance of 12.25%. A proportion of explained variance was calculated in order to be able to compare the predictive value obtained in our study for the concept of dissociation with the value obtained in the meta-analysis. A proportion of explained variance of 16% was obtained for dissociation in our study, which is higher than the result observed in the meta-analysis by Ozer et al. [68]. As in their study, this predictor turned out to be a major factor in ours, as well.

Like previous studies [58, 59], the *prospective* part of our study found a significant correlation between peritraumatic reactions, such as dissociation, and both physical and emotional reactions. As a result, it has been suggested that dissociation could be a way to cope with the strong emotions experienced during a TE. Consistent with this conjecture, Bernat et al. [59] noted that negative emotional reactions during a traumatic event, especially fear, are predictors of dissociation. The physical sensations of panic appear to have a mediating effect on the relationship between acute fear and dissociation during a TE [59]. Other studies have suggested that states of physiological hyperactivation could lead to dissociation [154–156]. Intense emotional states could cause an increase in physical activation, which in turn triggers dissociation. Although dissociation may be considered a priori as a form of coping behaviour at the time of trauma, many empirical findings, including our study, suggest that dissociation increases the risk of developing PTSD later on.

In short, peritraumatic stress and peritraumatic dissociation seem to be strong predictors of PTSD. In an effort to explain the relationship between these two predictors and their predictive power, Brunet, Sergerie and Corbo (2006) [157] suggest that in a longitudinal context, peritraumatic distress predicts the development of acute PTSD, whereas peritraumatic dissociation predicts the persistence of chronic PTSD.

5.2.3 *Social Support*

In the aftermath of a traumatic event, the environment in which victims seek to come to terms with the trauma and recover from its effects is a major factor. Social support is one aspect of this environment that has received a good deal of attention from the scientific community. However, we did not observe that the social support measured in the *prospective* part predicted the development of PTSD, even though negative support between the TE (Critical Scale) and T1, as well as positive support between the TE and T1, are correlated significantly at the two MPSS assessment times.

However, the results from the *retrospective* part suggest, on the contrary, that perceptions of positive social support from coworkers, both peritraumatic and posttraumatic, are associated as a protective factor against PTSD. Peritraumatic social support from coworkers turned out to be one of the most prominent predictors in the *retrospective* part of the project. These findings are consistent with the results of other studies of other police forces, which indicate that positive social support from coworkers appears to be a major predictor (PF) to consider [118, 158]. Our results are also in line with those of the meta-analysis by Ozer et al. [68] indicating that perception of positive social support is one of the best predictors (PF), with an effect size of -0.28, or the equivalent of a proportion of explained variance of 8%. In a way, this underscores the importance of providing prompt, adequate support to the victims of a TE. Police officers who reported that they had not received any support from their coworkers during the event were significantly more likely to be diagnosed with partial or clinical PTSD than officers who reported that they had received support, whether it was just a little support or extensive support (Fisher, $p < .05$). This result substantiates the results of studies showing that a non-supportive social network is associated with poor posttraumatic coping [15, 91].

To our knowledge, no study has examined social support as a peritraumatic protective factor. Social support is frequently assessed in the months following exposure to the trauma rather than during or immediately afterward (e.g., in the first few hours or days following the trauma). However, studies of high-risk populations (e.g., police officers, soldiers, firefighters, ambulance attendants and first-aid workers) should focus on peritraumatic social support, as coworkers and supervisors are often present during the TE. The type of support received immediately after a TE can have an impact on the speed and quality of a person's recovery. In the interviews, police officers often reported things that made it hard for them to cope after the trauma, such as disapproval or harsh criticism from superiors, peers or even themselves regarding the standard of their performance during the event. Another factor that affects the quality and speed of recovery is the pejorative image of police work sometimes conveyed by the media. It is therefore hardly surprising that positive social support during or immediately after the event is a major protective factor, given that we know that police culture relies highly on fraternity, loyalty and trust among officers.

Contrary to our hypotheses, perceptions of positive social support or negative social interactions with significant others were not significant predictors in either of the two parts of the project. One possible explanation for these non-significant results may be the assessment instrument used for social support. The *Perceived Support Inventory* was initially designed to assess support from spouses, but the questionnaire was adapted to measure the social support received from a significant other, regardless of the relationship with the respondent. This meant that it could be a coworker, spouse, family member or friend. Some questions from the inventory were occasionally not really applicable or were less relevant when the support was received from individuals other than the person's spouse. Moreover, some police officers reported that even though they had identified their spouse as their most significant other, they had not discussed the TE at home, which made it hard for the officers to recall whether their spouses had been supportive or not in the months following the event. Furthermore, perception of social support from supervisors was not a significant predictor in our study. Another possible explanation for the lack of significant results regarding social support in the *prospective* study concerns the event selected. As soon as an officer had experienced an event that met the DSM-IV criteria for a TE, he or she was invited to take part in the study and was assessed in connection with that specific event. It is possible that the event was not one of those that marked the officer the most in his or her career. Social support is especially useful and necessary when people experience events that are more than they can cope with or that upset the way they operate. It is possible that some officers in the *prospective* part of the study did not feel any particular need for social support and so they were able to cope after the event without seeking support. If this is true, it is not surprising that support did not stand out as a protective factor. The difference in comparison with the *retrospective* part is that in that study, officers were asked to choose the event that had had the biggest impact on them among all those they had experienced throughout their career as a police officer. If they chose the worst event, it is quite likely that the social support was more beneficial in helping them to cope. It was in that part of the study that social support was shown to be of assistance in coping with the TE. This is why social support, though non-significant in the *prospective* part, should not be considered to be unimportant. The benefits associated with social support in many studies could be influenced by the type of event experienced, the importance of the event to the individual, and the meaning it has for that person at that particular moment in his or her life. A posteriori analyses that go into greater depth will help shed light on this relationship.

5.2.4 *Depression, ASD and Emotion Management*

The factors associated with the development, persistence or exacerbation of posttraumatic symptoms and that can upset a person's equilibrium and progress are key aspects to be considered for victims who are trying to recover and come to terms with trauma. The results of our study suggest that ASD and posttraumatic symptoms of depression in police officers are associated with the development of PTSD. We noted in the review of the literature that depressive reactions in accident victims, additional stressors that occur in the aftermath of a TE (e.g., loss of a job, financial or legal problems, illness or death of a significant other) and ASD are indicators of the future development of PTSD. In police officers, physical injuries resulting from the TE, depressive symptoms and subsequent adverse life events appear to be posttraumatic risk factors for PTSD. Officers who reported having used avoidance-focused stress management strategies to cope with the TE had greater posttraumatic symptomatology. In addition, in police

officers, postevent psychological debriefing either had no effect on PTSD symptoms or actually led to an increase in symptoms. Our results substantiate these findings for the most part. In this study, posttraumatic risk factors like severity of depressive symptoms and number of ASD symptoms chiefly stand out as major predictors that need to be considered on a clinical level and in future research. Our results corroborate those of earlier studies of police officers in this regard.

Furthermore, the negative impact of emotion-focused coping strategies observed in Part II seems to act as a risk factor for PTSD symptoms. These strategies can be defined as efforts the individual makes to change the negative interpretation of the situation and reduce the intensity of the negative emotions experienced. To achieve this, the person uses strategies such as avoidance, distraction, diversion or daydreaming. It appears that this type of passive management of emotional reactions is not suitable and that this pretraumatic predictor should be taken into consideration in primary prevention, from screening to treatment. In this case, too, our results corroborate data already obtained for police officers.

5.3 Clinical Implications

The results of this research project could enhance the training given as part of the employee assistance program (PAPP) of the SPVM and other police forces. The findings confirm the importance of taking a preventive approach, which is already a recommended practice being followed by the PAPP and other programs. Overall, the findings of our study have implications for primary and secondary prevention, screening, assessment and treatment (i.e., tertiary prevention) of officers exposed to TEs in the course of their work. We propose prevention and intervention strategies based on the significant predictors identified by our research project and by other empirical studies in the field. We believe that the recommendations could also be relevant and useful for non-police organizations that have employees at high risk of exposure to TEs at work, such as emergency services employees (e.g., firefighters, ambulance attendants, first-aid workers).

5.3.1 *Primary Prevention*

To improve primary prevention, organizations that employ people at high risk of experiencing TEs in the course of their work (e.g., soldiers, police officers, firefighters, ambulance attendants) should promote the development of protective measures and the reduction of risk factors in their employee training programs. It is possible to take action even before there is any exposure to adverse events [27]. For instance, police organizations could foster resilience in their staff by including in their training programs effective coping strategies such as problem solving, autogenic or applied relaxation, or breathing retraining. Strategies for controlling or better managing intense emotions, reducing physiological activation or preventing the emergence of dissociative reactions at the time of the trauma could also be taught. The training could focus on developing hardiness. At present, there are a few training programs aimed at increasing individual resilience and capacity to withstand stressful events that can occur in the workplace [152, 159-161]. The programs use a variety of strategies, including teaching effective coping strategies specific to a given work environment, conducting physical activity and simulation exercises (e.g., for police, simulating a shooting or hostage-taking, with the help of a scenario) and establishing an adequate social support network. These programs also seek to foster cohesion

among team members, improve individual communication skills and promote members' engagement in their workplace. While the programs hold out promise, we will have to wait for the findings of other empirical studies before any conclusions can be drawn about their effectiveness in preventing posttraumatic reactions. In their book, Paton, Violanti and Smith [162] offer some practical suggestions for improving the coping strategies of employees at high risk of experiencing TEs.

The qualitative data from the *retrospective* study indicate that a few officers found it helpful to use cognitive avoidance as a coping strategy. Some of them advise their colleagues to try it, too, by thinking of other things or making an effort to forget the event. However, this strategy is usually not an effective way to cope with stress or prevent the development of PTSD [49, 51, 93]. The *prospective* study showed that this type of coping used by police officers is actually a risk factor for developing PTSD. That is why it is important to educate officers about what strategies are effective over the short, medium and long term, and to inform them about the ones that are ineffective and may even be harmful over the longer term.

5.3.2 *Secondary Prevention*

In the days following a TE, "psychological first aid" should be provided. Care should be limited to making people feel secure by informing them of the possible psychological consequences and providing them with tangible, emotional support [163]. Later, within the first month of the event, various effective, immediate postevent strategies should be suggested to officers who have experienced a TE. One such strategy is to provide brief, intensive, cognitive behaviour therapy, in the form of five sessions two weeks after the event, to people having ASD symptoms [164]. On the basis of the empirical evidence supporting this type of intervention, it has been recommended that individuals with ASD symptoms or ASD be given trauma-focused cognitive behaviour therapy (including exposure and/or cognitive therapy) for 5 to 10 one-on-one sessions [115, 116]. Immediate postevent intervention can also promote appropriate social support and encourage the verbalization of emotions in a safe, supportive environment [165]. The coworkers, supervisors and even family members of officers who have experienced a traumatic event could then receive psychological training on the symptoms to watch out for, as well as practical advice on the various ways to provide the officers with appropriate positive support following a TE. There are a number of different forms of support that each significant other can provide to an officer who needs it. Coworkers can offer emotional support and information (e.g., express their appreciation, give positive feedback or helpful advice). Supervisors can give organizational support or tangible assistance (e.g., give time off, reassign the person to other duties for a while). The children and spouses of affected officers can try to spend more family time together and plan nice, relaxing activities. It is important to foster a supportive environment, both at home and at work [163]. Before preventive therapy is offered to people involved in a TE, the trauma psychologists need to conduct an initial assessment of each individual.

5.3.3 *Evaluation*

It is recommended that an assessment of an individual's psychological and physical state be done shortly after a TE, for instance in the phase when the "psychological first aid" is given. The clinician should use reliable instruments to screen not only for posttraumatic symptoms and other

clinical conditions such as depression, but also for predictors. The screening instruments used should be based on valid empirical data. Clinicians will then be able to quickly and accurately identify individuals at risk of developing PTSD (i.e., individuals who have well-known risk factors or who lack sufficient protective factors). More specifically, clinicians should be on the lookout for individuals who have experienced strong physical anxiety reactions, negative emotional reactions, dissociation at the time of the trauma, acute stress following the trauma or who have a weak social support network, as these are all well-documented risk factors that have a significant influence on PTSD symptoms. The results of the assessment could help clinicians decide whether or not psychological follow-up needs to be provided to TE victims. It would be desirable and opportune to monitor high-risk individuals closely and to offer short, early, postevent therapy, on a cautious, one-to-one basis, primarily to individuals who have a high likelihood of developing PTSD.

5.3.4 *Tertiary Prevention*

Tertiary prevention should focus on developing therapeutic treatments based on empirical evidence of PTSD risk and protective factors [27]. The clinician should aim to reduce the negative effect of risk factors, while facilitating the acquisition of the protective mechanisms likely to have the greatest impact on posttraumatic symptoms, but that can also be altered by means of therapeutic strategies. These factors should be made priority targets in developing therapeutic interventions [25]. Predictors that have a limited impact on PTSD could be included in the therapy at a later stage, if they are still relevant. For individuals who have experienced a TE, therapists can show them effective coping strategies, help them build their sense of self-efficacy and work to change their negative or unrealistic attributions regarding the trauma (e.g., taking the blame or responsibility for the traumatic event). In addition, clinicians should try to help their clients become hardier by emphasizing situations where they have a measure of control, urging them to regard stressful situations as challenges and encouraging them to commit to important goals [166]. Treatment should also be adapted according to a person's psychiatric condition and symptoms, and be customized and tailored to suit the individual if there is comorbidity. In short, it is essential to provide specific proven psychological therapy suited to the individual based on the initial assessment following the TE. Decisions about therapeutic options should be based on empirical evidence [115–117].

The qualitative data produced by our study indicated that almost 85% of police officers would like to be able to consult a psychologist if they feel a need to do so following a TE. In addition, 43% of the officers recommended that coworkers consult a psychologist to help them cope in the aftermath of a major critical event [1]. This shows open-mindedness among officers and recognition that it is possible and even normal, to a certain extent, to experience posttraumatic reactions. It is highly likely that officers will continue to have illusions of control and invulnerability—personal beliefs that make it psychologically easier for them to carry out their duties. Nevertheless, the results of this research project suggest that a change is underway in police culture. There seems to be a growing recognition among officers that they are not totally invincible and that it is acceptable to ask for help in the aftermath of a stressful event.

To sum up, therapy for people who have had a traumatic experience must be planned on the basis of valid empirical results. For instance, the risk and protective factors that have been shown to be the best predictors of the development of PTSD (i.e., those with a high effect size) and those

susceptible to change must be prioritized in the assessment and in therapy decisions, while factors having less of an influence on PTSD can be considered at a second stage if necessary [25]. Planning the therapy is not as simple as it appears, however. Clinicians should not forget that risk and protective factors can operate differently in different populations (e.g., military personnel versus civilians, women versus men) and with respect to different types of trauma. Predictors of acute and chronic PTSD are also different. Clinicians must weigh all these considerations and use their judgment when developing therapeutic strategies. In addition, other factors can act as mediators or moderators of the relationship between predictors and PTSD. Knowledge of these factors is absolutely essential to the therapeutic planning process. It is also important to remember that a TE can cause disorders that co-occur with PTSD [9, 10, 30, 167] or mental disorders other than PTSD, such as major depression [168, 169]. Posttraumatic therapeutic strategies must therefore be adjusted on the basis of the person's current psychological state, as well as possible comorbidity. All these considerations should alert clinicians and researchers against applying rigid, one-size-fits-all therapeutic solutions to all trauma victims, regardless of individual characteristics of personality, context and time. Provided the above-mentioned points are given proper consideration, therapeutic strategies developed and followed in the future should prove more effective in addressing the potentially negative consequences of exposure to a TE.

5.4 Limitations and Scope of Findings

Our findings should be interpreted with caution and restraint for a number of reasons. First, it is possible that police culture may encourage officers not to show that they are psychologically or physically vulnerable. In some cases, this could prompt officers to underreport their posttraumatic symptoms in an interview. If this is true, our estimates of posttraumatic symptoms and PTSD rates for our two samples may well be on the conservative side. Second, the hardiness (DRS) assessment subscales have low reliability, which means that caution must be exercised when using the overall test to measure this construct. Despite this limitation, we decided to include this measurement instrument because it is the only French-language version of the questionnaire that has also been validated with a French-speaking sample population and because there are relevant conceptual grounds for wanting to assess this construct. In the *retrospective* part of our study, PTSD symptoms with regard to a single event, i.e., the TE that occurred at work and that upset the officer the most, was assessed. It is therefore possible that the extent of the posttraumatic reactions from cumulative events at work and outside of work may have been underestimated. The *prospective* study, on the other hand, assessed the officer's most recent TE, but it was not possible to control for the cumulative effect of TEs. Another limit to our research project lies in the fact that it is hard to know whether our results can be generalized to other high-risk populations. Moreover, our sample may not be representative of all officers working for the SPVM or other police forces involved in our study, as participation was voluntary. The study participants may differ from all the other officers who did not respond to our invitation to take part in the study. In the *retrospective* study, the two main reasons officers gave for not taking part were lack of time and lack of interest. We did not have access to this information in the *prospective* study. It is possible, however, that the participants were to a certain degree representative of the entire SPVM force, as the reasons given for not taking part were acceptable, understandable reasons that did not imply anything about non-participants struggling with worse symptoms or distress. These assertions need to be interpreted cautiously, however. Furthermore,

prudence is called for when analysing and interpreting the findings because of the officer participation rate. It is also possible that our results may not be valid for other municipal or provincial police forces in Quebec. Another limitation of our study is the fact that the design is not completely *prospective*. Some pretraumatic variables, such as coping strategies and fundamental beliefs, were not assessed before the TE, but in the days following it. In other words, the person's perception of his or her functioning or way of thinking may have changed as a result of the TE. These two variables are therefore not necessarily true pretraumatic constructs.

Despite these limitations, our research does have a number of strengths. First, PTSD predictors were measured in Canadian, more specifically Quebec, police officers for the first time, as they had not been the subject of this kind of study before. Second, our study uses a validated semistructured interview as a basis for diagnosing PTSD and other psychiatric disorders, in contrast with many previous studies that have opted for self-report questionnaires. The diagnoses for current and lifetime PTSD are therefore formally assessed. By using standard instruments, this study was able to measure a series of predictors, including rarely assessed risk factors and especially protective factors. Three categories of predictors were distinguished: pretraumatic, peritraumatic and posttraumatic. Moreover, several protective factors that had not been measured previously or that had not been assessed frequently in prior research on police officers (e.g., hardiness, personal beliefs, coping strategies) were systematically evaluated in this study. We also established a distinction, seldom taken into consideration, between positive social support and negative social interactions. We also assessed various sources of social support (e.g., coworkers, supervisors and a significant other). In addition, our study measured peritraumatic social support, whereas no previous study had ever assessed the impact of this type of support during and immediately after a TE. Moreover, peritraumatic social support seems to be a major predictor, although no previous study had ever identified any peritraumatic protective factors. In addition, the *prospective* study not only addressed some of the methodological shortcomings of the *retrospective* study, but also helped us to control for methodological flaws found in previous studies. It also allowed us to compensate for the lack of rigour of many studies. Our research project can be seen as an effort to move in that direction in order to address current weaknesses and study protective factors. Lastly, multivariate analyses were used to delimit not only the relations between risk factors, protective factors and symptoms, but also the impact of various predictors. We also analysed the incremental impact of PTSD predictors over time.

5.5 Future Research

The *retrospective* study was extremely useful, not only for the purpose of obtaining epidemiological and descriptive data on SPVM officers, but also for setting up the *prospective* study and improving the assessment of potential predictors. The retrospective study helped us to (1) learn more about police officers' reactions and perceptions when they are faced with a TE; (2) describe the current state of the situation (e.g., the study produced an estimated PTSD rate); and (3) promote the improvement of assessment tools for the prospective study (e.g., the study led to the development of a questionnaire on different types and sources of social support and to improvements in the semistructured interview with police officers). Due to more rigorous methodology, the *prospective* study allowed us to (1) learn more about the reactions and

perceptions of police officers at the time of a recent TE, rather than a TE from the past, and to compare the results with data from the *retrospective* study; (2) describe more accurately the present situation of police officers who experience a TE and estimate the prevalence of current PTSD; (3) observe how posttraumatic reactions change over time and especially examine the impact of pre-, peri- and posttraumatic factors on PTSD symptoms at different times.

Quite a few studies have been done on PTSD predictors since this diagnosis was defined. Yet they have shed little or insufficient light on the valence of the predictors, their relationships and their respective roles in the development of PTSD. Researchers and research clinicians must continue their work in order to gain a better understanding of factors that influence posttraumatic reactions, in relation to the type of trauma and the population involved. Future research should always take into consideration the assessment of both risk and protective factors. Hardiness and the concept of posttraumatic growth deserve greater attention from trauma researchers. More prospective and longitudinal studies of trauma are needed in order to explore changes in posttraumatic reactions over time, highlight the predictors associated with PTSD development at different times, specify the factors associated with the persistence or chronicity of PTSD, identify the underlying causal mechanisms involved, and investigate the impact of cumulative stressful events, especially in high-risk populations. At the beginning of their careers, individuals at high risk of experiencing TEs at work provide researchers with an opportunity to take pretraumatic measurements, that is, even before they are exposed to a TE. The resulting pretraumatic data would provide a baseline that could subsequently be compared with data for the same measurements taken after the individual has been exposed to trauma. These pre-post measurements (i.e., taken before and after the occurrence of a TE) will help in assessing the impact of the various predictors. The identification of PTSD predictors must be based on rigorous empirical studies so that researchers and clinicians can develop effective prevention and intervention programs for trauma victims. Future research should assess the effectiveness of the primary, secondary and tertiary therapies that will have been developed in light of the known risk and protective factors. In this regard, the chapter by King, Vogt and King [25] includes some useful methodological recommendations for researchers, intended to improve our understanding of the etiology of PTSD. Optimal predictors need to be better understood, which entails determining which predictors have not only good sensitivity, but also optimal specificity. Researchers should operationalize the variables and use a common terminology, give preference to a diagnostic interview and use validated instruments, in addition to doing more research on the impact of partial PTSD. They should also pursue work on dissociation with a view to agreeing on a common conceptualization.

Future research should focus more on the assessment of social support and the impact of negative social interactions as risk factors, and immediate and postimmediate positive support as a protective factor in the development of PTSD. In this research project, as in other studies, social support stands out as a noteworthy predictive variable. However, very few studies make distinctions about the various types and sources of support. The vast majority of studies have measured the perception of the availability of support, but not the perception of the support actually received. No study has measured the perception of the support received during or immediately after the TE, although this support could have a major role to play in influencing posttraumatic reactions. The instruments used to assess social support and PTSD symptoms are often self-reports, which have some obvious weaknesses (e.g., no clinical judgment involved, no guarantee that the questions have been understood properly). Hence the importance of assessing

support by the interview method. In addition, these instruments have not been adapted for a police population, which has certain specific characteristics that reduce the validity of more general instruments. In short, prospective and longitudinal work needs to be done on Quebec police officers to determine the types and sources of support at different times that influence the development of PTSD in these officers after they experience a TE while on duty. Future analysis of the complementary results from our *prospective* study will focus on this very important topic.

6. CONCLUSION

The findings of this study confirm what is currently known about PTSD prevalence rates and predictors, according to the literature on various population groups, including police officers. The PTSD rate for police shows that they are resilient, despite the fact they are at high risk for TEs as part of their work. Furthermore, the development of clinical or partial PTSD and the intensity of PTSD symptoms are associated with risk factors (RFs) that increase the probability that exposure to a TE will have a long-term impact on the individual's psychological well-being, as well as with protective factors (PFs) that make coping following a TE easier, by preventing posttraumatic symptoms or reducing their intensity [25]. As a result, in our study, the intensity of PTSD symptoms is tied to certain pretraumatic (hardiness [PF] and emotional stress-management techniques [RF]) and posttraumatic factors (perception of social support of colleagues following TE [PF], number of ASD symptoms [RF] and intensity of depressive symptoms [RF]), but more specifically to peritraumatic factors (perception of social support of colleagues during TE [PF], dissociation [PF], and emotional and physical reactions [RF]). The predictors that have the most impact on PTSD symptoms are peritraumatic dissociation and social support during or immediately after the event, along with ASD and the intensity of depression. In addition, police officers state that they resort to a variety of coping techniques and strategies to deal with a critical event at work, such as talking to colleagues about it, getting their support or taking time off. These techniques and strategies seem to help them recover, especially after a TE. Officers advise their colleagues who experience this kind of event to talk about it and to see a psychologist, and the majority of them are open to receiving this kind of support service if needed.

Specific, tailored therapies could be developed in the future, as the factors that have a major impact on PTSD (e.g., dissociation, emotional and physical reactions, ASD and depressive symptoms) can be influenced using psychological stress-management techniques. The other identified factors that help with coping (i.e., social support and hardiness) are also susceptible to change by means of preventive strategies that could easily be incorporated into staff training programs.

As part of a preventive strategy, it is recommended that the factors of social support, dissociation, ASD and depressive symptoms be targeted first, as they are not only associated with influencing PTSD, but are also considered to be predictors that have a major impact on posttraumatic reactions. Predictors having less of an impact and that are associated with the development of PTSD can be targeted later.

Devising and implementing therapeutic strategies could be the most effective way to help prevent PTSD among police officers and promote faster recovery after a TE.

7. APPLICABILITY OF FINDINGS

We believe that the findings of our study could be applied to SPVM police officers who are at risk of experiencing TEs in the performance of their duties. The findings could also be applied to other police forces whose members may be exposed to TEs. We believe that the prevention, screening, evaluation and treatment strategies for coping with PTSD that will be developed on the basis of the collected data can be generalized and possibly be applied not only to Canadian, including Quebec, and even U.S. police populations, but also to other workers at high risk of developing posttraumatic stress reactions while on the job (e.g., soldiers, firefighters, first responders, ambulance attendants, peace officers). The study findings should therefore be useful to a number of other organizations who employ people at high risk of developing PTSD.

8. POTENTIAL IMPACT

One of the anticipated benefits of the project for police officers will be that employee assistance program workers, at the SPVM and other police departments, will have access to the measurement instruments used in this study and so will be able to do earlier screening of people at risk of developing posttraumatic symptoms. It would even be desirable to develop a posttraumatic reaction screening instrument specifically for police officers. The instrument could be based on the data gathered in the retrospective and prospective studies. It would provide employee assistance program workers of the SPVM and other police departments with information about whether or not to provide psychological follow-up. The study should therefore lead to new treatment paths and practices aimed at lending support to police officers involved in TEs and offering them the psychological assistance they need. The clinical work of the assistance program professionals of the SPVM and other police forces could be adjusted, validated and improved on the basis of the data from this research program, which at the same time, will support these professionals in their clinical approach. Furthermore, the data collected in the course of this study will provide valuable material for the critical incident stress management training workshop given to all recently promoted SPVM supervisors. More effective screening of people at risk and the development of new primary, secondary and tertiary prevention strategies based on our data could help diminish the intensity of posttraumatic reactions, promote faster return to work and, over the longer term, reduce the prevalence of this disorder in police forces like the SPVM and so bring down the related costs.

9. LIST OF SCIENTIFIC PUBLICATIONS PRODUCED WITH THIS FUNDING

The scientific papers, book chapters, and oral and poster presentations produced thanks to the funding received for this project are listed below.

Lacerte, S., Marchand, A., & Nadeau, C. (2011). Les facteurs prévisionnels de l'état de stress post-traumatique chez les policiers: état de la question. *Journal International de Victimologie*, 8 (3), 208-233.

Marchand, A., Boyer, R., Martin, M., & Nadeau, C. (2010). *Facteurs prévisionnels du développement de l'état de stress post-traumatique à la suite d'un événement traumatique chez les policiers: Volet rétrospectif*. Études et recherches, Rapport R-633, Montreal, IRSST, 2010, 120 pages.

Martin, M., & Marchand, A. (2010). *Facteurs prévisionnels du développement de l'état de stress post-traumatique à la suite d'un incident critique chez les policiers*. Lecture given at the Centre Jeunesse de Montréal, Monday, December 6, 2010.

Martin, M., Marchand, A., Boyer, R., & Martin, N. (2009). Predictors of the development of posttraumatic stress disorder among police officers. *Journal of Trauma & Dissociation*, 10, 451-468.

Martin, M., Marchand, A**.,** & Boyer, R. (2009). Traumatic Events in the Workplace: Impact of Psychopathology and Healthcare Use of Police Officers. *International Journal of Emergency Health, 11* (3), 165-176.

Belleville, G., Levrier, K., St-Pierre-Delorme, M-Ê., Cousineau, J., Marchand, A. (2010). *Nightmares and Sleep Disturbances Following Cognitive-Behavior Therapy for PTSD: A Meta-Analytic Review.* Poster presented at the 26th annual meeting of the International Society for Traumatic Stress Studies: Translation, Collaboration and Mutual Learning, Montreal, November 4 to 6, 2010.

René de Cotret, I., Martin, M., & Marchand, A. (2010). *Predictors of Peritraumatic Dissociation Among Canadian Police Officers.* Poster presented at the 26th annual meeting of the International Society for Traumatic Stress Studies: Translation, Collaboration and Mutual Learning, Montreal, November 4 to 6, 2010.

Marchand, A., & Martin, M. (2010). *Facteurs prévisionnels du développement de l'état de stress post-traumatique à la suite d'un incident critique chez les policiers*. Paper presented at symposium titled Santé psychologique au travail: des solutions pour mieux intervenir dans le milieu du travail, at the IRSST, Wednesday, November 3, 2010.

Lacerte, S., Marchand, A., & Nadeau, C. (2010). *Les variables modulant l'État de stress post-traumatique au sein de la population policière.* Poster presented at annual research day, Centre de recherche Fernand-Seguin, held at Hôpital Rivière-des-Prairies, on May 18, 2010.

Lacerte, S., Marchand, A., & Nadeau, C. (2010). *Les facteurs prévisionnels de l'état de stress post-traumatique chez les policiers: état de la question.* Paper presented at workshop 633 titled Internet et santé: Stratégies d'usages et d'intervention, at the 58th Annual Conference of Association francophone pour le savoir (ACFAS), Université de Montréal, May 10 and 11, 2010.

Martin, M., Marchand, A., & Boyer, R. (2008). *Is acute stress disorder useful in predicting PTSD?* Poster presented at the 25th annual conference of the International Society for the Study of Trauma and Dissociation, Chicago, November 15 to 17, 2008.

Martin, M., Marchand, A., Boyer, R., Martin, N., & Collacciani, G. (2008). *Le soutien des collègues est-il essentiel au rétablissement lorsqu'un événement traumatique survient en milieu de travail?* Poster presented at annual research day, Centre de recherche Fernand-Seguin, Montreal, April 18, 2008.

Martin, M., Marchand, A., & Martin, N. (2008). *Le soutien social chez les policiers : un facteur de protection contre le stress post-traumatique?* Paper presented at the symposium Le soutien des proches après un événement traumatique: mieux comprendre pour mieux agir, at the 30th Conference of the Société Québécoise pour la Recherche en Psychologie, Trois-Rivières, March 14 to 16, 2008.

Martin, M., Marchand, A., Collacciani, G., Beaulieu, M., & Brault, J. (2008). *Comment s'adapter à un événement traumatique en milieu de travail?* Paper presented at the 3rd International Commission on Occupational Health / Work Organization and Psychosocial Health (ICOH-WOPS) International Conference, Psychosocial Factors at Work: From Knowledge to Action, Quebec City, September 1 to 4, 2008.

Martin, M., Marchand, A., Boyer, R. (2008). *Facteurs prévisionnels du développement de l'état de stress post-traumatique suite à un événement traumatique chez les policiers: volet rétrospectif.* Presentation to the Service des enquêtes spécialisées, Service de Police de la Ville de Montréal, Montreal, May 21, 2008.

Martin, M. (2008). *Facteurs de risque et de protection dans la modulation de l'état de stress post-traumatique.* Guest lecturer in PhD-level course PSY-9232: Les troubles liés aux événements traumatiques, Department of Psychology, Université du Québec à Montréal, Montreal, January 23, 2008.

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Martin, M. & Germain V. (2006). *Facteurs de risque et de protection dans la modulation de l'état de stress post-traumatique*. Lecture given in the Department of Psychiatry, Université de Montréal, as part of the symposium PTSD et données probantes: Mise à jour, Montreal, December 1, 2006.

Martin, M., Marchand, A., Boyer, R., Martin, N., & Janelle, A. (2006). The impact of dissociation and social support on PTSD in law enforcement personnel. Poster presented at the 22nd Conference of the International Society for Traumatic Stress Studies, Hollywood, November 4 to 7, 2006.

Martin, M., Nadeau, C., Marchand, A., & Boyer, R. (2006). *Predictors of comorbid posttraumatic stress disorder and depression in police*. Paper presented in the session Posttraumatic and depressive reactions among military veterans, police officers and cashiers, at the 28th Conference of the Société Québécoise pour la Recherche en Psychologie, Montreal, March 17 to 19, 2006.

Nadeau, C., Martin, M., & Marchand, A. (2006). *Predictors of posttraumatic stress disorder among police officers*. Paper presented in the session Posttraumatic and depressive reactions among military veterans, police officers and cashiers, at the 28th Conference of the Société Québécoise pour la Recherche en Psychologie, Montreal, March 17 to 19, 2006.

Nadeau, C., Martin, M., Marchand, A., Gagnon, C., & Poirier-Bisson, J. (2006). *L'impact du soutien social sur le développement du trouble de stress post-traumatique chez des policiers: Une étude rétrospective*. Poster presented at the 28th Conference of the Société Québécoise pour la Recherche en Psychologie, Montreal, March 17 to 19, 2006.

Martin, M., Marchand, A., Boyer, R., Nadeau, C., & Dequoy, F. (2005). *Predictors of Posttraumatic and Depressive Reactions in Police*. Poster presented at the 21st Annual Conference of the International Society for Traumatic Stress Studies, Toronto, November 2 to 5, 2005.

Martin, M., Nadeau, C., Marchand, A., Dequoy, F., & Boyer, R. (2005). *Risk Factors for Acute Stress Disorder and Posttraumatic Stress Disorder in Police Officers: Preliminary Results.* Poster presented at the 9th European Conference on Traumatic Stress, Sweden, June 18 to 21, 2005.

Martin, M., Nadeau, C., Marchand, A., Dequoy, F., & Boyer, R. (2005). *Facteurs de risque associés à l'état de stress aigu et au trouble de stress post-traumatique chez des policiers québécois: Résultats préliminaires*. Paper presented in the session Les variables biologiques, psychologiques et sociales modulant la réaction post-traumatique, at the annual convention of the Canadian Psychological Association, Montreal, June 9 to 11, 2005.

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