Findings from an Epidemiological Catchment Area:

Trauma and Posttraumatic Stress Disorder

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November 2015

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Doctor of Philosophy

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Abstract

Empirical evidence in research on posttraumatic stress disorder (PTSD) within representative populations in Canada remains sparse. The goal of this dissertation was to comprehensively study, replicate, and extend existing findings of rates of trauma and PTSD, quality of life and neighbourhood environment, and importantly, examine their association over time. Data were drawn from the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) project, Canada's only ongoing social and psychiatric epidemiology catchment area. Based in Southwest Montreal, ZEPSOM'S use of a large, representative, general population provided an opportune environment to carry out the research included in this dissertation. The first study assessed differences in reported trauma exposure and rates of PTSD using single-question and list-based trauma assessments. Findings indicated increases in reported trauma exposure rates from the single-question to list-based assessment and differences were more pronounced in women and in younger participants. Furthermore, list-based assessment identified few additional current cases of PTSD, leading to a discussion of the implications of using different assessment measures within both clinical and epidemiological research. The second study examined how individuals across the full trauma spectrum perceived their neighbourhood environment. Results revealed that neighbourhood disorder was associated with increased trauma exposure and lifetime PTSD. Perceived neighbourhood social cohesion was indirectly associated with trauma exposure through neighbourhood disorder. Neighbourhood social cohesion was also directly associated with lower odds of having current PTSD and higher odds of being in remission. Results highlight the need to better understand how neighbourhood contexts are linked to an individual's trauma exposure, risk of, and resilience for, PTSD. Finally, the third study entailed a longitudinal analysis of global and specific domains of quality of life in

relation to trauma and PTSD. Results confirmed that trauma and PTSD diagnosis demonstrate significant, lasting effects on an individual's global as well as specific domains of quality of life. This thesis broadens current knowledge of PTSD, trauma assessment methods, perceived neighbourhood context, and longitudinal effects on quality of life through replicating and expanding previous findings both longitudinally and in breadth. Importantly, by drawing from the ZEPSOM dataset, this thesis lends significant strength to the generalizability of our reported findings, overcoming an enduring limitation in previous trauma literature.

Abrégé

Les données empiriques portant sur l'état de stress post-traumatique (ÉSPT) recueillies auprès de populations canadiennes représentatives sont rares. L'objectif de cette thèse est d'étudier, de répliquer et d'accroître les connaissances existantes quant aux taux d'exposition à un traumatisme et aux taux d' ÉSPT, à la qualité de vie et à l'environnement du quartier ainsi que d'examiner leur relation au fil du temps. Les données sont issues du projet Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal (ZEPSOM). Ce projet est le seul à échantillonner des données sur l'épidémiologie sociale et psychiatrique au Canada. Conduit dans le Sud-Ouest de Montréal, le projet ZEPSOM utilise un large échantillon représentatif de la population générale offrant ainsi l'opportunité de mener les études présentées dans cette thèse doctorale. La première étude a évalué les différences entre les taux rapportés d'exposition à un événement traumatique et les taux d'ÉSPT en utilisant une évaluation basée sur une question unique, mais également une évaluation du trauma à partir d'une liste de questions. Les résultats révèlent une augmentation dans les taux rapportés d'exposition à un événement traumatique lorsque l'évaluation passe d'une question unique à une liste de questions, les scores de différence étant les plus marqués chez les femmes et chez les participants plus jeunes. En outre, l'évaluation basée une liste de questions a permis d'identifier quelques individus additionnels souffrant d'ÉSPT. Ces résultats amènent une réflexion sur les implications de l'utilisation de différentes mesures d'évaluation à la fois en recherche clinique et épidémiologique. La deuxième étude a examiné comment les individus exposés à un événement traumatique percevaient l'environnement de leur quartier. Les résultats ont révélé que les difficultés dans le voisinage sont associées à une exposition traumatique plus grande et au fait d'avoir souffert d'un ÉSPT à un moment ou l'autre de sa vie. La perception de la cohésion sociale du quartier est indirectement relié à l'exposition traumatique par le désordre

social dans le quartier. Un lien direct a également été trouvé entre la cohésion sociale du quartier et une probabilité plus faible de souffrir actuellement de TSPT de même que de plus grandes chances d'être en rémission. Les résultats soulignent la nécessité de mieux comprendre comment les contextes sociaux des quartiers sont liés à l'exposition à un événement traumatique, au risque de présenter un ÉSPT et à la résilience face à l'ÉSPT. Enfin, la troisième étude consiste en une analyse longitudinale des domaines globaux et spécifiques de la qualité de vie en lien avec le trauma et l'ÉSPT. Les résultats ont confirmé que le trauma et le diagnostic de l'ÉSPT présentent des effets durables et significatifs sur les domaines globaux et spécifiques de la qualité de vie des individus. En somme, cette thèse approfondit les connaissances actuelles portant sur l'ÉSPT, les méthodes d'évaluation du trauma, la perception du contexte du quartier et les effets longitudinaux sur la qualité de vie, et ce, en reproduisant et en élargissant les résultats d'études antérieures. Enfin, les données étant extraites de la base de données ZEPSOM, cette thèse ouvre la voie à la généralisation des résultats ci-rapportés, et aide à surmonter une limitation souvent rencontrée dans les études antérieures portant sur le trauma.

Acknowledgements

There are a great number of people to whom I am grateful, and without whom completion of this thesis would not have been possible. I would like to thank all the participants for the study run by the Psychiatric and Epidemiologic Catchment Area of South-West Montreal (PECASOM/ZEPSOM). I am incredibly grateful for the continued interest and commitment of our community participants.

I owe a great debt of gratitude to my supervisor, Dr. Alain Brunet, whose sage advice, insightful feedback and overall encouragement throughout the course of my time with his lab have allowed me to grow and excel as a researcher. Under his guidance I have become more assertive and autonomous in my research abilities while feeling supported and secure in the knowledge that he believes in my abilities as a researcher.

I would also like to thank the members of Dr. Brunet's Research Laboratory on Psychological Trauma who have all been excellent colleagues. Specifically, I would like to acknowledge Michelle Lonergan, who has been an unrelenting support and whose friendship I hope to cherish for many years to come. A massive thank you also to my volunteer research assistants from these past three years, without you, I can imagine that I would still be working on this thesis for many years to come. Nicole Arsenault, Kiran Mccloskey, Anna Park, Emily Facer-Irwin, and Stephanie Bailey-Ogilvie – it's been an incredible journey, and I am so happy to have had the opportunity to share my research with you. And thank you Émilie Thomas for translating the abstract of this dissertation.

I have been fortunate in my connection to the talented and highly experienced group of experts from the PECASOM/ZEPSOM study. In particular I would like to thank Dr. Jean Caron, whose initiative and dedication to the pursuit of understanding in the area of Canadian

epidemiological research concerning mental illness has allowed for a wealth of understanding in the areas of trauma and PTSD. Also from the PECASOM, I would like to thank Dr. Michel Perreault, of my thesis committee, whose kind nature has been a source of inspiration over my graduate degrees.

For two "winters" I had the incredible opportunity to be hosted by Dr. Mark Daniel and his team at the University of South Australia. From these experiences I have gained not only expertise, but great friendships. Dr. Catherine Paquet, Dr. Katherine Baldock, Dr. Natasha Howard, Stine Hoj and Felix Mendosa – I thank you – it has been my pleasure. In particular, and though it may be repetitive, I would like to acknowledge the contribution of Dr. Mark Daniel, Dr. Catherine Paquet, Dr. Katherine Baldock for specific and valuable feedback when drafting the "Place and Posttraumatic Stress Disorder" manuscript found herein.

A massive thank you to Pascal Doray-Demers, who played an important role in providing practical and theoretical knowledge of statistical approaches, as well as empirical evidence of the power of the "placebo effect", and who generally supported me throughout the writing of the final paper of this thesis.

I would like to thank certain individuals outside my field of research. Dr. Sylvia Kairouz, you have been a constant source of advice and an incredible mentor this past year, whether is be for my career in academia or research in general. Most of all though, I thank you for your "telepathic" mental support, advice and incredible amount of moral support; I could, I can and I did ☺.

I thank my family. My parents, Dr. Barry Monson and Milda Markauskas, and my sister, Dr. Rita Monson, have often brought me much a needed outside perspective that has allowed me

to remain continually grounded. Your support throughout this degree (and the ones that came before!), is the reason I am where and who I am today.

A massive thank you also to my friends Maddy Werker (esq), Serena Corsini-Munt, and Jennifer Booker, for their unwavering support and willingness to listen to my, sometimes inconsequential, and irrelevant, problems without judgment. And Runa Reta, I thank you for providing a tropical haven from which I could start this beast.

Kevin Delabruere. In the nick of time you arrived and for this I hope to forever be grateful. I loke you always.

And finally, this research was also made possible through the generosity of my doctoral fellowship awarded from the Canadian Institutes of Health Research (CIHR), as well as through operating grants awarded to Dr. Caron and Dr. Brunet from CIHR. This research does not necessarily reflect the official views of these funding bodies.

Contribution of Authors

This thesis consists of three papers with a brief introduction, an extended literature review and a general discussion. An additional extended methods section can be found as an Appendix. The first manuscript, entitled "Assessing Trauma and Posttraumatic Stress Disorder: Single, Open-ended Question versus List-based Inventory", was co-authored by myself, Michelle Lonergan, Jean Caron, and Alain Brunet. The second manuscript, entitled "Place and Posttraumatic Stress Disorder" was co-authored by myself, Catherine Paquet, Mark Daniel, Alain Brunet, and Jean Caron. The third manuscript, entitled "Longitudinal Analysis of Quality of Life Across the Trauma Spectrum" was co-authored by myself, Jean Caron, Kiran McCloskey, and Alain Brunet.

My supervisor, Dr. Alain Brunet, provided substantial contribution in an advisory capacity for all aspects of this Ph.D. project, from conception of the idea, to formulation of the research questions, to the final review of this dissertation. He served specifically in an editorial capacity during the writing of all the manuscripts included here and is also a co-PI for the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) project funding (CIHR # CTP-79839).

As first author, I was responsible for most, if not all, data processing, analysis, and interpretation. I was fundamental in overseeing and consulting on any changes and testing of the PTSD diagnosis after Wave 2. Furthermore, I drafted the majority of all three manuscripts and all of the additional thesis sections, revising all versions for important intellectual content. I alone undertook all integration of each co-author's feedback for each of the manuscripts and oversaw the manuscript from the beginning through to the end of the online submission process. I also integrated and responded to all reviewer and editor feedback. Additionally, I secured

external funding for my full salary and 75% of all personal research expenses such as conference travel (CIHR Frederick Banting Doctoral Award).

Jean Caron contributed to the conception and design of the work, acquisition of data, and critical revision of the manuscripts for important intellectual content. He also secured funding for the entire ZEPSOM study (CIHR # CTP-79839).

Michelle Lonergan aided in the manuscript analyses and composition for the second manuscript.

Mark Daniel served in an advisory capacity during the formulation of research questions and theoretical framework included within the first manuscript. He is also a co-PI for the ZEPSOM project funding (CIHR # CTP-79839).

Catherine Paquet served as an advisor during the formulation of research questions and theoretical framework of the first manuscript. She also oversaw the statistical analyses run and drafted the initial version of the results and statistical analysis sections of the manuscript. She was instrumental in the interpretation of results and during the editing process for the manuscript.

Kiran McCloskey assisted in the literature review and organization of information for the third paper. She also assisted with the initial drafting of the structure of this paper and aided with the editing and submission process.

Statement of Original Contribution

This dissertation comprises three manuscripts that are novel contributions to the field of traumatic stress. The first paper, "Assessing Trauma and Posttraumatic Stress Disorder: Single, Open-ended Question versus List-based Inventory" is currently accepted by *Psychological Assessment*. This manuscript is the first to compare single and list-based trauma assessment measures using a within-subject design and a general population sample, making the results more generalizable than previous work. It is also the first to explore specific associations between individuals' perceptions of what constitutes potentially traumatic events broken down by both gender and age. Results replicated, within a large representative Canadian sample, previous studies that have found significant increases from the single-question assessment to the list-based enquiry. Furthermore, the significant increase that was found in traumatic event exposure from the single-question to list-based assessments was more pronounced in women than men, as well as in younger participants. Our results also highlight differences in trauma exposure between clinical and non-clinical populations. Results also indicate that the single-question was better at ruling out people who did not experience a traumatic event rather than including individuals who had, in fact, experienced a traumatic event, and that minimal current PTSD diagnoses would have been overlooked with a single-question trauma screener alone. Importantly, findings contradict a fundamental principle, supported by many studies that men are more likely than women to experience potentially traumatic events, encouraging the possibility that previous conclusions may have only been relevant to particular types of traumas being enquired about. This study has important implications because the measures used allowed for both extrapolation of previous epidemiologic findings about trauma exposure and replication of previous findings concerning PTSD diagnosis beyond clinical samples. Notably, these study findings confirm the

consistency and reliability of the rates of trauma and PTSD within the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) population waves while strengthening previous findings and securing their generalizability.

The second instigating paper entitled, "Place and Posttraumatic Stress Disorder" is currently under review by the *Journal of Traumatic Stress*. This study explores the relationships between trauma, PTSD, and perceived neighbourhood context. Results demonstrate that perceived neighbourhood disorder is associated with a greater likelihood of having experienced a traumatic event. Findings also confirm that perceived neighbourhood social cohesion is associated with trauma exposure indirectly through neighbourhood disorder. Among participants who had experienced trauma, perceived neighbourhood disorder is associated with greater likelihood of lifetime PTSD diagnosis; and perceived social cohesion is associated with lower likelihood of having current PTSD diagnosis as well as higher likelihood of remission. These findings help provide a more thorough understanding of the contribution of contextual factors and their associations to reported trauma exposure and PTSD diagnosis status (lifetime, current, remitted). Furthermore, the findings provide preliminary support for claims that environmental factors affect mental health and strengthen generalizability of previous research with its large geographically-defined population.

The third paper, "Longitudinal Analysis of Quality of Life Across the Trauma Spectrum" is will be submitted for publication to the *Canadian Medical Association Journal*. It is one of the first papers to demonstrate longitudinally, within a generalizable sample, that quality of life is affected by trauma and PTSD both globally and across specific domains. These results build on prior theory and research by providing a more nuanced understanding of how an individual's trauma and PTSD diagnostic history

Abbreviations

APA American Psychiatric Association

CCHS Canadian Community Health Survey

CFS Canadian Forces Supplement

CIDI Composite International Diagnostic Review

CIDI-SF Composite International Diagnostic Review short-form

CIHR Canadian Institutes in Health Research

DIS Diagnostic Interview Schedule

DSM *Diagnostic and Statistical Manual of Mental Disorders*

ECA Epidemiological catchment area

ICD-10 *International Classification of Diseases, Tenth Revision*

NIMH National Institute of Mental Health

NPV Negative predictive value

PPV Positive predictive value

PTE Potentially traumatic event

PTSD Posttraumatic stress disorder

SCID Structured Clinical Interview for DSM Disorders

WHO World Health Organization

WMH World Mental Health

ZEPSOM *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal*

Chapter 1: Introduction

Posttraumatic stress disorder (PTSD) presents a significant burden to those directly affected, their loved ones, and society as a whole (Freed, Goldberg, Gore, & Engel, 2010). In fact, the disorder is among the top 10 causes of disability-adjusted life years (Collins et al., 2011; Desjarlais, Eisenber, Good, & Kleinman, 1996), and epidemiological studies have clearly demonstrated that PTSD is becoming a major health concern worldwide (Brunello et al., 2001; Chan, Air, & McFarlane, 2003). Still, opportunities to estimate lifetime and current prevalence of trauma exposure and PTSD among samples representative of the Canadian population have been few and far between. In 2015, the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) project published its first manuscript related to traumatic stress (Monson, Brunet, & Caron, 2015). This essential publication aimed to systematically compare specific domains of quality of life and social support as they pertain to the full trauma spectrum of (i) healthy individuals, (ii) those with ongoing posttraumatic stress disorder (PTSD), (iii) remitted PTSD, and (iv) those who did not develop PTSD in spite of trauma exposure (Figure 1). This manuscript not only responded to the dearth of epidemiological data concerning current rates of PTSD in Canada, but also bridged a gaps in psychiatric research by examining categories across the trauma/PTSD spectrum and by examining detailed subscales of quality of life that are often overlooked. Indeed, while results concerning overall quality of life were generally in line with current scientific literature, the study yielded additional unanticipated findings that prompted three distinct pathways of enquiry for future research.

Firstly, although the study reported an 8.1% conditional lifetime PTSD (combined current and remitted diagnoses) that was comparable to previous epidemiological findings (e.g., Breslau et al., 1998), rates of trauma exposure and nonconditional PTSD were lower than

expected within the population. Second, the study's results revealed that individuals remitted from PTSD had significantly higher *total* quality of life than those currently suffering from PTSD. However, this finding did not hold once different types of quality of life were examined in more depth. While many of the quality of life types, (i.e., daily life/social relationships and autonomy), did demonstrate a similar trend to findings from the overall quality of life scores, others did not (e.g., the housing/neighbourhood subscale). Specific to the housing/neighbourhood subscale, lower quality of life was found between 'Current PTSD' as well as 'Trauma, No PTSD' groups when compared with the 'No Trauma' group, but results did not yield a significant difference between the two types of PTSD groups (current vs. remitted). Finally, although the study was able to validate many previous quality of life findings in a large probabilistic sample drawn from the community recruited not solely based on diagnosis of PTSD or treatment seeking behaviour, the study's cross-sectional design did not allow for inferences about causation and the direction of causality.

This dissertation aims to undertake these three interesting challenges and as a result, broaden our understanding of trauma assessment methods, perceived neighbourhood risk factors, and the longitudinal effects of trauma and PTSD on quality of life. The ultimate goal of this thesis is to strengthen (Chapter 3) and expand (Chapters 4 and 5) previous findings of the ZEPSOM project and epidemiological studies of traumatic stress in general both longitudinally and in breadth. Additionally, while previous studies have been limited in their generalizability, the ZEPSOM, a rich and comprehensive dataset, has provided the perfect environment and opportunities for much needed research on traumatic stress within a large epidemiological general population.

The literature review (Chapter 2) delineates the necessary background on various topics of interest that will be discussed over the course of the dissertation manuscript. The key points covered within the literature review are as follows: (a) a history of PTSD diagnosis within the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*; APA, 1980; APA, 200; APA; 2013) to establish the framework for comparison of trauma assessment types within the sample, (b) an examination of the current state of knowledge about potential risk factors that look beyond the individual-level, and (c) an overview of previous empirical evidence of the relationships between quality of life and trauma as well as PTSD. Limitations of previous research relevant to the content of this dissertation are indicated. Overall, the shortcomings emphasized in this literature review make evident the need for a more comprehensive understanding of these topics, and have inspired the studies presented in this dissertation.

The first manuscript in this dissertation, entitled "Assessing Trauma and Posttraumatic Stress Disorder: Single, Open-ended Question versus List-based Inventory" accepted at *Psychological Assessment,* begins with a full overview of the history of the Criterion A stressor and the various methods that have been traditionally used for trauma assessment, focusing mainly on single-question versus list-based assessments. It then presents the results of analyses contrasting the two methods of enquiry collected during the third wave of the ZEPSOM project. The study's goal was to replicate, and thus solidify, within a community-based representative sample, previous increases in reported trauma exposure when using a list-based trauma assessment compared to a single-question assessment. The study additionally aimed to examine potential changes in the prevalence of PTSD diagnosis when comparing different forms of assessment, and to explore the relationships between fluctuations in perceptions of what constitutes potentially traumatic events between different age and gender categories. Ultimately,

the study aimed to validate the consistency and reliability of the rates of trauma and PTSD within previous and ongoing ZEPSOM population waves. With this affirmation, the focus of the research was able to shift confidently to other areas of interest, such as contextual/neighbourhood factors and their association to trauma and PTSD.

A second line of enquiry undertaken within this thesis concerns how people across the trauma spectrum perceive their neighbourhood environment. Hence, the second manuscript of the dissertation (Chapter 4), entitled "Place and Posttraumatic Stress Disorder" submitted to the *Journal of Traumatic Stress,* begins with an assessment of the limitations of past empirical efforts to understand risk factors for PTSD that have solely focused on the level of the individual. The limited research devoted to neighbourhood context and mental illness is then reviewed, with an emphasis on PTSD. Through cross-sectional investigation using an epidemiological community sample, this study aims to build upon and expand current understanding of the associations between neighbourhood context and trauma/PTSD. To account for the reciprocal relationship between the outcomes of interest (perceptions of disorder and social cohesion), their respective direct and indirect effects on trauma and PTSD outcomes were additionally analysed.

The final manuscript of the dissertation (Chapter 5) entitled "Longitudinal Analysis of Quality of Life Across the Trauma Spectrum" submitted for publication to the *Canadian Medical Association Journal* presents result of longitudinal analyses of quality of life of individuals within the catchment area. The goal of this study was to extend previous findings from the ZEPSOM project longitudinally to determine if and/or how quality of life is affected by trauma and PTSD diagnosis over time.

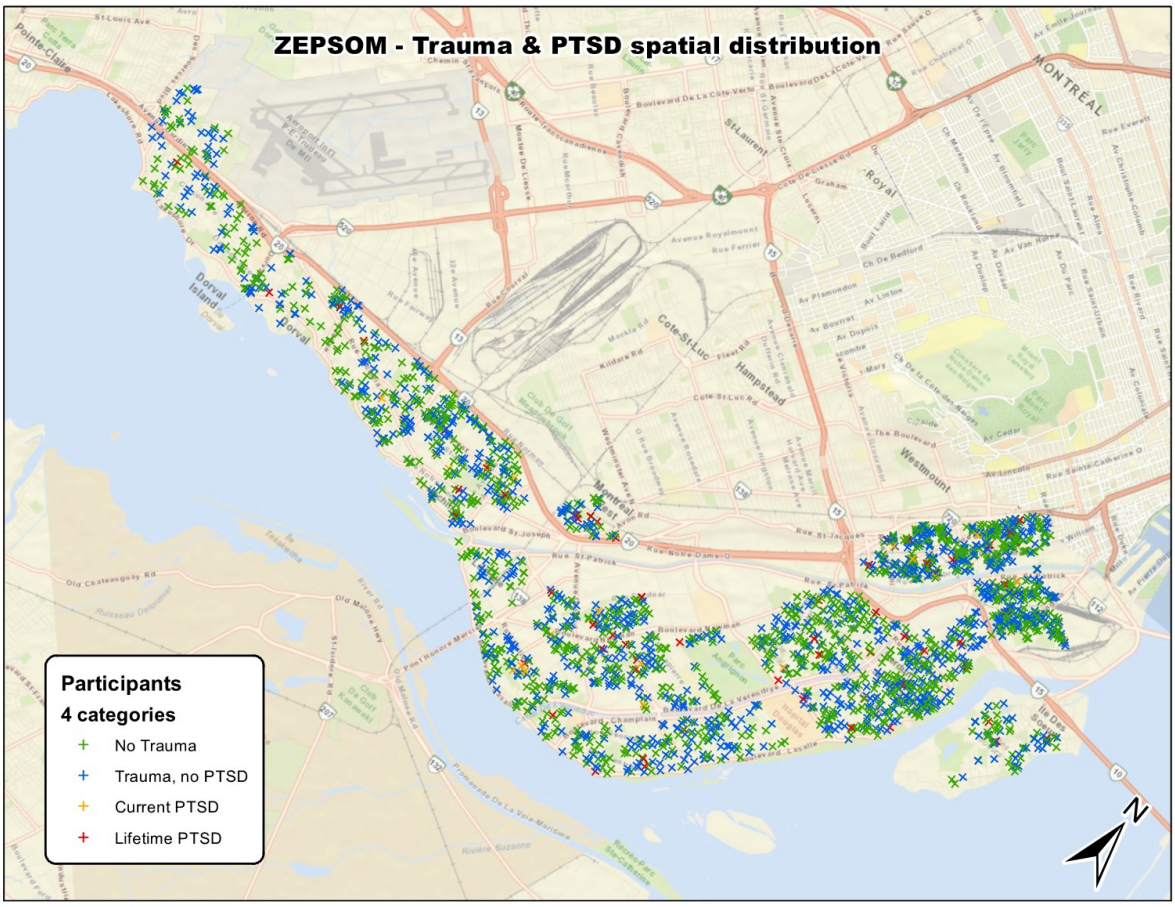

Figure 1: Spatial Representation of Trauma and PTSD (Wave 1)

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Chapter 2: Literature Review

"There are things known and there are things unknown, and in between are the doors of perception." - Aldous Huxley

Overview

Numerous areas within the field of traumatic stress require further examination such as general population replication, novel conceptualization, and longitudinal validation. These research directions would allow examination of specific issues such as differences between assessment types, contextual risk factors, and changes in quality of life over time, respectively. The three chosen dissertation focal points aim to strengthen and expand trauma-related findings of the ZEPSOM project both longitudinally and in breadth, and this literature review will provide a brief account of the background knowledge necessary for a comprehensive understanding of each area of study. Moreover, this review will consider the limitations in available empirical evidence, gaps in literature of previous attempts at clarifying these three primary topics, and highlight the necessity of the manuscripts to follow (Chapters 3-5).

Posttraumatic Stress Disorder (PTSD)

PTSD occurs, as implied by its designation, after exposure to a traumatic event. PTSD is characterized by clusters of symptoms stemming from a traumatic experience including heightened arousal, re-experiencing, avoidance, negative cognitions, and negative mood (American Psychiatric Association [APA], 2013). Symptoms of heightened arousal are characterized by disturbances in sleep, hypervigilance, and harmful behaviours toward the self while re-experiencing refers to uncontrollable thoughts, dreams, or flashbacks about the trauma, and psychological distress. Avoidance may pertain to thoughts, memories, or feelings that externally recall the traumatic event that was experienced. Lastly, negative cognitions and mood

are marked by social disengagement, misrepresented feelings of personal culpability or blame onto others, and poor recall of the trauma. PTSD symptoms must last a minimum duration of one month for diagnosis.

Prevalence of PTSD is also often classified by occurrence, either as lifetime (i.e., meeting the diagnostic criteria for at least 1 month since birth), and current (i.e., meeting the diagnostic criteria in the previous month). Lifetime PTSD rates typically combine individuals with current and past diagnosis of PTSD. Similarly, in this dissertation, lifetime PTSD will include all those (past or current) who meet the full diagnostic criteria. The conditional rate of PTSD is the proportion of individuals with PTSD divided by the number of individuals with trauma exposure, and as such, is highly dependent on the stressor definition. Conversely, the nonconditional rate is the overall probability of PTSD in individuals within the entire sampled/general population, and thus removes the factor of previous trauma exposure.

Prevalence of PTSD. PTSD is among the most common of mental disorders in Western societies and is considered a global health concern (Desjarlais, Eisenberg, Good, & Kleinman 1996), with lifetime prevalence rates ranging from 1-14% in community based studies (APA, 2000), and 7-9% in large scale epidemiological surveys (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Very few large studies exist examining conditional rates of PTSD using Canadian general population samples. Previous studies of lifetime PTSD have estimated rates as high as 9.2% in the general population with a significant difference between genders of 5.3% in men and 12.8% women (van Ameringen et al., 2008). Another study by Frise, Steingart, Sloan, Cotterchio, and Kreiger (2002), prior to van Ameringen and colleagues' 2008 publication, with a female-only sample, found rates of PTSD estimated at 10.7%. While previous studies report rates close to those found in the USA, some researchers had originally theorized that Canada would

have lower trauma and PTSD rates due to their considerably smaller military in addition to lower rates of violent crime and natural disasters (van Ameringen et al., 2008). As previously theorized, and in contrast to the two published findings within Canada, PTSD (and trauma exposure) rates from the ZEPSOM project have been found to be substantially lower than results from previous Canadian and US epidemiological studies and more in line with those found in European countries (Blanco, 2011).

The conundrum of defining trauma exposure. The PTSD criteria are defined in terms of their connection, in time and in content, with a distinct traumatic event (Breslau, 2009). Initially, a diagnosis of PTSD was primarily the result of a need to manage psychological needs of American veterans of the Vietnam War (Schlenger et al., 1992). Indeed, many still associate the words "traumatic experience" and "PTSD" with combat, though the definition of what constitutes a traumatic event has broadened significantly with time to include those occurring within the general population, such as car accidents, natural disasters, physical abuse, and rape (Weathers & Keane, 2007). Exposure is not random and may vary across subgroups of the population classified by sociodemographic characteristics (Breslau, 2002). Men, the young, and members of minority groups residing in inner cities have a higher lifetime risk of exposure to assaultive violence, compared to women, older persons, and residents of middle-class suburban areas (Breslau et al., 1998). Males also tend to have a higher risk for exposure to serious accidents and to witnessing violence perpetrated on others (Breslau et al., 1998). For most other event types, however, differences by sociodemographic characteristics have been found to be minimal (Breslau et al., 1998).

Rates of trauma exposure in community samples have consistently demonstrated gender differences from 25.2% (Perkonigg, Kessler, Storz, & Wittchen, 2000) to 81.3% (Stein, Walker,

Hazen, & Forde, 1997) in men, and 17.7% (Perkonigg et al., 2000) to 74.2% (Stein et al., 1997) in women. Within Canada, frequency (or rate of occurrence/exposure) has been reported to be 73.4% in women and 78.5% in men, with many individuals reporting multiple traumatic exposures; mean of 2.31 events (*SD* = 2.33). Reports also showed that men experienced a significantly greater number of potentially traumatic events than women (2.48 vs. 2.15 events; van Ameringen et al., 2008). In contrast, the ZEPSOM first wave had identical rates (49.6%) between genders of lifetime trauma exposure (Monson, Brunet, & Caron, 2015).

Exposure to trauma in community-based studies seems relatively common; rates have ranged from 39.1% (Breslau, Davis, Andreski, & Peterson, 1991) to 89.6% (Breslau et al., 1998). Exposure rates in Canada are similar to those in other developed countries, with 75.9% reported lifetime exposure to one or more potentially traumatic events (van Ameringen et al., 2008). In 2015, Monson and colleagues reported exposure to potentially traumatic events of 46.9% within the ZEPSOM, an epidemiological catchment area in Southwest Montreal for the first wave of data collection.

There are various potential explanations for between sample differences in reported trauma rates. First, some studies are done over the phone, providing more anonymity, while others (like the ZEPSOM) consist of face-to-face interviews that may have resulted in lower reported rates of trauma exposure as individuals could be potentially more willing to report traumatic events if not directly faced with another person (Caron, 2011). Thus, telephone interviews may contribute to higher rates of reported trauma in previous studies, as it has been found that experimental manipulation of the anonymity of responses importantly affects the prevalence estimates of potentially embarrassing behaviours such as drug use and sexual behaviour (Rogers et al., 1998; Turner et al., 1998). However, in face-to-face interviews,

countermeasures are employed to provide a certain amount of discretion for interviewees given the sensitive nature of these topics (Kessler, 2000). For example, individuals can be asked to endorse a number, rather than speak specifically about a particular traumatic event, as was the case for ZEPSOM. Asking individuals to exclusively refer to a potentially traumatic event by its number has been found to increase emotional distance, thereby allowing an individual to feel more at ease (Kessler, 2000).

Second, differences in reported prevalence of exposure may be due to differences in socioeconomic status of differing samples. For example, within the ZEPSOM, which comprises a lower socioeconomic status group of individuals, perceived trauma exposure could have been underreported if individuals did not perceive their experiences to be traumatic. Thus, differences in reported rates may depend not only on the person being interviewed, but on the way that trauma exposure is enquired about. Previous studies have had participants endorse events from a given list of potentially traumatic events (van Ameringen et al., 2008), while others investigate prevalence of exposure via a single-question screener.

As detailed above, rates of exposure vary across epidemiologic studies as a function of the combined effects of differences in the stressor definitions in studies, methods, and/or questions previously used to ascertain these rates (Breslau, 2002). To shed further light on how these differences come to be, one must consider the history of the "stressor criterion" (Criterion A).

History of PTSD Criterion A: the stressor criterion. From its inception in 1980 as a diagnostic category within the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (3rd ed.; *DSM-III*; APA, 1980), there has been much debate surrounding what accurately defines a "traumatic event". Originally defined as an event "outside the range of usual

human experience" that "would evoke significant symptoms of distress in almost everyone" (APA, 1980, p. 250), the definition has been rigorously scrutinized. Generally, it was criticized for being vague, impractical, ignorant of individual differences, and for overemphasizing the necessity that the event should be "rare". The result was twofold - the required stressor or traumatic event, now made up of two parts (Criteria A1 and A2) was expanded to become more inclusive of a variety of stressors such as natural disasters or rape and, in parallel, became more restrictive with the addition of Criterion A2, which specified that the event must elicit fear, helplessness, or horror (APA, 2000). In subsequent years, the usefulness of the A2 Criterion was brought into question, with some research indicating that although it has useful predictive power for the onset of PTSD symptoms, the prevalence of PTSD does not vary as a function of A2 (Bedard-Gilligan & Zoellner, 2008). And so, history was to repeat itself; in 2013, Criterion A2 was once again removed from the most recent version of the *DSM* (5th ed.; APA, 2013). A traumatic event is now defined as one in which an individual either directly experiences or witnesses an event involving actual death, threatened death, actual or threatened serious injury, or sexual violence (APA, 2013). Furthermore, learning that a close friend or relative was involved in a violent or accidental event, as well as repeated exposure to details of aversive events, qualifies for diagnosis (APA, 2013).

Assessment of the traumatic stressor criterion. A continued inability to reach a clear consensus on a definition has led to multiple revisions of the stressor criterion and, as a result, variability in the measurement of trauma exposure that has impacted epidemiological findings examining trauma exposure and PTSD diagnosis (Breslau & Kessler, 2001). Indeed, there exists an ever-growing array of different self-report and interview assessment tools developed to measure an individual's history of trauma exposure (for a review see: Briere, 2004; Frueh, Elhai,

& Kaloupek, 2004; Norris & Hamblen, 2004). Early measures of trauma exposure, typically a single-question screener, have been replaced by more systematic enquiries of specific event types using a list-based approach. While some research has been undertaken to compare and contrast different forms of enquiry, it remains unclear if accurate and full descriptions of all traumatic event exposures are necessary to correctly diagnose PTSD (Weathers & Keane, 2007). Since trauma exposure is necessary for diagnosis of PTSD, traumatic event assessments that systematically over or underreport actual exposures have the potential to affect the rate of PTSD diagnosis (Peirce, Burke, Stoller, Neufeld, & Brooner, 2009). Indeed, inconsistencies and variability in the measurement of trauma exposure may specifically impact epidemiological studies investigating the prevalence of trauma exposure, PTSD diagnosis, and the conditional risk for the development of PTSD (El-Sayed & Galea, 2011; Norris & Slone, 2013). Hence, there is an important need for explanations that consider the differences in how individuals perceive and report trauma.

"We shape our buildings; thereafter they shape us."

- Winston Churchill

PTSD Risk Factors

Studies using the biomedical paradigm frequently propose a stress-diathesis model of PTSD. This model suggests an underlying predisposition to PTSD that is expressed following exposure to stress – thus, this model assumes stressors or triggers (i.e., proximal/acute factors) to be state dependent, and diathesis/threshold domain (i.e., distal/chronic factors) to be trait dependent (Flouri, 2005). Individuals vary widely, not only in their exposure to potentially traumatic events, but also in their vulnerability to developing PTSD in the wake of trauma.

While most individuals will be exposed to one or more potentially traumatic event over the course of their lifetime, only a small percentage will experience PTSD. Indeed, the majority of trauma survivors recover from initial posttrauma reactions without professional help (McNally, Bryant, & Ehlers, 2003). Although many therapists are inclined to attribute reluctance to partake in psychological services to "denial" or "avoidance", trauma survivors who decline professional help may be either resilient or relying on social support from the family and *community networks* on which they have traditionally relied (Gist & Lubin, 1999).

An individual's response to trauma (namely, the likelihood of developing PTSD) is based on various factors, including previous exposure to trauma (Bromet, Sonnega, & Kessler, 1998), specifically assaultive violence (Breslau, 2001), as well as age at the time of the trauma, history of childhood maltreatment, the type and severity of the trauma, individual personality and psychiatric history, family psychiatric history, race, and educational level (Breslau, 2001; Breslau et al., 1991; Brewin, Andrews, & Valentine, 2000; Bromet et al., 1998; Ozer, Best, Lipsey, & Weiss, 2003). Three factors have been identified as having uniform effects through epidemiological studies of PTSD in the general population: (1) pre-existing psychiatric disorders, (2) family history of disorders, and (3) childhood exposure to trauma (Brewin et al., 2000). Beyond these three, however, studies have varied for other risk factors (Breslau et al., 2002; Brewin et al., 2000; Ozer et al., 2003). Brewin and colleagues (2000) found five main predictors of PTSD in a meta-analysis: prior trauma, prior psychological adjustment, family history of psychopathology, perceived life threat during the trauma, posttrauma social support. Social support was the strongest, associated with an average weighted effect size (Cohen's *d*) of .40. Three years later, Ozer et al. (2003) published another meta-analysis that reviewed over 2,500 studies of PTSD to determine psychological correlates of PTSD and its symptoms. Their seven

predictors included the five previously found by Brewin et al. (2000) with the addition of peritraumatic distress (i.e., high levels of emotion during or in the immediate aftermath of the traumatic event) and peritraumatic dissociation (i.e., dissociative experiences during or in the immediate aftermath of the traumatic event). All seven of the predictors yielded significant effect sizes though, in this case, peritraumatic dissociation yielded the largest with an estimated effect size of .35, as compared to their own estimate of .28 for social support.

Although it is still unclear how well risk factors predict the development of PTSD, gender also seems to have a strong association (Breslau et al., 1998; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Perkonigg et al., 2000; Stein, Walker, & Forde, 2000; Stein et al., 1997). Previous epidemiological studies conducted in Canada and the United States have estimated that women are twice as likely as men to experience lifetime PTSD (Breslau, 2001; Breslau, Chilcoat, Kessler, & Davis, 1999; Stein et al., 1997). Indeed, in a recent paper using ZEPSOM data (Monson et al., 2015), men made up only 30% and 29.5% of the Current and Remitted PTSD groups, respectively.

Beyond the Individual

While individual-level risk factors have been extensively researched within traumatic stress literature, they explain only approximately 20% of the variance in the etiology and maintenance of PTSD (Ozer et al., 2003; Koenen et al., 2009). As a result, researchers have begun to expand their research focuses beyond the individual. An emerging body of research has begun to document the relationships between neighbourhood social conditions and mental illness (Aneshensel, Phelan, & Bierman, 2013; Pearson, Griffin, Davies, & Kingham, 2013), but few studies have looked at the associations between neighbourhood context and PTSD.

Neighbourhoods and mental health. Perceived neighbourhood disorder may lead to a decline in mental health through many pathways, including the lack of neighbourhood order and social control which serves as a contextual stressor that erodes mental health (Fitzpatrick & LaGory, 2000), or perhaps neighbourhood disorder discourages residents from taking part in social activities needed to maintain good health (Ross, 2000b). Neighbourhood disorder is also related to higher levels of mistrust and fear, both of which correlate with psychological distress (Ross, 2011; Ross & Jang, 2000).

Neighbourhood social cohesion has been found to influence physical health (Black & Macinko, 2008; Diez-Roux & Mair, 2010) as well as mental health. While lower levels of neighbourhood social cohesion are associated with poorer mental health, most research has again almost solely focused on relationships related to depression and anxiety (Aneshensel & Sucoff, 1996; Echeverría, Diez-Roux, Shea, Borrell, & Jackson, 2008; Mair et al., 2009). Community cohesion has conceptual similarities to social support (i.e., the extent of person's relationships such as friends and family) and social capital (i.e., an individual's resource network), both of which have been repeatedly shown to foster mental and physical well-being (Fitzpatrick, Piko, Wright, & LaGory, 2005; Uchino, Cacioppo, & Kiecolt-Glaser, 1996).

Neighbourhood Factors

Previous mental health research has identified two environmental factors of interest: perceived neighbourhood disorder (i.e., visible cues indicating a lack of order and social control in the community), and social cohesion (i.e., the willingness of residents who realize common values to intervene for the common good; Ross & Mirowsky, 1999; Ross, 2000; Echeverría et al., 2008). Disorder is generally defined in the literature as "direct, behavioural evidence of disorganization" (Skogan, 1992, p. 21) and can be expressed through physical and social cues

within a neighbourhood (Ross & Mirowsky, 1999). Physical cues entail enduring, day-to-day aspects of the environment such as abandoned buildings, noise, or graffiti. The "broken windows" hypothesis posits that neighbourhood physical disorder signals neglect and diminished social control to individuals residing in the neighbourhood in question and implies to outsiders that high-risk behaviour in disordered neighbourhoods is tolerated, or at least normative (Wilson & Kelling, 1982). Disorder can be further interpreted as a sign that residents do not care. This can result in withdrawal from public space, which in turn increases opportunities for criminal behaviour. Indeed, the level of physical disorder (based on observations of litter, graffiti, and abandoned cars) in Pittsburgh, Pennsylvania neighbourhoods was found to be associated with levels of crime and firearm injuries or deaths, even after taking neighbourhood poverty into account (Wei, Hipwell, Pardini, Beyers, & Loeber, 2005).

Neighbourhoods and PTSD. While some enquiry has been made concerning the associations between environmental factors and psychopathology, literature has primarily focused on depression, substance use and schizophrenia, leaving any discussion of the effects of "place" on PTSD relatively untouched (Gapen et al., 2011; Johns et al., 2012; Lowe, Galea, Uddin, & Koenen, 2014). This is particularly striking considering that PTSD *requires* the occurrence of a specified etiological environmental factor (the traumatic event) in order to develop.

From a theoretical perspective, neighbourhood contextual factors may impact PTSD in at least three ways: by influencing an individual's (i) number and severity of traumatic experiences, (ii) pre-morbid vulnerability to developing PTSD upon trauma exposure, and (iii) prognosis. For instance, particular neighbourhoods may be more likely to expose residents to trauma than others due to factors contributing to increased rates of crime and delinquent behaviour (Jacobs, 1961;

Johns et al., 2012) and neighbourhood social contexts may further interfere with an individual's ability to cope with a trauma that has occurred (Carlson & Dalenberg, 2000). This may increase the risk of PTSD, and by influencing the availability of resources posttrauma, neighbourhood contexts can similarly affect odds of remission (Carlson & Dalenberg, 2000).

Neighbourhood contextual factors have been linked to trauma. As mentioned above, exposure to trauma varies across populations, countries, and communities (Norris & Slone, 2013) and neighbourhood disorder is associated with crime and assaultive violence (e.g., rape, or being shot) within a community (Breslau et al., 2004; Obasaju, Palin, Jacobs, Anderson, & Kaslow, 2009).

Neighbourhood physical disorder also entails social cues, which relate to people engaging in specific negative events or activities such as public drinking or drug use, panhandling, or indifference (Ross, 2000). In areas with increased criminal behaviour associated with signs of social disorder (such as drug use), residents may have increased chances engaging in to criminal behaviour. This might, in turn, lead to increased exposure to potentially traumatic events.

Neighbourhood social cohesion has also been theorized to influence an individual's risk of trauma exposure (Johns et al., 2012). Particularly, neighbourhoods characterized by low social cohesion may be deficient in the "informal social control" necessary to discourage crime and delinquent behaviour and, as such, could raise residents' risk of experiencing trauma (Johns et al., 2012). This premise aligns with the reciprocal determinism of neighbourhood disorder and social cohesion (i.e., disorder can decrease social cohesion, and vice versa). For example, it has been theorized that when residents interpret disorder as a sign that "nobody cares", it can trigger anxiety, fear, worry, and withdrawal from public spaces, inhibiting community cohesiveness and

"eyes on the street" (Jacobs, 1961, p. 35) which in turn provides opportunity for greater criminal behaviour.

However, previous studies have yielded mixed results, or have failed to find empirical evidence to support an association between neighbourhood social cohesion and frequency of traumatic events (Johns et al., 2012). This may be because social cohesion is linked to posttrauma reactions, rather than trauma exposure, through influencing the psychological consequences of experiencing a trauma. Perceived neighbourhood social cohesion may affect an individuals' pretrauma psychological state (for example, through perceived level of control), or also interfere with one's ability to cope posttrauma (Carlson & Dalenberg, 2000). As a result, neighbourhood social contextual factors may increase the risk of PTSD and hinder an individual's ability to progress to remission. As social support and neighbourhood social cohesion show a conceptual similarity (Gapen et al., 2011), this process may be related to neighbourhood social cohesion influencing the availability of resources that may be associated with remission (Carlson & Dalenberg, 2000). Lack of social support has long been understood to be a major risk factor for PTSD (Ozer et al., 2003), and negative interactions within social networks have been shown to predict a poorer response to treatment (Des Grosseilliers et al., 2013).

Empirical Evidence. Only one study has examined the direct associations of perceived neighbourhood disorder to PTSD. Gapen et al. (2011) published findings that perceptions of high neighbourhood disorder increase severity of past two-weeks' symptomatology for PTSD. These findings might be interpreted with caution, however, because Gapen and colleagues (2011) sampled from just one medical facility, thus limiting the study's generalizability and potentially introducing selection bias resulting in overestimation of the effects of neighbourhood disorder on

PTSD symptomatology. Furthermore, the sample included exclusively low-income, African-American participants, and assessed PTSD symptomatology over a short-term (2-week) period prior to the survey.

In terms of social cohesion, previous literature has not, as aforementioned, produced consistent empirical evidence to support an association between neighbourhood social cohesion and frequency of traumatic events (Johns et al., 2012). Conversely, a recent study by Johns and colleagues (2012) found that while the odds of past-year PTSD were not significantly associated with individual-level perceptions of neighbourhood social cohesion, a significant association existed when perceptions of neighbourhood social cohesion were aggregated to the neighbourhood level. These findings may suggest perceptions of social cohesion shape risk of PTSD through individual response to trauma. Additionally, a recent study by Lowe et al. (2014) assessed longitudinal trajectories of PTSD, using the same dataset as Johns et al. (2012), and found that higher perceived social cohesion and support at baseline were predictive of a trajectory pattern of consistently few PTSD symptoms.

No studies have directly examined the potential relationships between perceived neighbourhood disorder and social cohesion with regard to remission from PTSD. Although researchers have begun to take interest in neighbourhood context and PTSD, literature has been consistently hindered by a limited generalizability of findings. As aforementioned, the study by Gapen and colleagues (2011) used sub-optimal sampling techniques (e.g., recruitment from a single hospital). Other issues in the literature include sample specificity (e.g., sampling only African-American individuals; Gapen et al., 2011; Johns et al., 2012; Lowe et al., 2014), or a focus solely on the relationship between neighbourhood social cohesion and PTSD diagnosis and symptom trajectories (Johns et al., 2012).

Theoretical Framework

As mentioned above, residing in areas of high social disorganization and poverty increases risk of exposure to traumatic events, including witnessing violence both inside and outside the home, experiencing physical discipline, and being a victim and/or perpetrator of violence (Drake et al., 2011; Foster, Brooks-Gunn, & Martin, 2007; Kiser, 2007). Furthermore, residents of high-crime, poverty-stricken areas experience increased risk of exposure to assaultive traumatic events (e.g., being raped, shot, or stabbed) that are more strongly associated with higher posttraumatic symptomology than non-assaultive traumatic events (Agnew, 2007; Goldmann et al., 2011; Margolin & Gordis, 2000). Previous work with ZEPSOM data by Monson and colleagues (2015) has demonstrated, albeit peripherally, that negative associations do exist within the population between individuals' views of neighbourhood quality of life and trauma exposure/PTSD. Given the complex and multifactorial nature of both neighbourhood context and PTSD, and the potential for reciprocal relationships to emerge, it is too soon to focus solely on one direction for directional associations between variables or predetermine the type of indirect relationships examined.

In order to demonstrate the relationships in question, Figures A and B illustrate the theoretical models that will be used to guide analyses examining how neighbourhood disorder and social cohesion are directly and indirectly associated with PTSD diagnosis (Chapter 4).

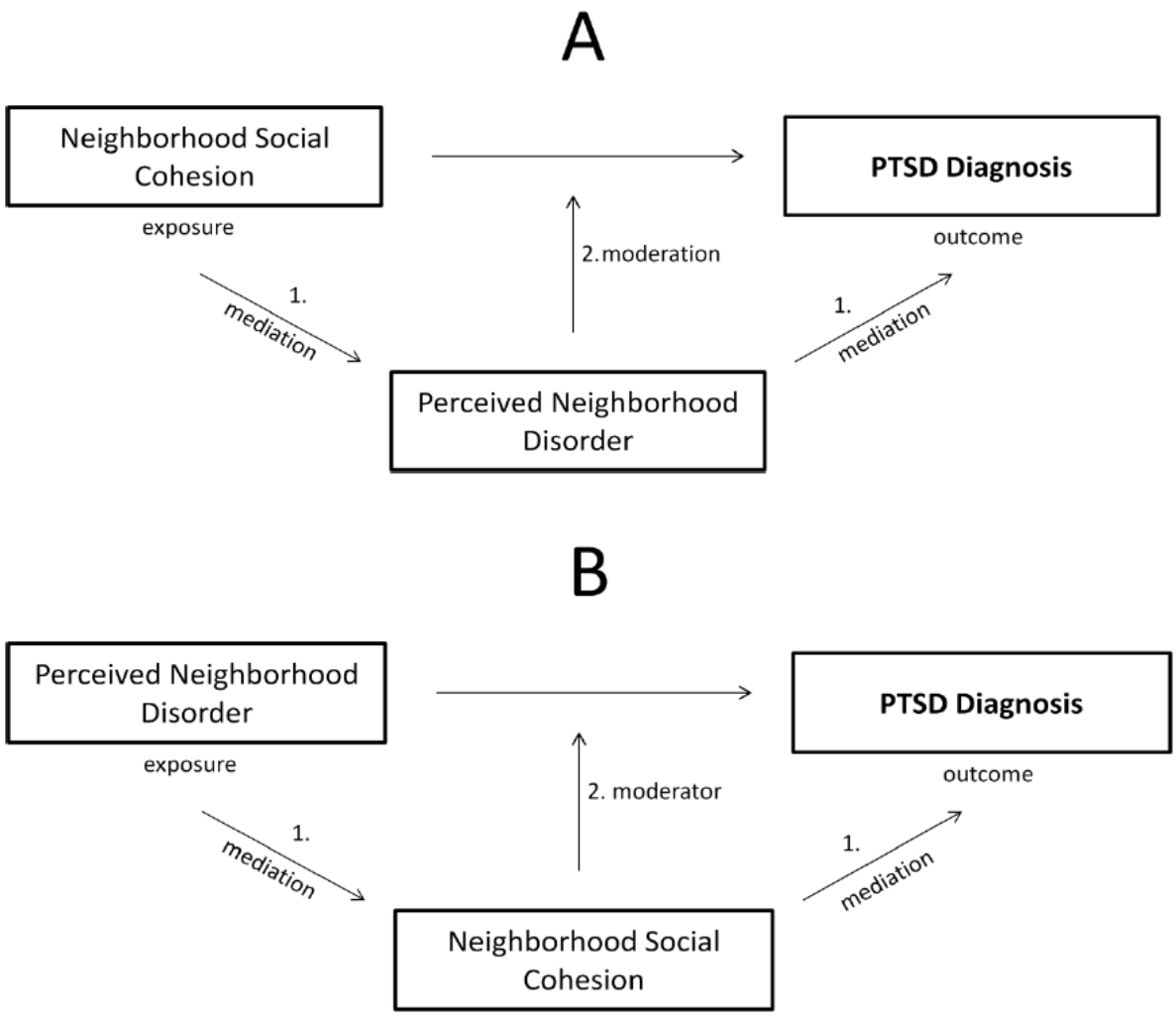

Figure 1. Theoretical models of the interactions between neighbourhood contexts and PTSD diagnosis. Figure A represents a model in which neighbourhood social cohesion impacts perceived neighbourhood disorder and PTSD diagnosis, and neighbourhood disorder moderates the interaction between social cohesion and PTSD diagnosis. Figure B represents a second model, where social cohesion might play the moderator role in the association between neighbourhood disorder and PTSD diagnosis.

"We live in a modern society that loves shortcut techniques. Yet quality of life cannot be achieved by taking the right shortcut. There is no shortcut. But there is a path."

- Stephen Covey, Roger A. Merrill, and Rebecca R. Merrill, *First Things First*

Quality of life across the trauma spectrum

The WHO defines health generally as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (1948, p. 1) and quality of life as physical, mental, and social well-being (World Health Organization, 1948). A meta-analysis by Olatunji, Cisler, and Tolin (2007) found that PTSD, alongside panic disorder, obsessive-compulsive disorder, social phobia, and generalized anxiety disorder, were among anxiety disorders resulting in most significant quality of life impairment, particularly mental health and social functioning when specific domains of quality of life were examined. The largest estimates of effect sizes on domains of quality of life were associated with PTSD, versus only medium effect sizes with social phobia, obsessive-compulsive disorder, and panic disorder. Rapaport, Clary, Fayyad, and Endicott (2005) also found that PTSD was associated with a markedly high rate of impairment across all domains of quality of life, including social relations, household situation, physical health, general sense of well-being, and economic health, in comparison to other anxiety disorders such as obsessive-compulsive disorder, social phobia, and panic disorder. Although Olatunji et al. (2007) found that no one anxiety disorder diagnosis showed significant impairment of quality of life than another, they point out that initial evidence shows individuals with PTSD reporting more quality of life impairment than other anxiety disorders. However, they state their comparative analysis should be interpreted with caution, considering the differences in impairment of quality of life for specific domains and the small sample sizes.

Quality of life was defined as aspects of life that make it fulfilling and worthwhile and extends beyond the immediate effects of anxiety symptoms to include patients' general subjective well-being and life satisfaction (Angermeyer & Kilian, 1997). As such, the assessment of anxiety disorders incorporated patients' subjective views of their life circumstances including perceptions of mental health, physical health, social and family relationships, functioning at work, and functioning at home.

Traumatic experience is associated with lower quality of life, a finding that has been replicated by several studies examining a variety of traumatic events (Araya, Chotai, Komproe, & de Jong, 2007; Carlsson, Mortensen, & Kastrup, 2006; Grills-Taquechel, Littleton, & Axsom, 2011; Wang, Tsay, & Bond, 2005). The specific negative effects of PTSD (i.e., beyond trauma-exposure) on quality of life have also been demonstrated within traumatic stress literature (Hansson, 2002; Olatunji et al., 2007; Rapaport et al., 2005). It has been shown that more PTSD symptoms are associated with less satisfaction with the quality of current life. Furthermore, individuals with PTSD report less satisfaction on the Satisfaction With Life Domains Scale than do individuals with other diagnoses (Friedman, Schneiderman, West, & Corson, 1986).

Domains of Quality of Life

Research examining satisfaction in specific domains of quality of life within a convenience sample of veterans has shown lower satisfaction with relationships (Gold et al., 2007; Koenen, Stellman, Sommer, & Stellman, 2008) and parenting (Gold et al., 2007; Ruscio, Weathers, King, & King, 2002; Samper, Taft, King, & King, 2004). Examination of specific domains of quality of life showed that impairments may be particularly prominent among patients with PTSD with their domains of mental health and social functioning being associated with the highest levels of impairment among anxiety disorder patients (Olatunji et al., 2007). To

date little research has been done to address the particular impairments of individuals with PTSD brought forth by Olatunji et al. (2007).

The work of Rapaport and colleagues (2005) also found that PTSD, like depression, was related to a more general pattern of lower satisfaction in multiple domains of quality of life. Rapaport et al. (2005) defined quality of life as a participant's subjective view of social relationships, physical health, functioning in daily activities, economic status, and an overall sense of well-being, as quantified by measures of life satisfaction. Their work examined quality of life impairment in research participants with one of eight anxiety or affective disorders, one of which was PTSD. Their findings were that, when compared to the community norm, all participants with psychiatric disorders had diminished quality of life across all domains measured with greater impairment among certain disorders. Specifically, PTSD and mood disorders were associated with more profound and global impairments. Trauma-exposed individuals reported lower levels of life satisfaction, with 59% of participants diagnosed with PTSD being categorized as having "severely impaired" quality of life and the lowest mean scores. Exploring individual quality of life domains revealed that PTSD resulted in broad, substantial impairment across all domains.

Limitations of quality of life and trauma/PTSD literature. Ruscio et al. (2002) provide a good summary of limitations commonly found with quality of life research within trauma and PTSD literature. There are, like with many outcomes, issues of generalizability, as researchers are often left wondering if their findings can indeed be extrapolated beyond a particular convenience sample or an at-risk community (e.g., veterans). Samples are also often drawn from clinical trial studies, where subjects are recruited based on their willingness to participate in an experimental medication trial and therefore may not be representative of all

individuals experiencing a particular disorder in the community. Furthermore, clinical trial studies often use inclusion and exclusion criteria to limit medical and psychiatric comorbidity, further limiting generalizability of findings to non-selected individuals with similar symptomatology (Rapaport et al., 2005). Findings are also often regarded as tentative until replicated with larger and representative samples (Ruscio et al., 2002).

Thus for many years, a gap existed with regard to large community-based samples within the trauma and PTSD literature, particularly with respect to comparisons of the effects of trauma exposure, current and remitted PTSD on total perceived quality of life. Moreover, a large knowledge gap lingered with respect to the particular effects of trauma exposure and the progression of diagnosis of PTSD on specific domains of quality of life (Guay, Billette, & Marchand, 2006; Mendlowicz & Stein, 2000; Rona et al., 2012).

In 2015, Monson et al. published an article examining the relationships between quality of life and the full trauma spectrum, including healthy individuals, those with PTSD, those with remitted PTSD, and those exposed to trauma but did not develop PTSD. The results demonstrated a general trend with global quality of life decreasing across the spectrum of trauma exposure from 'No Trauma' to 'Current PTSD' that replicated and extended previous findings using non-representative convenience samples and/or abridged measures (Barayani et al., 2010; Rappaport et al., 2005). As hypothesized, individuals currently suffering from PTSD had lower quality of life than those without trauma exposure; a finding that proved true for the global index and all subscales of quality of life (Monson et al., 2015). The study further demonstrated that individuals remitted from PTSD have better total quality of life than those currently suffering from PTSD. This supported failed recovery models of PTSD (Yehuda & LeDoux, 2007), where those who remit from PTSD (considered a normal, or "healthy" response) should be considered

resilient and more akin to individuals who have resisted PTSD symptomatology after trauma exposure than to individuals currently suffering from the disorder. Additionally, remitted PTSD and resilient ('Trauma, No PTSD') groups demonstrated no differences on quality of life scores.

The study also demonstrated the importance of looking beyond global indices of quality of life. Monson et al. (2015) argued that looking beyond global indices, which potentially dilute the impact of severe dysfunction in particular domains (Rapaport et al., 2005), allows for a more complete picture of the etiology and impact of PTSD as a multidimensional disorder and, for practical purposes, has the potential to suggest new directions to improve effective treatment strategies. In Monson and colleagues' (2015) study, some subscales, such as daily life/social relationships and autonomy, did align closely with findings from the overall quality of life scores, but other analyses, for instance those pertaining to housing/neighbourhood and personal relationships subscales, yielded no difference between the two types of PTSD groups (current vs. remitted). This may suggest that the damaging effects of PTSD continue to linger within certain domains of quality of life (such as personal relationships) over others, or vice versa, that poorer quality of life in specific domains at the time of exposure increases risk of sustained PTSD. Longitudinal analysis is needed, but in either instance, treatment of PTSD can potentially benefit from additional focus on specific impairments of particular domains of quality of life. Conflicting subscale findings also strengthen the relevance of looking beyond global indices to specific domains of quality of life (Mendlowicz & Stein, 2000), as individuals with both present and past diagnoses of PTSD demonstrate varied impairment depending on the domain under examination.

Further, Monson et al. (2015) emphasized the need to examine the associations between to neighbourhood social conditions and individual trauma exposure and risk for PTSD. Specific

to the housing/neighbourhood subscale, lower quality of life was found between 'Current PTSD' as well as 'Trauma, No PTSD' groups when compared with the 'No Trauma' group. There has only been limited previous research on the associations between PTSD and perceptions of housing and neighbourhoods (Monson et al., 2015). That said, although the topic remains in its infancy, recent publications do support the current study's findings that associations exist between perceptions of neighbourhood and trauma exposure/PTSD (Gapen et al., 2011; Johns et al., 2012). Future research is needed to better understand how neighbourhood social conditions are linked to an individual's exposure to traumatic events and their risk and resilience for PTSD.

While the study by Monson et al. (2015) was one of the first to examine previous quality of life in a large representative sample from a general population across the entire spectrum of posttraumatic outcomes, it was cross-sectional in nature and thus is limited in its ability to understand the causal relationships between trauma, PTSD, and quality of life.

Longitudinal Studies of Quality of Life (PTSD Symptoms)

Previous research examining the relationship between trauma-specific PTSD symptoms and quality of life has consistently found an inverse relationship (Zhao, Wu, & Zu, 2012). This finding has been supported by select longitudinal studies. For example, Giacco, Matanov, and Prieve (2013) examined specifically subjective quality of life, and found that symptom reduction over time was related to improved subjective quality of life scores. Chopra et al. (2014) and Zhao et al. (2012) reported similar findings, but Zhao and colleagues also found that the interaction between social support and quality of life weakened the associations between quality of life and PTSD. Goenjian et al. (2011) further examined specific domains of quality of life (family relations, social interactions, alcohol/drug and academic related problems, anxiety/somatic complaints, risk-taking behaviour), and found that of the five domains analysed, both global

quality of life and each individual domain was associated with PTSD scores, and anxiety/somatic complaints in particular had the highest association with PTSD scores. While Goenjian and colleagues' (2011) study focused exclusively on adolescents and the domains are thus adolescent-specific, this finding again highlights the importance of considering specific domains in the examination of the association between PTSD and quality of life.

Previous longitudinal studies have been limited in multiple ways that hinder generalizability and stability of findings. For instance, many drew participants from a specific population that had experienced trauma; of the studies examined in the present literature review, most chose a geographical area that had recently undergone a natural disaster, and Chopra et al. (2014) used a clinical, treatment-seeking population. These sampling methods may limit the generalizability of findings to an overall population and prevents an examination of the full trauma spectrum (including, for example, a 'No Trauma' group). Further, post-natural disaster sampling limits the variability of types of trauma studied. Future research in general population samples remains necessary.

Summary of Entire Literature review

PTSD presents both literal (e.g., increased medical and psychological costs, reduced work productivity, etc.) and figurative significant costs to society (Breslau, Lucia, & Davis, 2004; Kessler, 2000; Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000). This literature review has covered a range of topics including an overview of PTSD and trauma, a breakdown of diagnosis and specific assessment strategies utilized for Criterion A, an overview of the small number of studies that have looked at environmental factors and mental illness (and PTSD) and a current understanding of quality of life in relation to PTSD from both a theoretical and empirical standpoint.

Using data drawn from cross-sectional and longitudinal analyses from a broader ongoing general population study on mental health and mental health service use in an epidemiological catchment area in Southwest Montreal, this dissertation will provide a strong addition to current traumatic stress literature through both replication and extrapolation of existing research topics such as trauma exposure assessment, risk factors of PTSD and longitudinal examination of quality of life for those who have suffered a traumatic event as well as those with a current diagnosis of, or who are in remission from, PTSD.

What follows are the results of three studies: the first examines the differences between trauma assessment types commonly used in epidemiological work. It aims to both explain and validate previous ZEPSOM findings, as well as discuss the various pros and cons for different types of assessment in various research settings (e.g., clinical vs. large epidemiological samples). The second delves into general underpinnings of how neighbourhood contexts may affect trauma exposure and PTSD. The third and final manuscript, aims to replicate and extrapolate, longitudinally, previous ZEPSOM findings concerning the associations of quality of life (overall and specific subscales) across the trauma spectrum. On the basis of this empirical work, this thesis concludes with a comprehensive conceptualization of these three themes as well as with suggestions for classification and measurement of trauma assessment tools, as well as clinical implications of neighbourhood contexts and how trauma and PTSD may affect quality of life outcomes over time. Proposed directions for future research are also offered.

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Preface

This dissertation grew from the fertile seeds (i.e., findings) of a manuscript written as the culmination of the candidate's Master's dissertation (Monson et al., 2015). Published in *Social Psychiatry and Psychiatric Epidemiology,* these findings laid the foundation for this dissertation by making evident the need for novel research in three specific domains within the field of traumatic stress (briefly outlined in Chapter 1). The following chapter comprises the first direction, or topic, undertaken by this dissertation. The second and third paths drawn as a result of the 2015 manuscript findings make up the primary focal points of the second and third manuscripts (Chapters 4 and 5, respectively) that will be prefaced in similar fashion by way of transitional texts between the relevant chapters.

Previous studies done with Canadian epidemiological samples have found rates of lifetime and current PTSD similar to those of the National Comorbidity Survey and the Detroit Area Survey of Trauma (e.g., van Ameringen, Mancini, Patterson, & Boyle, 2008). As a result of much debate concerning rates within the ZEPSOM population compared to previous existing Canadian based findings (van Ameringen et al., 2008), the focus of the leading manuscript concerns the necessity to examine, potentially confirm, or at least contextualize the consistency and reliability of the rates of trauma and PTSD within the ZEPSOM study. It should be noted that the ZEPSOM results do align with both theorized rates of Canadian populations (van Ameringen et al., 2008) as well as actual rates within European countries. Thus, the first challenge undertaken by this dissertation concerns the seemingly "low" rates of reported PTSD and trauma exposure within the general population/community based sample under examination. As discussed at length in the literature review (Chapter 2), there are several potential reasons why these rates might indeed underrepresent Canadian populations, or conversely that they

might be completely valid. The line of enquiry undertaken in the first manuscript presented here concerns the debate as to whether rates were lower than expected due to the single-question trauma screener used for the first wave of data collection by ZEPSOM.

The third wave of the ZEPSOM data afforded an opportunity for further examination of the trauma and PTSD rates by including both single and list-based trauma assessment measures using a within-subject design with a general population samples. The aim was to determine the differences between single-question and list-based trauma assessment measures and how these differences might affect PTSD diagnoses. An additional objective was to report whether differences varied between age and gender categories. The first manuscript of this dissertation is the results of these efforts.

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Monson, E., Lonergan, M., Caron, J., & Brunet, A. (2015). Assessing trauma and posttraumatic stress disorder: Single, open-ended question versus list-based inventory. *Psychological Assessment*. Manuscript accepted for publication.

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Chapter 3: Assessing trauma and posttraumatic stress disorder: Single, open-ended question versus list-based inventory

Reference:

Monson, E., Lonergan, M., Caron, J., & Brunet, A. (2015) Assessing trauma and posttraumatic stress disorder: Single, open-ended question versus list-based inventory. *Psychological Assessment*. Manuscript accepted for publication.

Abstract

Trauma exposure is a precursor to diagnosis of posttraumatic stress disorder (PTSD). A dearth of empirical evidence exists on the impact of different measurement practices on estimates of trauma exposure and PTSD within representative epidemiological samples. The present study examines differences in reported trauma exposure and rates of PTSD using single, open-ended question versus list-based trauma assessments in a general community sample. Using data from the third wave of the Montreal epidemiological catchment area study (N = 1,029), participants were interviewed in person by a lay interviewer about lifetime history of trauma exposure and PTSD. Prevalence rates of trauma exposure and PTSD diagnosis using single, open-ended question and list-based assessment were compared using a within-subject design. A single, open-ended question versus list-based trauma assessment yielded trauma exposure rates of 61%, 95%CI [57.8% – 63.8%] and 78%, 95%CI [75.2% - 80.3%], respectively. Conditional rates of lifetime PTSD decreased from 6.7%, 95%CI [5.8% - 9.4%] to 6%, 95%CI [4.4% - 7.7%], respectively. Increases in trauma exposure were more pronounced in women (33.7%) than men (21.5%), as well as in the younger (15-24 years old) stratum of study participants (36.1%). Underestimation of PTSD using a single, open-ended question assessment was minimal although all missing cases were women. Our results lend support to the importance of using comprehensive assessments of exposure to potentially traumatic events when conducting epidemiological research, especially when reporting conditional rates of PTSD. Previous research may have underestimated the prevalence of trauma exposure, particularly among young women.

Keywords: trauma; posttraumatic stress disorder; assessment; catchment area; methodology

Assessing trauma and posttraumatic stress disorder:

Single, open-ended question versus list-based inventory

Posttraumatic stress disorder (PTSD) is a chronic and debilitating mental health disorder characterized by symptoms of re-experiencing, avoidance, negative cognitions and mood, as well as arousal that result from exposure to a traumatic event (American Psychiatric Association, 2013). Historically, the stressor criterion (i.e., Criterion A or the traumatic event) required for PTSD diagnosis was primarily associated with combat experiences. However, by its inception in 1980 as a diagnostic category in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1980), the definition of a traumatic event had expanded to include event types occurring within the general population, such as car accidents, sexual or physical abuse, or natural disasters, among others (Weathers & Keane, 2007). Considerable debate regarding the accurate definition of what constitutes a traumatic event has led to repeated revisions of the stressor criterion throughout the evolution of the *DSM*. As a result, there has been variability in the measurement of trauma exposure that has impacted epidemiological findings of studies examining trauma exposure and PTSD diagnosis (Breslau & Kessler, 2001).

History of Criterion A

In the *DSM-III*, Criterion A was defined as an event that was "outside the range of usual human experience" that "would evoke significant symptoms of distress in almost everyone" (American Psychiatric Association, 1980, p. 250). This definition was largely criticized for being too vague, impractical, ignorant of individual differences, and for overemphasizing the importance that a relevant event should be relatively rare (a common misconception of that time). Furthermore, it provided no clear guidelines as to what should be considered within or

outside the normative range of usual experience (Weathers & Keane, 2007). In an attempt to provide further clarification, the PTSD stressor criterion was broken down into two components in the *DSM-IV-TR* (American Psychiatric Association, 2000). First, Criterion A1 required that the individual "experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others", and second, Criterion A2 specified the emotional response at the time of the event (i.e., peritraumatic distress) must involve intense fear, helplessness, and horror (American Psychiatric Association, 2000; p.428).

Recent evidence suggests that although Criterion A2 has useful predictive power for the onset of PTSD symptoms, the prevalence of PTSD does not vary as a function of A2 (Bedard-Gilligan & Zoellner, 2008). In the *DSM-5* (American Psychiatric Association, 2013), this criterion has been removed. A traumatic event is now defined as one in which an individual either directly experiences or witnesses, in person, an event involving actual death, threatened death, actual or threatened serious injury, or sexual violence (American Psychiatric Association, 2013). Additionally, learning that a close friend or relative was involved in a violent or accidental event, as well as repeated exposure to details of aversive events qualifies for diagnosis.

Assessing Traumatic Event Exposure

A plethora of self-report and interview assessment tools have been developed to measure an individual's history of trauma exposure (for a review see: Briere, 2004; Frueh, Elhai, & Kaloupek, 2004; Norris & Hamblen, 2004). These measures differ with regard to their aims, their method of administration (e.g. self-report versus interview), how narrow or broadly they define traumatic events, the time necessary for administration, and the degree to which objective and

subjective descriptive information is obtained. Early measures of trauma exposure typically began with a single-question screener, also known as a gating question or a single, open-ended question. Within this manuscript the single, open-ended question will be referred to as a "single-question". Originally, single-question screeners (e.g. the Diagnostic Interview Schedule [DIS] and the Structured Clinical Interview for *DSM-IV-TR* [SCID] PTSD modules), often open-ended and thus having the potential to include all types of traumatic experiences, were aimed at identifying the maximum number of individuals who have experienced a traumatic event (Koss, 1993). Over time, issues surrounding the comprehensiveness and accuracy of trauma history based on a single-question screener began to surface along with an increased interest in the potential impact of cumulative lifetime trauma history on PTSD. As a result, a shift arose in assessment of trauma exposure toward systematic enquiry of specific event types using a list-based approach, commonly known as event inventories. For example, one commonly used trauma exposure measure is the 28-item event inventory that can be found as part of the PTSD section of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI).

There are advantages and disadvantages to different trauma exposure assessment methods. For example, single-item questions present a potential bias as a consequence of volunteered reporting of traumatic events. Simply put, individuals generally do not spontaneously report on the occurrence of an event if that event has not caused them significant distress; the result is a selected reporting of traumatic events. For example, a car accident would not be volunteered in response to a single-item question concerning traumatic event history unless that person found that accident traumatic. As such, these spontaneous responses are subsequently more likely to cause PTSD. Thus, single-item questions have a tendency to

underestimate the prevalence of potentially traumatic events, which results in inflation of conditional risk (Breslau, 2002). The conditional probability of PTSD is the number of individuals with PTSD divided by number of individuals with trauma exposure, and as such, is highly dependent on the stressor definition.

Assessing trauma using a list-based versus a single-question measure (or a long versus a short list) has been theorized to enhance recall of events that are less memorable but also less likely to have led to PTSD (Breslau, 2002). This theory is more broadly supported by findings suggesting that while trauma exposure rates vary widely among different samples and populations, rates of PTSD are often in a similar range (Blanco, 2011), but empirical based evidence remains sparse. As a result, it is still unclear if accurate and full descriptions of all traumatic event exposures are necessary to correctly diagnosis PTSD (Weathers & Keane, 2007).

A continued lack of consensus concerning the definition of trauma has led to inconsistencies and variability in the measurement of trauma exposure, which has specifically impacted epidemiological studies investigating the prevalence of trauma exposure, PTSD diagnosis, and the conditional risk for the development of PTSD (El-Sayed & Galea, 2011). At the heart of the issue is the conceptual inclusivity and exclusivity of the approaches used to define traumatic stressors. Since trauma exposure is necessary for diagnosis of PTSD, traumatic event assessments that systematically over- or under-identify actual exposures have the potential to affect the rate of PTSD diagnosis (Peirce, Burke, Stoller, Neufeld, & Brooner, 2009). Indeed, researchers have cautioned that

> When interpreting prevalence estimates of trauma exposure and PTSD… the most important thing for any reader of this literature to keep in mind is that a study's

> definitions of trauma and PTSD and its approach to assessment will strongly influence results (Norris & Slone, 2013; p. 1)

Previous Studies

Within current literature, there are few studies that have systematically examined the impact of using an event list compared to a single-question assessment on the prevalence of trauma exposure and subsequent diagnosis of PTSD. Existing literature is limited to clinical populations and college students (Elhai, Gray, Kashdan, & Franklin, 2005; Franklin, Sheeran, & Zimmerman, 2002; Peirce et al., 2009; Weaver, 1998). These studies have generally shown a 20% increase in trauma exposure when using a list-based questionnaire compared to a single-question screener. Furthermore, a study by Mills et al. (2011) found that increasing length of the list-based measures from 11 to 29 event types increased the overall population prevalence of trauma exposure by 18%. These findings align with those of Breslau and Kessler (2001) who demonstrated that increasing the number of applicable traumatic events by 5 increased the prevalence of trauma exposure within their sample by 21.5%.

Most support for the historical shift toward employing comprehensive list-based assessments has come from comparing prevalence rates between studies that use different methodologies, or samples drawn from clinical treatment seeking populations (Peirce et al., 2009; Weaver, 1998). No study to date has examined this question using a within-subject design and a large Canadian sample. Thus, the aims of the current study are twofold: (1) to replicate the increase in prevalence estimates of trauma exposure when using a list-based trauma assessment compared to a single-question assessment, and (2) examine changes in the prevalence of PTSD diagnosis when comparing both forms of assessment. It is hypothesized that estimates of the prevalence of trauma exposure using single-question assessment will be lower than using a list-

based assessment. Furthermore, given previous findings (Mills et al., 2011; Peirce et al., 2009), it was hypothesized that differences between estimates of trauma exposure will be more pronounced in women than men.

Method

Study Design

This study is based on cross-sectional analyses from a broader ongoing longitudinal general population study on mental health and mental health service use in an Epidemiological Catchment Area (ECA) in South-West Montreal, Canada (Caron et al., 2012; Caron et al., 2007). The catchment area had a population of 269,720 spread over four neighborhoods ranging in population from 29,680 to 72,420. The study area was chosen due to its diverse mix of residents and broad range of social structures, socio-economic statuses, level of education, availability of health services, neighbourhood dynamics, and levels of security. Analyses were carried out using data from a cohort of 1,029 respondents who were newly recruited for the third cycle of the ECA and interviewed from June 28, 2012 to June 10, 2013.

Selection Criteria and Sample

To be included in the survey, participants had to be 15 to 65 years old and residing in the study area. The objective of the ECA has been to obtain a representative sample of the targeted population geographically, in proportion to the population density, and in terms of socio-economic status (SES). A target sample of addresses was selected and a door-to-door recruitment strategy was undertaken. Of the 1,299 persons recruited, 1,029 completed their interview (79.2% retention rate). Data was collected by lay interviewers, trained by an expert in the field of traumatic stress (A.B.), who assessed participants within a week of initial contact/recruitment. Those who agreed to partake in the study were scheduled a face-to-face meeting with an

interviewer at either the participant's home or, in rare instances, in an office designated for interview purposes at the Douglas Mental Health University Institute. At the beginning of each interview, a complete description of the study was provided and each participant's written informed consent was obtained. All participants were fluent in either French or English, therefore interviews were conducted in the language of the participant's preference. In the event that a possible mental health problem was detected during the interview, participants were asked if they wanted to be contacted again by the research team in order to be referred to the appropriate mental health services and resources. All aspects of the study were approved by the Research Ethics Board of the Douglas Mental Health University Institute.

The mean participants' age was 37.85 (*SD* = 13.67), 54.1% were women, 43.8% were single, 43.6% were married or in a relationship, 10.8% were divorced or separated, 1.9% were widowed and 81.1% had graduated high school; 77.6% were employed in the last 12 months; The average personal income was $34,011.72 CAD (*SD* = $33,400.09) and the average family income $62,412.51 CAD (*SD* = $51,880.02).

Measures

Sociodemographic Variables. Sociodemographic and economic data were collected using the Canadian Community Health Survey questionnaire (CCHS 1.2; Statistics Canada, 2002). The following variables were recorded for all participants: age, gender, marital status, education, primary language, and personal and household annual income.

PTSD Diagnosis. PTSD was identified using the Canadian Community Health Survey – Canadian Forces Supplement (CCHS-CFS; Statistics Canada, 2003), which uses the WHO CIDI, version 2.1 (WMH-CIDI 2.1) to generate diagnosis according to the criteria of both the *International Classification of Diseases, Tenth Revision (ICD-10),* and the *DSM-IV-TR*

(American Psychiatric Association, 2000; Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998). The CIDI is a fully structured instrument for use by lay interviewers without clinical experience and has been shown to have high levels of reliability and consistency with clinician-based diagnoses of the *DSM-IV-TR* disorders. The diagnosis of PTSD was based on assessment of symptoms and functional disability stemming from exposure to one (or more) of 28 possible traumatic events. If respondents endorsed multiple traumatic events, PTSD symptomatology was anchored on individuals' reported "worst" event.

Assessment of Trauma Exposure

At the beginning of the PTSD module, each participant was asked the following single-question trauma exposure assessment:

> "In this next part of the interview, we ask about how people react to traumatic events that might have happened any time during their life. Some questions might be a little more sensitive than others but it is important for you to know that you will not be asked to describe in detail any traumatic experience. Over the course of your life, have you ever experienced or witnessed a traumatic event that included threatened or actual death, serious injury or another kind of threat to your physical integrity or that of others?"

Regardless of how an individual responded to the single-question assessment, they were then handed a sheet with the complete event inventory of the CCHS-CFS questionnaire. All participants were then asked report, without identifying which ones specifically, if they had experienced, during their lifetime, any of the events on the list of 28 traumatic events. If a participant said yes then they were asked about exposure to each of the 28 potentially traumatic events. The list is comprised of 27 distinct events and a residual category (i.e. "other") abstracted from the PTSD section of the WMH version of the CIDI.

Data Analysis

Data were analyzed using SPSS v. 20 (IBM Corp., 2010). Participants were divided by trauma history into four groups of individuals covering a complete spectrum of trauma exposure, namely: (i) individuals reporting no lifetime trauma exposure (the 'No Trauma' group), (ii) trauma-exposed individuals who never developed PTSD ('Trauma, No PTSD'), (iii) individuals fulfilling the diagnosis of PTSD for the previous year or longer ('Current PTSD'), and (iv) and individuals no longer meeting the PTSD criteria for the past year or longer ('Remitted PTSD'). The prevalence of current, remitted, and lifetime PTSD was determined. The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of the single-question screener were examined for identifying trauma history. The prevalence of trauma exposure and PTSD diagnosis based on single and list-based assessments were further broken down by gender. Differences in trauma exposure based on single-question and list assessments were also examined by age. All comparisons were made using two-tailed McNemar tests for pairwise comparisons and chi-square tests for between group comparisons with alpha set at .05

Results

Prevalence of Trauma Exposure Using a Single-Question versus List-Based Assessment

Fourteen participants were missing substantial data from the PTSD module and were therefore excluded from the analysis yielding a sample size of 1,015. In this sample, 617 (60.8%, 95%CI [57.8% – 63.8%]) individuals endorsed having experienced one (or more) traumatic event with the single-question assessment. In comparison, 790 individuals (77.8%, 95%CI [75.2% - 80.3%]) endorsed having experienced a traumatic event when given the list of 28 potentially traumatic events, representing a 28% increase from the single-question assessment.

This difference was statistically significant, $\varphi = .48$, $p < .01$. The sensitivity, specificity, positive predictive value, and negative predictive value for the single-question screener in detecting trauma history were 73.2%, 82.7%, 93.7%, and 46.7% respectively.

The most frequently reported potentially traumatic event (PTE) was unexpected death of a loved one for both forms of assessment (30.3%, 95%CI [27.4% - 33.1%], for list-based and 24.2%, 95%CI [21.6% - 26.8%] for single-question). In total, 2,812 PTEs were endorsed for list-based, while 2,399 were endorsed for those who said yes to the single-question. With the addition of the 212 people who said no to the single-question screener and then endorsed at least one PTE on the list-based questionnaire, an additional 413 traumatic events were added. The largest difference was found between single and list-based for unexpected death of a loved one, of which 15.6% of those who said no to the single-question reported the event when given the list-based inventory (Table 1).

Gender and age differences in the prevalence of trauma exposure. The percent increase in the prevalence of trauma from the single-question to the list-assessment was more pronounced in women (59.9%, 95%CI [55.8% - 64%] to 80.1%, 95%CI [76.7% - 83.4%]; 33.7% increase), $\varphi = .42$, $p < .01$, than in men (61.9%, 95%CI [57.5% - 66.3%] to 75.2%, 95%CI [71.3% - 79.1%]; 21.5% increase), $\varphi = .54$, $p < .01$. Furthermore, in accordance with previous literature (Blanco, 2011), there was an expected trend for younger individuals having less exposure to PTEs regardless of assessment type (Figure 1). However, they showed the largest percent increase in prevalence rates between the single-question and list-based assessments (15-24 years old: 51.6%, 95%CI [44.4% - 58.7%] to 70.2%, 95%CI [63.7% - 76.7%]; 36.1% increase), $\varphi = .49$, $p < .01$. When further broken down by gender and age, females aged 15-24 had the largest percent increase in trauma exposure from the single-question to list-based

assessment (47.3%, 95%CI [37.2% - 57.4%] to 74.2% [95CI = 65.3% - 83.1%]; 56.9% increase) $\varphi = .46$, $p < .01$. In contrast, males between the ages of 15-24 had the smallest percent increase (55.8%, 95%CI [45.8% - 65.8%] to 66.3%, 95%CI [56.8% - 75.8%]; 18.8% increase). See Figure 2.

Prevalence of PTSD Using a Single-Question versus List-Based Assessment

Non-conditional lifetime PTSD was diagnosed after the list-based assessment in 4.6%, 95%CI [3.3% - 5.9%], of participants compared to 4.0%, 95%CI [2.8% - 5.2%] of participants after the single-question assessment. A large majority of lifetime diagnoses were remitted at the time of the assessment (26 of 47 for list assessment; 22 of 41 for single-question). Following the list-based assessment, the conditional rates for current and remitted PTSD were 2.7%, 95% CI [1.7% - 3.8%], and 3.3%, 95%CI [2.1% - 4.5%], respectively. When using a single-question assessment, those rates increased to 3.1%, 95%CI [1.9% - 4.3%] and 3.6%, 95%CI [2.3% - 4.9%], respectively. Of the 398 individuals who answered *no* to the screening questionnaire, 212 (53.3%) subsequently reported a trauma when cued by the trauma list. Of these 212 participants, two (1%) met the criteria for a diagnosis of current PTSD and four (2%) endorsed a diagnosis of past (remitted) PTSD.

Gender differences in the prevalence of PTSD diagnosis. There was a significant difference between men and women on the proportion of participants with non-conditional PTSD subsequent to single-question assessment, $\chi^2(1) = 16.67$, $p = .001$. When compared after the list-based assessment, the percentage of men with PTSD remained identical, while more women met criteria for PTSD. Nevertheless, with list-based assessment, there remained a significant difference in the proportion of PTSD between genders, $\chi^2(1) = 12.07$, $p < .001$ (Figure 3).

Discussion

The present study is one of few empirical investigations to assess the impact of using single versus list-based trauma assessment tools on the prevalence of reported trauma exposure and PTSD within a large community based epidemiologic catchment area. The rates of trauma exposure (77%) within this sample replicate previous Canadian prevalence rates using list-based approaches (75.9%; van Ameringen, Mancini, Patterson, & Boyle, 2008). To our knowledge, this is the first study to examine single and list-based trauma assessment measures using a within-subject design with a general population sample. This study is also the first to explore specific associations between individuals' perceptions of what constitutes potentially traumatic events by breaking down the prevalence of trauma exposure by gender and age.

Differences in Trauma Exposure for Single versus List-Based Assessment

The significant increase in traumatic event exposure of 28% from single-question to list-based assessment is not unexpected. Indeed, previous studies looking at single versus list-based assessment in samples of psychiatric outpatients, primary care patients and college students have found similar rates (18.8%, 18.2% and 40.2%, respectively; Elhai, Franklin, & Gray, 2008; Franklin et al., 2002). Furthermore, Mills et al. (2011) looked at the impact of increasing the number of PTEs listed in population surveys (from 11 to 29 events) on the prevalence of trauma exposure and found a 31.6% increase in a community sample. Their findings echoed Breslau and Kessler (2001) who found that broadening the *DSM-IV-TR* A1 criterion increased the overall prevalence of trauma exposure from 68.1% to 89.6%, or a 31.6% increase.

Sensitivity of the single-question (73.2%) was far from perfect in identifying trauma history. Our study showed out of all of those who said no to the single-question, 53% said yes when cued by the trauma list, which is higher than previous findings within young adults,

primary care patients, and psychiatric outpatients (23% - 37%; Elhai et al., 2008; Franklin et al., 2002). Our results also highlight differences in trauma exposure between clinical and non-clinical populations. The single-question correctly ruled out a history of trauma (i.e. specificity) in 82.7% of participants. In other words, the single-question was better at ruling out people who did not have trauma rather than including individuals who did have trauma. Previous studies in college students and primary care patients have found similar numbers for specificity (87.2% and 67.4%, respectively; Elhai et al., 2008). Our findings, like those of Elhai et al. (2008), are less encouraging than those of Franklin et al. (2002) who report 100% specificity in identifying non-trauma victims in a sample of mental health patients.

Many researchers and clinicians may be more concerned with identifying a trauma history that is ultimately related to a PTSD diagnosis. The single-question trauma assessment performed reasonably well compared to the list-based assessment in identifying PTSD diagnosis. Less than 10% ($n = 2$) of current diagnosis, and less than 13% of total lifetime diagnosis ($n = 6$) would have been missed if the single-question trauma screen were used in place of the list-based assessment to evaluate trauma history. These results are in line with those of Elhai et al. (2008) who found that approximately 12% of "probable PTSD" would be missed if using a single-question screener in place of a list-based assessment in samples of students and primary care patients. Given that using the list-based assessment identified few additional cases of PTSD, our data supports previous studies theorizing that individuals with diagnosable PTSD symptoms readily recall that they have experienced trauma and report it when asked a screening type question (Elhai et al., 2008; Franklin et al., 2002).

Conditional and Non-conditional Prevalence of PTSD Single versus List-Based Assessment

The rate of lifetime PTSD of 4.6% (95%CI = 3.3% - 5.9%) within this community based sample is lower than some estimates in the USA, but is comparable to most other countries (Blanco, 2011; Kessler & Üstün, 2008; Norris & Slone, 2013). Similarly, the rate of current (i.e., past-year) PTSD of 2.1% lands below previous reported estimates in the USA (3.5%), but above most other countries that report current rates of PTSD of less than 1% (Kessler & Üstün, 2008). Unfortunately, few large studies examining conditional rates of PTSD using Canadian general population samples have been published. Using a telephone survey of 1,002 randomly selected Canadian adults from Winnipeg, Stein, Walker, Hazen, & Forde (1997) reported rates of past *month* non-conditional PTSD of 2.7% for women and 1.2% for men. More recently, van Ameringen et al. (2008) reported conditional rates of lifetime PTSD of 9.2%. However, usually a conditional rate implies the prevalence of PTSD in those who have suffered a traumatic event. As such, the accuracy of van Ameringen et al. (2008) rates may be inflated, given they were calculated based on those who had suffered a traumatic event *and who had experienced symptoms* of PTSD. Van Ameringen and colleagues (2008), like Stein et al. (1997), also reported past month PTSD for their current conditional PTSD rates, which hinders comparison to our study findings.

The lifetime non-conditional rates of PTSD increased by 0.6% when using a list-based approached compared to a single-question. Similarly, Franklin et al. (2002) reported a 1% increase in rates of non-conditional lifetime PTSD in a sample of psychiatric outpatients. Elhai et al. (2008) reported a 2% increase in non-conditional rates of probable PTSD with a list-based trauma assessment versus single-question in primary care patients and a 1.5% increase in college students. Peirce et al. (2009) found a non-conditional change from single to list of 9% in a

sample of opioid dependent patients. While differences in methods employed hinder the generalizability of our findings to previous studies, it may be that the clinical implications of using a comprehensive trauma assessment is more important and/or relevant, as least in terms of non-conditional rate reporting, with at-risk populations than in general community based surveys.

As expected, there was a decrease from 6.7% to 6.0% in the conditional rate of lifetime PTSD when using the single-question compared to the list-based assessment. The decrease with list-based assessment was similar to the decrease reported in primary care patients (0.58%; Elhai et al., 2008), although less pronounced than that found in college students (decrease of 4.7%), and psychiatric outpatients (decrease of 4%; Franklin et al., 2002). In contrast, an increase with list-based assessment was found with Peirce with opioid patients of 5% for lifetime PTSD. This difference is most likely due to the high prevalence of trauma exposure (100% using a list-based assessment) with an at-risk group, in this case, opioid dependent patients.

Age and Gender Differences in Prevalence Estimates of Trauma and PTSD

The present study demonstrates that regardless of gender, there was a significant increase in traumatic event exposure from the single-question to list-based assessments. However, percent increases were more pronounced in women than in men (33.7% and 21.5%, respectively). This finding replicates previous work by Mills et al. (2011), who observed increases of 17.7% for men, and of 49.09% for women, when comparing a short versus a longer list of PTEs. Within a clinical sample, Peirce et al. (2009) found that there was a greater increase in the number of *event types* reported by women than men when comparing a multi-item and a single item trauma assessment. The current study extrapolates on these previous findings in that for single-question assessment, men had higher rates of exposure to traumatic events, but with list-based assessment,

women had higher exposure. This is different from Mills et al. (2011) who found that although the overall difference in prevalence of exposure to PTEs was more pronounced in women, men still had slightly higher estimated trauma exposure regardless of the type of assessment used.

These findings are important as they contradict a fundamental principle, supported by many studies, that men are more likely than women to experience PTEs (Breslau, 2002; Creamer, Burgess, & McFarlane, 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Norris, 1992). The present study, like that of Mills et al. (2011), suggests that previous conclusions may have been due to the particular types of traumas being inquired about. Indeed, Mills et al. (2011) found that although men and women did not differ with regard to having experienced a traumatic event when asked using a list-based approach, they did differ in the types of events they endorsed; a finding previously supported within trauma literature (Breslau, 2002; Creamer et al., 2001; Kessler et al., 1995). It is important to note that differences in reported events between the sexes may also reflect differences in the interpretation of events as traumatic as well as actual differences in the occurrence of these events. As a result, failure to comprehensively assess a broad range of trauma types may lead to erroneous conclusions about gender differences in the prevalence of trauma exposure and, potentially, diagnosis of PTSD.

A study by Peirce et al. (2009) found no significant differences in PTSD diagnosis between genders for single-question, but did find significant difference when using a list-based assessment, with more women meeting PTSD criteria following the list-based assessment. This finding was not supported with our results as we had a significant difference between the genders regardless of single or list. This may be due to the differences in samples, theirs being clinical and ours being a community based sample. To date, no study has looked at differential impacts of gender on PTSD diagnosis in a community-based sample. Peirce et al. (2009) also found that

the increase in rates of PTSD was due almost entirely to the effect of the list assessment on the diagnosis of PTSD in women. This finding was replicated within our results, where all of the missed PTSD diagnoses following the single-question trauma assessment were women. Thus, although single-question assessments may be amenable to researchers due to time and financial constraints, women are at much greater risk of being underestimated when diagnosis is an outcome.

Many studies have shown that younger individuals have less trauma exposure (Blanco, 2011), but no studies have looked specifically at differences in reported trauma exposure when using single-question and list-based assessments. Our study supports the notion that regardless of the assessment type, trauma exposure is associated with older age, such that the likelihood of experiencing a traumatic event increases with age. Interestingly, in our study, young women had the most pronounced significant increase in PTE prevalence when comparing single-question versus list-based assessments compared to all other age groups. Almost half of women aged 15-24 years old reported trauma exposure when assessed with the single-question, while three quarters reported trauma exposure when prompted with a list. In contrast, males from the same age group only increased by approximately 20%. Indeed, when factoring in age and gender, the increase in PTE exposure from single-question to the list-based assessment among young males aged 15-24 years old was the only non-significant contrast. These findings highlight the importance of comprehensive trauma exposure assessment specifically among young women, who may not fully understand what constitutes a traumatic event.

Strengths and Limitations

The study's strengths include a large epidemiological sample of the general population and a within-subject design. The study is therefore more generalizable than previous findings

that have been limited to specific samples of men and women (Elhai et al., 2008; Peirce et al., 2009). Furthermore, the study used validated comprehensive diagnostic measures administered by trained interviewers which allowed for not only extrapolation of previous epidemiologic findings regarding trauma exposure but also replication of previous findings concerning PTSD diagnosis beyond clinical samples.

The study's findings are not without their limitations. With all types of trauma assessment one must consider the potential for recall bias due to use of retrospective self-reporting. Non-response bias should also be noted as a potential confounder as some individuals may have been more or less likely to refuse participation; unfortunately no data were collected on those who refused to participate, precluding the ability to examine any differences between those who agreed to participate and those who refused. Also, individuals may have underreported trauma exposure due to the in-person interview methodology, though the PTSD module used for diagnosis allows for anonymity when discussing traumatic events, allowing for the option of using numbers associated with each type of event that only interviewees see.

As with other studies comparing single-question and list-based assessments, this study was not a head-to-head comparison of the two approaches, but was instead run to examine how much information is missed by a single-question assessment. As a result of asking the single-question first, then following with the list-based assessment that was subsequently used to determine PTSD diagnosis, sensitivity and NPP of the trauma list were 100%. Still, our findings did replicate many previous studies that have looked at similar questions longitudinally and using mixed method designs.

Findings from the present study support the notion that using single-question trauma screeners may lead to an underreporting of trauma exposure in community-based epidemiologic

samples, especially among young women. Although this may not be considered to have a significant impact on the diagnosis of PTSD from an epidemiological perspective, 10% of the current cases of PTSD, all of which were women, would have not been identified by using a single-question assessment of trauma. Failure to diagnose PTSD or other psychological sequelae of trauma exposure has important clinical implications for sufferers who may not receive adequate, or any, treatment. Finally, future epidemiological research on PTSD will benefit from paying close attention to how the assessment of trauma impacts prevalence estimates of exposure and conditional diagnoses of PTSD.

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Table 1.

Prevalence of trauma exposure by assessment type.

	List-based Event Inventory		Single-question Screener	
Event Type	*n*	%	*n*	%
Combat experience	39	3.8	34	3.3
Relief worker in war zone	14	1.4	14	1.4
Civilian in a war zone	39	3.8	31	3.1
Civilian in region of terror	65	6.4	55	5.4
Refugee	34	3.3	26	2.6
Kidnapped	25	2.5	23	2.3
Toxic chemical exposure	69	6.8	62	6.1
Automobile accident	157	15.5	137	13.5
Life-threatening accident	50	4.9	47	4.6
Natural disaster	99	9.8	80	7.9
Man-made disaster	64	6.3	58	5.7
Life-threatening illness	83	8.2	64	6.3
Beaten up as a child by caregiver	112	11	97	9.6
Beaten up by spouse or romantic partner	88	8.7	80	7.9
Beaten up by somebody else	103	10.1	92	9.1
Mugged or threatened with a weapon	230	22.7	190	18.7
Raped	115	11.3	106	10.4

Sexually assaulted	241	23.7	197	19.4
Stalked	131	12.9	106	10.4
Unexpected death of a loved one	308	30.3	246	24.2
Child's serious illness	37	3.6	26	2.6
Traumatic event to love one	173	17	150	14.8
Witness physical fights at home	159	15.7	136	13.4
Witnessed death or dead body	237	23.3	216	21.3
Accidentally caused serious injury, death	25	2.5	21	2.1
Purposely injured, tortured or killed	30	3	24	2.4
Saw atrocities	23	2.3	23	2.3
Other	62	6.1	58	5.7
Any Event	790	77.8	617	60.8
Total	2812		2399	

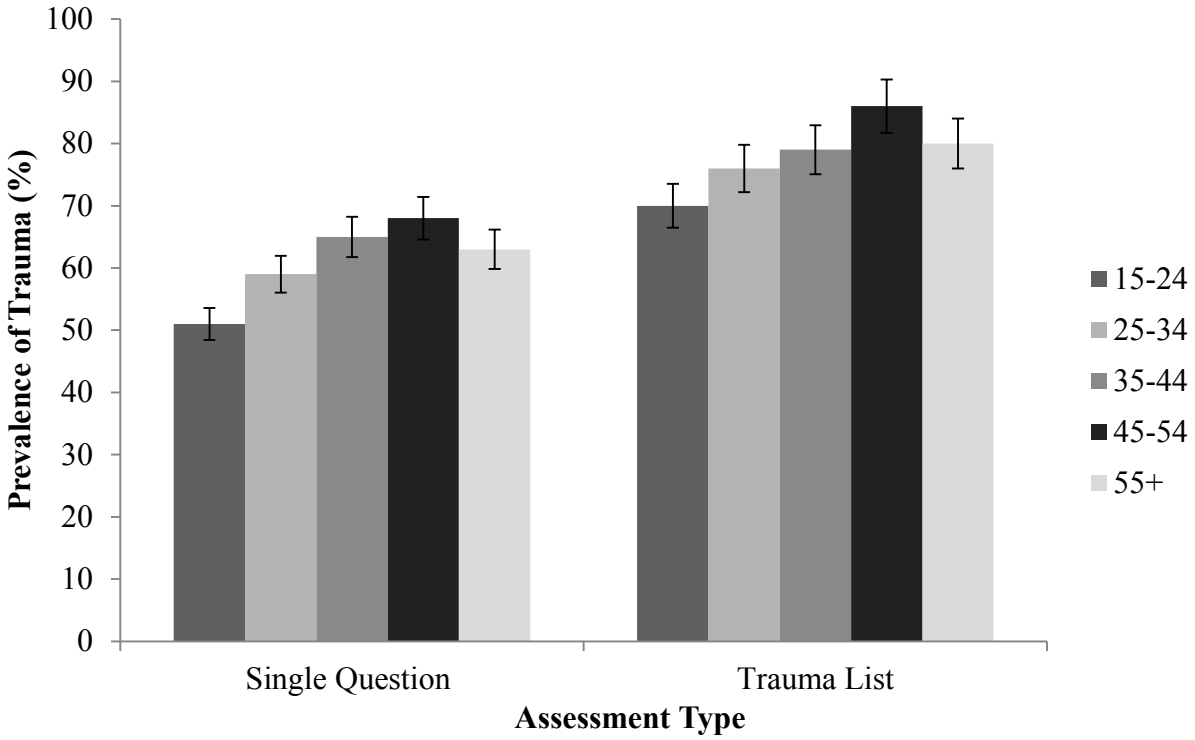

Figure 1. *Prevalence of trauma exposure by age following the single-question and list-based assessments.*

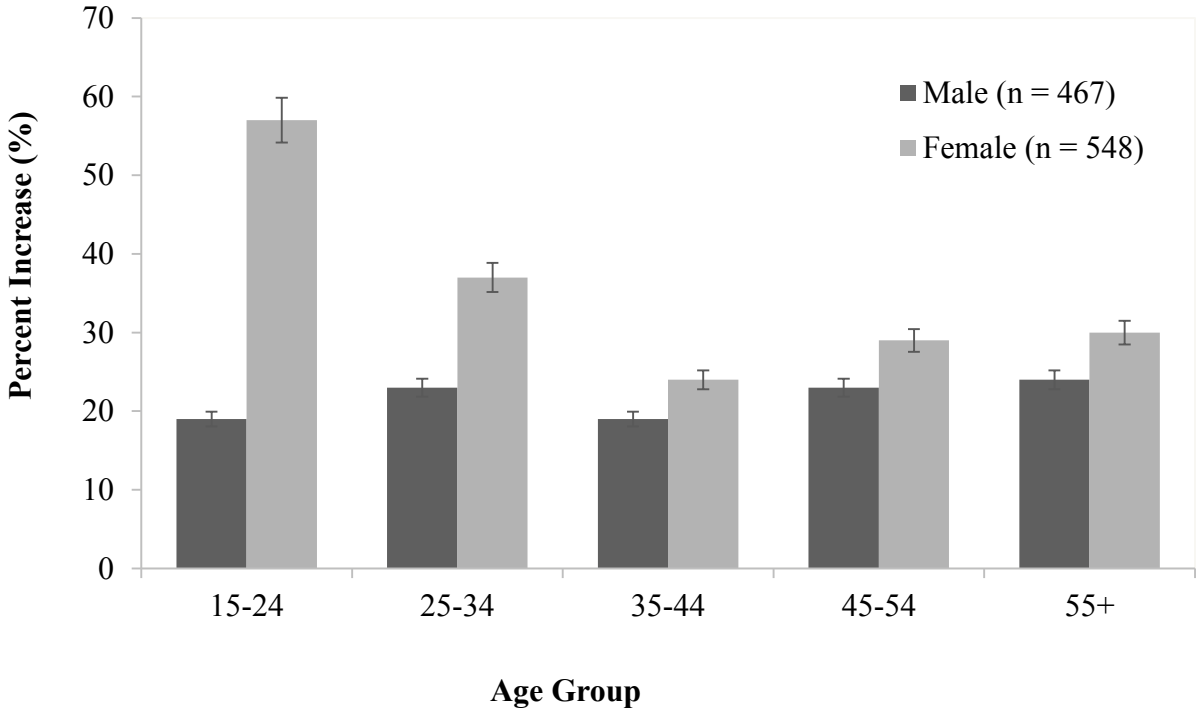

Figure 2. *Percent increase in the prevalence of trauma exposure from single-question to list assessment by gender and age.*

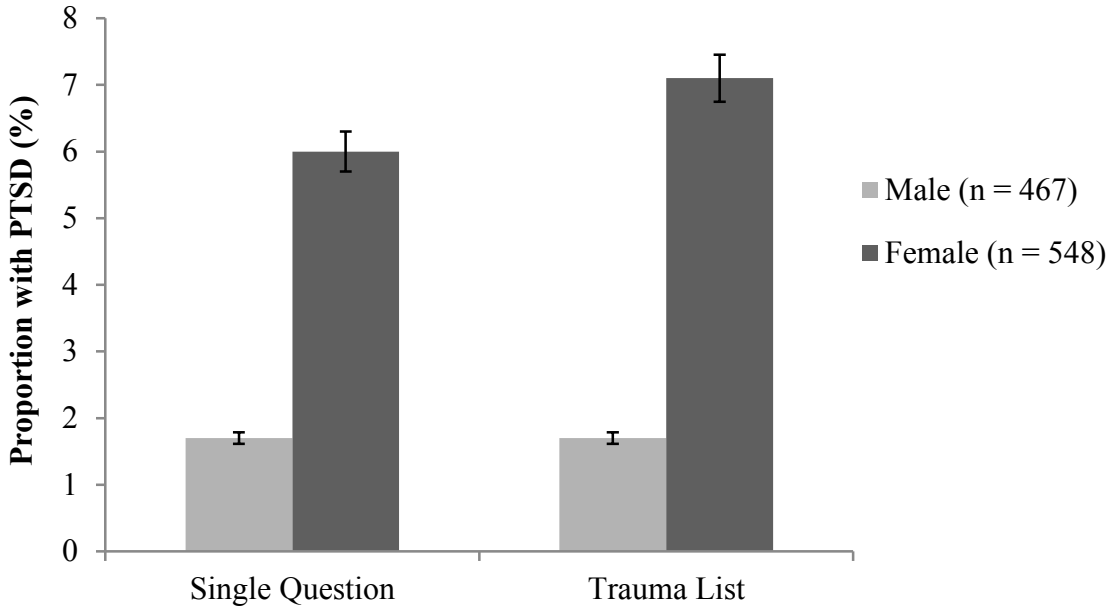

Figure 3. *Gender differences in prevalence of lifetime PTSD using a single-question versus list-based assessments.*

Transitional Text #1

Reported rates of trauma exposure and PTSD within Canada have varied in recent years (Monson, Brunet, & Caron, 2015, van Ameringen et al., 2008). Hence, in an effort to validate previous the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) project rates, the first manuscript of this dissertation looked at the differences in reported rates of trauma and PTSD within a subsample of newly recruited catchment participants when using a single versus list-based assessment. Overall, there was a 25% increase in reporting of traumatic event exposure from the single-question to list-based assessments; a finding that replicates similar studies that used convenience samples (i.e., psychiatric outpatients, primary care patients and college students; Elhai, Gray, Kashdan, & Franklin, 2005; Franklin, Sheeran, & Zimmerman, 2002; Peirce et al., 2009; Weaver, 1998). Findings additionally revealed that increases in trauma exposure were more pronounced in women than men, as well as in younger participants. The question of how these differences might affect PTSD diagnoses is central to this manuscript. Use of list-based assessment identified few additional cases of PTSD, and as such, the data supports previous studies theorizing that individuals with diagnosable PTSD symptoms readily recall that they have experienced trauma and report it when asked a screening type question (Elhai et al., 2008; Franklin et al., 2002). And further, findings also support the notion that using single-question trauma screeners may lead to an underreporting of trauma exposure in community-based epidemiologic samples, especially among young women. Although this may not be considered to have a significant impact on the diagnosis of PTSD from an epidemiological perspective, they do highlight the importance of refining the definition of 'trauma' in interview (i.e., clinical) settings as accurate identifications of trauma is the first step to obtaining valid diagnoses and epidemiological rates. Missed current cases of PTSD, which in

this case included only women, could have long-term consequences for individuals seeking treatment if they were not identified by using a single-question assessment of trauma. The consistency in the rates of trauma and PTSD within the ZEPSOM population and those found worldwide suggest these findings were yielded reliably and precisely, strengthening previous findings and securing their global generalizability.

With the validity of the ZEPSOM rates secured, the direction of this dissertation moves from validation of previous results to a somewhat novel and more in depth contextualization of previous findings. In Monson et al. (2015), global quality of life scores were further broken down into specific domains. A notable finding was that certain subscales did not display similar results to those of global trends of increasing quality of life along the trauma spectrum from no trauma to those currently suffering from the disorder. In Monson and colleagues' (2015) study, some subscales aligned closely with findings from the overall quality of life scores, but other analyses did not yield significant difference between the two types of PTSD groups (current vs. remitted). One such scale, the housing and neighbourhood subscale, displayed lower quality of life was found between 'Current PTSD' as well as 'Trauma, No PTSD' groups when compared with the 'No Trauma' group, but results did not yield a significant difference between the two types of PTSD groups (current vs. remitted). When a cursory literature review was preformed on the subject, it became evident that there was a need for research focusing on neighbourhood context and PTSD. As a result, the second line of enquiry undertaken within this thesis concerns how people across the trauma spectrum perceive their neighbourhood environment and how neighbourhood context might be related to risk of trauma exposure, PTSD, and potentially subsequent remission. The second manuscript, entitled "Place and Posttraumatic Stress Disorder" is the result of these enquiries.

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Chapter 4: Place and posttraumatic stress disorder

Reference:

Monson, E., Paquet, C., Daniel, M., Caron, J., & Brunet, A. (2015). Place and posttraumatic stress disorder. Manuscript submitted for publication.

Abstract

Background: Research on traumatic stress has focused on individual risk factors. A more thorough understanding may require investigation of the contribution of contextual factors, such as the associations between perceived neighbourhood disorder and social cohesion with reported trauma exposure and posttraumatic stress disorder (PTSD) diagnostic status (lifetime, current, remitted).

Methods: In our study, a cross-sectional analysis of an epidemiological catchment area survey (*n* = 2433) was used.

Results: Neighbourhood disorder was associated with increased trauma exposure. For trauma-exposed individuals, neighbourhood disorder was associated with greater odds of lifetime PTSD, and social cohesion was associated with lower likelihood of current PTSD. An indirect positive association between neighbourhood disorder and current PTSD was mediated by perceived social cohesion. For participants with lifetime diagnosis of PTSD, social cohesion was associated with higher odds of remission.

Conclusions: Environmental contexts play a role in the development and progression of PTSD.

Key words (Mesh): *Trauma; Stress Disorders, Post-Traumatic; Neighbourhoods; Social Networks*

Introduction

Posttraumatic stress disorder (PTSD) presents a significant burden to those who suffer it, their loved ones, and society as a whole[1]. PTSD is among the most common of mental disorders in western societies, with a lifetime prevalence of 6-10%[2, 3], and 11-37%[4, 5] in low and middle income countries, respectively. Individual-level risk factors for PTSD, such as gender, psychiatric history, and social support, have been extensively researched although they explain only approximately 20% of the variance in the etiology and maintenance of PTSD[6, 7]. A more thorough understanding requires going beyond individual risk factors.

Previous studies have explored environmental factors as they pertain to psychopathology and findings suggest that perceived neighbourhood disorder (i.e., visible cues indicating a lack of order and social control in the community), and social cohesion (i.e., the willingness of residents who realize common values to intervene for the common good) are related to mental health[8-10]. This literature has primarily focused on depression, substance use and schizophrenia, leaving discussion of the effects of "place" on PTSD in its infancy[11-13]. This is particularly striking considering that PTSD *requires* the occurrence of a specified etiological environmental factor (the traumatic event) in order to develop. From a theoretical perspective, neighbourhood context may impact PTSD in at least three ways: by influencing an individual's (i) number and severity of traumatic experiences; (ii) pre-morbid vulnerability to developing PTSD upon trauma exposure and (iii) prognosis.

Exposure to trauma varies across populations, countries, and communities[14] and neighbourhood disorder is associated with crime and assaultive violence (e.g., rape, or being shot) within a community[15, 16]. Neighbourhoods characterized by low social cohesion may be deficient in the "informal social control" necessary to discourage crime and delinquent behaviour

and, as such, could raise residents' risk of experiencing trauma[12]. This premise aligns with the reciprocal determinism of neighbourhood disorder and social cohesion (i.e., disorder can decrease social cohesion, and vice versa). For example, it has been theorized that when residents interpret disorder as a sign that "nobody cares", it can trigger anxiety, fear, worry and withdrawal from public spaces, inhibiting community cohesiveness and "eyes on the street"[17] which in turn provides opportunity for greater criminal behaviour.

Neighbourhood social contextual factors may influence not only an individuals' pretrauma psychological state (e.g., perceived level of control) but also one's ability to cope following trauma[18] and as a result may increase the risk of PTSD and hinder an individual's ability to progress to remission. Furthermore, neighbourhood social cohesion may also be associated with risk of PTSD by influencing the availability of resources that may be associated with remission[18].

Previous studies considering neighbourhood context and PTSD have been hindered by a limited generalizability of findings due to sub-optimal sampling techniques (e.g., recruitment from a single hospital[11]) and/or sample specificity (e.g., sampling only African-American individuals[11-13]), or have focused solely on the relationship between neighbourhood social cohesion and PTSD diagnosis and symptom trajectories[12].

Study Aims

This study aims to expand knowledge from previous studies through cross-sectional investigation in an epidemiological community sample of the associations between neighbourhood disorder and social cohesion and (i) lifetime trauma exposure, (ii) lifetime and (iii) current (past-year) PTSD diagnoses, and (iv) PTSD remission. We hypothesized that greater perceived disorder within a neighbourhood would be associated with a greater odds of exposure

to trauma and of having a current or lifetime PTSD diagnosis, and a lower odds of remission from the disorder. Similar associations were hypothesized for neighbourhoods perceived to have low levels of social cohesion. To account for the reciprocal relationship between perceptions of disorder and social cohesion, we also tested for their respective direct and indirect effects on PTSD outcomes.

Material and methods

Participants and Procedure

Data were drawn from a broader general population study of mental health and mental health service use in an epidemiological catchment area (ECA) in the Southwest of Montreal, Canada[19]. The Montreal ECA has a sample size comparable to those of the psychiatric epidemiological zones that have been developed/studied in American cities with similarly sized populations[20]. The catchment area, population 269 720 comprises a range of social structures, socioeconomic status, education, and neighbourhood dynamics and security.

A geographically representative sample of 2433 participants took part in the survey[19]. Demographic information is shown in Table 1. Sampling was equally distributed in the study area among five neighbourhoods: Saint-Henri/Pointe St-Charles (n = 612), Lachine/Dorval (n = 603), LaSalle (n = 584), and Verdun (n = 635). An overall participation rate of 48.7% was found, superior to median rates reported in epidemiological studies of populations conducted since 2000[21].

After a complete description of the study, participants' written, informed consent was obtained. In-person interviews were then conducted by trained lay interviewers, in either English or French, between April 2007 and November 2008. All English language measures underwent linguistic and transcultural validation for use in French and were administered to participants by

interviewers trained to administer questions of a sensitive nature. The Research Ethics Board of the Douglas Mental Health University Institute approved all study procedures.

Measures

PTSD diagnosis was identified using a slightly modified version of the Canadian Community Health Survey - Canadian Forces Supplement (CCHS-CFS), which is based on the World Health Organization Composite International Diagnostic Interview (CIDI) Version 2.1. Diagnosis is generated according to criteria and definitions of both the *International Classification of Diseases*, Tenth Revision (ICD-10), and the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*), Fourth Edition[22, 23]. The survey further allows for endorsement of multiple traumatic events, in which case individuals are assessed on their "worst" event or if unknown (in one case only), most recent. In the present study, individuals were classified by PTSD diagnostic status and trauma exposure as follows: "current" (past-year diagnosis of PTSD), "remitted" (lifetime diagnosis of PTSD but not meeting the criteria in the past 12 months), "resilient" (having suffered at least one potentially traumatic event but never meeting the criteria for diagnosis of PTSD) and "no trauma" (never having suffered a potentially traumatic event).

Perceived neighbourhood characteristics were assessed through self-reported responses to questionnaires. The neighbourhood disorder scale measured resident's perception of disruptive elements in the neighbourhood[24]. The scale includes eleven items assessing levels of visible disorder in the neighbourhood, such as poor maintenance, defaced public structures, abandoned property, loitering and disorderly conduct. Item responses were scored on a ten-point Likert scale with responses ranging from 'rarely' to 'frequently' (scored from 1 to 10 respectively). Social cohesion, a subscale of the Sense of Collective Efficacy Scale[25], was measured using five items

assessing individuals' perceptions of shared values and trust amongst neighbours, three positive (e.g., "people here are willing to help their neighbours") and two negative (e.g., "people in this neighbourhood generally don't get along with one another"). Item responses were scored on a five-point Likert scale with responses from 'strongly agree' to 'strongly disagree' (scored 1 to 5, respectively). The three positive items were reverse coded so that higher total scores represented greater social cohesion. Cronbach's alpha for the neighbourhood disorder and social cohesion scales in this sample were .91 and .77, respectively. Some participants declined to answer, or gave a "don't know" response for individual items in the neighbourhood disorder and social cohesion scales. For these individuals, scores were calculated from the number of items answered if the participant had a response rate above 50% for the subscale or total score[26].

Covariates included gender, age, being a high school graduate or not, household income and duration of residence at current address. As perceptions of neighbourhood disorder and social cohesion had the potential to be related to the socioeconomic position of the neighbourhood, we also included as a covariate an area-level measure of socioeconomic deprivation expressed at the census tract level using 2006 Canada Census data, operationalized as the proportion of households spending 20% or more on food, shelter and clothing, than the average household of similar size, region, and resident density[27].

Data Analysis

Data were analysed using MPlus v7.1[28]; statistical software used to conduct latent variable modeling. The following PTSD and trauma exposure outcomes were analysed in separate models: (i) current PTSD diagnosis (remitted and trauma-exposed resilient participants as reference group); (ii) lifetime diagnosis of PTSD (trauma-exposed resilient participants as reference group); (iii) remitted (current PTSD as reference group); and (iv) trauma exposure (no

exposure as reference group). We first separately analysed the association between each of neighbourhood disorder and social cohesion with PTSD/trauma exposure outcomes (Model 1 and 2, respectively). Neighbourhood disorder and social cohesion were then analysed together in another model (Model 3). This model allowed us to test if any significant effect of one of the variables emerging from Models 1 and 2 was due, partly or completely, to the association of the other variable with the same outcome. These potential "indirect" or mediated effects were tested using path analysis for categorical outcomes and the indirect effect estimated using the delta method[29]. Adverse neighbourhood contextual factors are known to be more prevalent in neighbourhoods with a lower socioeconomic status[9]. In order to account for the impact of neighbourhood socioeconomic status on associations between neighbourhood disorder/social cohesion and PTSD/trauma exposure outcomes we then specified a fourth set of models which included a measure of neighbourhood socioeconomic deprivation (Model 4). All models accounted for participants' age, gender, education, household income and duration of residence at current address. Models also accounted, through use of robust standard error estimation, for the clustering of observations at the level of census tracts. Neighbourhood disorder and social cohesion were standardized prior to analysis. Statistical significance was set at .05 and all hypothesis tests were two-sided. No correction for multiple testing was used due to the low number of hypotheses tested.

Results

Sample Description

The study sample included 2392 individuals who completed the PTSD module of the study. Rates of PTSD within the sample population have been previously reported[30]. In summary, 48 individuals (n = 1142) reported having been exposed to at least one traumatic

event. Of these, 25 (2.2%) had a current (i.e., past year) diagnosis of PTSD, and 67 (5.9%) were in remission (lifetime PTSD diagnosis but without current PTSD diagnosis). Of those 2392 participants with complete PTSD information, 52 participants had missing information on neighbourhood disorder or social cohesion, 189 had missing data for the income variable, and 9 had missing information on duration of residence. Analyses were conducted on participants with complete information on all predictors. Thus, 2142 participants were included in analyses, including 1028 who had suffered a potentially traumatic event.

Trauma Exposure

Trauma exposure was found to be related to perceived neighbourhood disorder and perceived social cohesion when tested separately (Table 2). Specifically, a one standard deviation increase in neighbourhood disorder was associated with a 22% higher odds of having experienced trauma, whereas a one standard deviation increase in social cohesion was associated with a 9% lower odds of having experienced trauma. The association between trauma exposure and perceived neighbourhood disorder remained statistically significant after accounting for perceived social cohesion and objective neighbourhood socioeconomic deprivation. Perceived social cohesion was no longer statistically significantly related to trauma exposure after accounting for perceived neighbourhood disorder, suggesting the effect might be mediated by perceived neighbourhood disorder. This was verified by path analysis results which revealed that perceived social cohesion was inversely related to perceived neighbourhood disorder (β=-0.43, P<.001), and a statistically significant indirect effect of social cohesion on trauma exposure through perceived neighbourhood disorder (parameter estimate for mediating pathway = -0.08; P<.001).

PTSD Diagnostic Status

Among participants who had experienced trauma, a one standard deviation increase in social cohesion was associated with a 37% lower odds of having a *current* PTSD diagnosis (Table 2). This association remained statistically significant following the inclusion of perceived neighbourhood disorder and neighbourhood socioeconomic deprivation in the models. No statistically significant associations were found between neighbourhood disorder and current diagnosis of PTSD, ruling out the potential mediation of the social cohesion results by neighbourhood disorder.

Among participants who had experienced a traumatic event, perceived neighbourhood disorder was associated with greater odds of *lifetime* PTSD diagnosis, with each one standard deviation increment in neighbourhood disorder being associated with a 42% higher odds of ever having been diagnosed with PTSD (Table 2). This association held after the inclusion of perceived social cohesion and objective neighbourhood socioeconomic deprivation in the model. Contrary to the results observed for current PTSD diagnosis, lifetime diagnosis was not related to perceived social cohesion, suggesting that social cohesion did not mediate the association found between perceived neighbourhood disorder and lifetime diagnosis.

Among participants who had experienced PTSD, the odds of remission was 2.45 greater for each one standard deviation increase in perceived social cohesion, and this association held after accounting for perceived neighbourhood disorder and objective neighbourhood deprivation (Table 2). Neighbourhood disorder was unrelated to remission.

Discussion

Trauma Exposure

As hypothesized, perceived neighbourhood disorder was associated with a greater likelihood of having experienced a traumatic event. Disorder is defined in the literature as

"direct, behavioural evidence of disorganization"[31] and can be expressed through physical and social cues within a neighbourhood[8]. Physical cues entail enduring, day-to-day aspects of the environment such as abandoned buildings, noise or graffiti. The "broken windows" hypothesis posits that neighbourhood physical disorder signals neglect and diminished social control to individuals residing in the neighbourhood in question and implies to outsiders that high-risk behaviour in disordered neighbourhoods is tolerated, or at least normative[32]. Disorder can be further interpreted as a sign that residents do not care. This can result in withdrawal from public space, which in turn increases opportunities for criminal behaviour. For example, the level of physical disorder (based on observations of litter, graffiti and abandoned cars) in Pittsburgh (USA) neighbourhoods was found to be associated with levels of crime and firearm injuries or deaths, even after taking neighbourhood poverty into account[33]..

Neighbourhood physical disorder also entails social cues, which relate to more people engaging in specific negative events or activities such as public drinking or drug use, panhandling or indifference. Aspects of social disorder highlight the increased chances of residents falling victim to criminal behaviour in areas that have increased criminal behaviour associated with signs of social disorder such as public drug use.

Neighbourhood social cohesion has also been theorized to influence an individual's risk of trauma exposure[12]. Previous studies have failed to find empirical evidence to support an association between neighbourhood social cohesion and frequency of traumatic events[12]. Our findings indicate that perceived social cohesion is associated with trauma exposure, but only indirectly through perceived neighbourhood disorder. These findings reinforce the importance of considering perceptions of *both* neighbourhood disorder and social cohesion when considering the potential associations between neighbourhood factors and trauma.

PTSD Diagnostic Status

A second pertinent finding from the current study is that among participants who have experienced trauma, perceived neighbourhood disorder was associated with greater odds of a lifetime PTSD diagnosis but not current PTSD. Only one study has examined the direct associations of perceived neighbourhood disorder to PTSD. Gapen et al.[11] published findings that perceptions of high neighbourhood disorder increase severity of past two-weeks' symptomatology for PTSD. These findings might be interpreted with caution, however, because Gapen et al. sampled from just one medical facility, thus limiting study generalizability and potentially introducing selection bias resulting in overestimation of the effects of neighbourhood disorder on PTSD symptomatology. Furthermore, the sample included exclusively low-income, African-American participants, and assessed PTSD symptomatology over just the 2-week period prior to the survey. The present study builds on and extends these findings to the diagnosis of lifetime and current (past-year) PTSD in a general population sample. Our finding that perceived neighbourhood disorder was associated with only lifetime diagnosis of PTSD is interesting as it provides evidence that perceived neighbourhood disorder may be mainly associated with a higher likelihood of PTSD through its ability to influence trauma exposure which, in turn, might raise the likelihood of lifetime PTSD.

While no direct association was found between perceived social cohesion and lifetime diagnosis of PTSD, our findings indicate that among participants who had experienced trauma, perceived social cohesion was directly associated with lower odds of having a current PTSD diagnosis. These results align with theoretical premises that suggest that the perception of neighbourhood social cohesion may influence the psychological consequences of exposure to trauma. These findings are discussed further in the context of the remission section below.

A recent study by Johns et al.[12] found that while the odds of past-year PTSD was not significantly associated with individual-level perceptions of neighbourhood social cohesion, a significant association existed when perceptions of neighbourhood social cohesion were aggregated to the neighbourhood level. While different in unit and level of measurement, our results measuring social cohesion at the individual level and the multi-level analysis by Johns et al.[12] expressing social cohesion at the neighbourhood level suggest perceptions of social cohesion shape risk of PTSD through individual response to trauma. Additionally, a recent study by Lowe et al.[13] using the same dataset as Johns et al.[12], assessed longitudinal trajectories of PTSD and found that higher perceived social cohesion and support at baseline were predictive of a trajectory pattern of consistently few PTSD symptoms.

Remission of PTSD

Among participants who had experienced PTSD, perceived social cohesion was associated with a higher odds of remission. To our knowledge, no studies have directly examined the potential relationships between perceived neighbourhood disorder and social cohesion with regard to remission from PTSD. However, previous literature does exist indicating that informal social ties, a contributing factor in community cohesion, is associated with lesser levels of fear and mistrust related to residing in a neighbourhood with high perceived disorder[34].

Strengths and Limitations

The major strength of this study is that it sampled and is representative of a large geographically-defined population. This strengthens the generalizability of the study findings and controls for potential biases found with convenience sampling (e.g., self-selection found within treatment seeking populations). A second key strength is its consideration of the spectrum of PTSD diagnostic status.

Due to the cross-sectional nature of this study the causal direction of effects is unknown. PTSD could negatively influence perceptions of neighbourhood social cohesion and disorder, and vice versa, as seen with studies of PTSD and social support (e.g., Kaniasty and Norris[35]). Longitudinal research that accounts for where and when traumatic events occur may be useful in untangling the nature of the relationships.

It is also important to acknowledge that the neighbourhood contextual measures used in this study were resident-perceived, as opposed to objectively-assessed. Objective assessments are typically considered to be "concrete and absolute" measures of the neighbourhood environment[36]; however, perceptions are influenced by a range of individual and contextual factors and often do not correspond to objective measures. As such, objectively-assessed neighbourhood disorder and cohesion may be differently related to PTSD than was observed in this study. Future research should also consider the addition of objective neighbourhood level measures such as crime rates or other measures obtained through systematic observation methods. Still, perceptions in their own right are important for understanding contextual associations with mental health outcomes and the associations between trauma, PTSD and perceived social context may provide evidence for the development of interventions to improve residents' perceptions.

An emerging body of research has begun to document the relationships between neighbourhood social conditions and mental illness[37, 38]. Few studies thus far have assessed whether PTSD is associated with between neighbourhood disorder and social cohesion. Our findings align with previous literature indicating that neighbourhoods play a role in shaping trauma exposure, diagnosis of lifetime and current PTSD as well as remission from the disorder. Specifically, our findings suggest that perceived neighbourhood disorder could relate to PTSD

through a greater likelihood of an individual experiencing a traumatic event. Perceived neighbourhood social cohesion in turn would seem to have more influence through the second pathway by which context affects risk of PTSD via shaping vulnerability to the disorder after trauma has occurred. This could occur perhaps by influencing residents' vulnerability to the effects of trauma, increasing the risk of developing PTSD and reducing ability to recover/remit[7, 15, 39]. Perceived neighbourhood disorder and social cohesion are also intertwined in their potential associations with PTSD with social cohesion mediating the association between neighbourhood disorder and PTSD. Whether this mediating function occurs over time requires the further investigation of temporal effects.

Clinical Implications

Information concerning the pathways through which perceptions of neighbourhood social cohesion and disorder contribute to incidence of PTSD provides clues to its etiology and has the potential to inform programs to prevent the development and improve the management of this disabling disorder. Population-based interventions concerning prevention and treatment models for PTSD will benefit from a more concrete understanding of perceived neighbourhood contextual factors and their associations and implications before crisis (primary prevention), during crisis (secondary prevention) and after crisis (tertiary).

Few studies have looked at the associations between neighbourhood context and PTSD. Given the findings reported in this paper, health care professionals in clinical settings should consider including assessment questions about the perceived physical and social environments to which individuals are exposed to better understand how these external factors may be contributing the presentation and course of PTSD.

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Table 1 Sociodemographic characteristics of the sample (n = 2433)	
	n
Gender	
Female	1503
Male	930
Marital Status	
Single	886
Married	724
Separated	74
Common-law	384
Divorced	319
Widowed	42
Education	
Less than high school	372
High school	280
Post-high school	1780
Immigrant	
No	1811
Yes	603
Primary Language	
English	528
French	1308
English & French	159
Neither English nor French	416
Caucasian	
No	450
Yes	1958
Held a job in past 12 months	
No	545
Yes	1866
	M (SD)
Age	41.39 (13.34)
Household size	2.50 (1.39)
Household income	58 601.04 (50 540.3)
Personal income	32 642.95 (31 138.02)
Neighbourhood disorder	39.22 (21.41)
Neighbourhood social cohesion	17.19 (3.70)

Table 2[a, b, c, d, e] Analysis of direct and indirect models of perceived neighbourhood disorder, perceived social cohesion, and objective neighbourhood deprivation in predicting PTSD and trauma exposure outcome

		Model 1			Model 2			Model 3			Model 4		
	Predictor	AOR	95%CI	*P*	AOR	95% CI	*P*	AOR	95% CI	*P*	AOR	95% CI	*P*
Current PTSD [c]	Perceived neighbourhood disorder	1.26	(0.88,1.80)	0.208				1.05	(0.71,1.57)	0.797	1.24	(0.82,1.87)	0.313
	Perceived social cohesion				0.63	(0.43,0.92)	0.017	0.64	(0.42,0.97)	0.038	0.64	(0.42,0.96)	0.032
	Objective neighbourhood deprivation										0.96	(0.93,0.99)	0.006
Lifetime PTSD	Perceived neighbourhood disorder	1.42	(1.18,1.71)	0.000				1.38	(1.10,1.75)	0.006	1.45	(1.15,1.84)	0.002
	Perceived social cohesion				0.84	(0.66,1.06)	0.131	0.95	(0.72,1.24)	0.69	0.94	(0.72,1.23)	0.665
	Objective neighbourhood deprivation										0.99	(0.97,1.01)	0.299
Remission [d]	Perceived neighbourhood disorder	1.00	(0.64,1.56)	0.999				1.24	(0.7,2.19)	0.456	0.93	(0.50,1.72)	0.814
	Perceived social cohesion				2.45	(1.47,4.09)	0.001	2.59	(1.55,4.3)	0.000	2.79	(1.69,4.59)	0.000
	Objective neighbourhood deprivation										1.07	(1.03,1.13)	0.003
Trauma [e]	Perceived neighbourhood disorder	1.22	(1.13,1.32)	0.000				1.21	(1.12,1.32)	0.000	1.27	(1.15,1.39)	0.000
	Perceived social cohesion				0.91	(0.84,1.00)	0.039	0.98	(0.90,1.07)	0.697	0.98	(0.89,1.07)	0.596
	Objective neighbourhood deprivation										0.99	(0.98,1.00)	0.032

a. All models adjusted for age, gender, education, household income, duration of residence at current address and clustering of observations by census tracts.
b. Statistical significance set at $P < 0.05$.
c. 1028 trauma-exposed participants included in analysis
d. 86 participants with lifetime PTSD included in analysis
e. 2142 participants included in analysis
Note: AOR = adjusted odds ratio

Transitional Text #2

The previous manuscript provided an in depth look at the relationships between trauma, PTSD, and perceived neighbourhood context. The aim was to examine the relationships between trauma, PTSD, and perceived neighbourhood context. Specifically, the study considered whether perceived neighbourhood disorder is related to incidence of PTSD before or after trauma exposure – that is, if perceived neighbourhood disorder is mainly associated with a higher likelihood of PTSD through its ability to influence the likelihood trauma exposure. We also sought to understand how perceived social cohesion is associated with trauma exposure, and if the relationship is direct or indirect (for example, through perceived neighbourhood disorder).

Results demonstrated that perceived neighbourhood disorder is associated with a greater likelihood of having experienced a traumatic event. Findings also confirmed that perceived neighbourhood social cohesion was associated with trauma exposure indirectly through neighbourhood disorder (Johns, Aiello, & Cheng, 2012). Among participants who had experienced trauma, perceived neighbourhood disorder was associated with greater odds of lifetime PTSD; perceived social cohesion was associated to lower odds of having current diagnosis of PTSD and higher odds of remission. These findings provide a more thorough understanding of the contribution of contextual factors and their associations to reported trauma exposure and PTSD diagnosis status (lifetime, current, remitted). Furthermore, it supports initial evidence that environmental factors are related to mental health and strengthens generalizability of previous studies with its large geographically-defined population (Echeverría, Diez-Roux, & Shea, 2008; Ross, 2000; Ross & Mirowsky, 1999). And finally, this manuscript highlights that novel future research is needed to better understand how neighbourhood social conditions are linked to an individual's exposure to traumatic events and their risk and resilience for PTSD.

The final manuscript included within this dissertation is possibly the most natural progression from the 2015 manuscript foundation: a longitudinal re-examination of the global and subscale quality of life outcomes across the first two waves of ZEPSOM data. Although the published 2015 ZEPSOM study was able to validate many previous quality of life findings in a large probabilistic sample drawn from the community, and recruited not solely based on diagnosis of PTSD or treatment seeking behaviour, the study's cross-sectional design did not allow for inferences about how quality of life might be affected over time. Indeed, there is a dearth of literature longitudinally examining the association between PTSD and quality of life, especially when paying particular consideration to the specific domains of quality of life. The final manuscript is unique in that it examines both the *longitudinal* relationship between trauma/PTSD and global, as well as particular aspects of, quality of life.

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Chapter 5: Longitudinal analysis of quality of life across the trauma spectrum

Reference:

Monson, E., Caron, J., McCloskey, K., & Brunet, A. (2015). Longitudinal analysis of quality of life across the trauma spectrum. *Canadian Medical Association Journal*. Manuscript submitted for publication.

Abstract

Background: Few longitudinal studies have examined the relationship between trauma exposure and PTSD in relation to quality of life. Similarly, only a small amount of literature has been designed to consider the relationships between trauma, PTSD diagnosis, and quality of life in terms of both global scores and their breakdown to specific domains. This paper aims to provide an essential longitudinal examination of the effects of trauma and PTSD diagnosis on global as well as specific domains of quality of life in order to paint a fuller picture of the diagnosis and unveil possible routes of research and successful treatment methods for the future.

Methods: Data was drawn from the initial two waves of *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM), an epidemiological catchment area study based in southwest Montreal (N = 2,433 and 1,823). PTSD diagnosis, as well as global and subscale scores of quality of life outcomes were established by face-to-face structured interviews using standardized instruments. Outcomes were compared between three trauma/PTSD categories and healthy controls.

Results: Findings extended previous cross-sectional findings within the catchment area by demonstrating that the effects of current PTSD diagnosis on quality of life endure with time. Specifically, the negative impact of current diagnosis of PTSD on Wave 2 quality of life is expressed through its influence on Wave 1 quality of life. Subscale findings are discussed.

Interpretation: Research needs to focus on understanding more than just global indices when it comes to the trauma spectrum. Additional research remains necessary to fully understand these complex relationships over time.

Longitudinal analysis of quality of life across the trauma spectrum

Introduction

Numerous studies have examined post-traumatic stress disorder (PTSD) and its effects on quality of life, defined as physical, mental, and social well-being,[1] yet there exists no universally accepted definition, making objective measurement and analyses in PTSD research difficult.[2] A meta-analysis by Olatunji et al.[3] found that PTSD was among anxiety disorders resulting in most significant quality of life impairment, particularly in mental health and social functioning when specific domains of quality of life were examined. The work of Rapaport et al.[4] also found that PTSD was associated with a markedly high rate of impairment across all domains of quality of life, including social relations, household situation, physical health, general sense of well-being, and economic health. Previous literature surrounding PTSD and quality of life has been limited in terms of generalizability, convenience samples, focus on level of posttraumatic symptoms rather than full PTSD diagnosis, and general lack of causal pathways due to cross sectional design.[4-7] For example, Olatunji et al.[3] do state that their comparative analysis should be interpreted with caution, considering the differences in impairment of quality of life for specific domains and the small sample sizes. Additionally, few studies have longitudinally examined the relationship between trauma exposure and PTSD in relation to quality of life. Giacco et al.[8] conducted a longitudinal study that examined subjective quality of life of a total of 745 current Balkan residents after war in former Yugoslavia and refugees in Western Europe, all diagnosed with PTSD. Compared to subjective quality of life at baseline, one year follow up showed significant improvement for both Balkan residents and refugees, which was associated with the reduction of symptoms over time. A study by Goenjian et al.[9]

found similar negative associations between PTSD and quality of life scores. Although longitudinal, results were again limited in generalizability as the sample consisted of adolescent survivors of the 1999 Parnitha earthquake in Greece. Nygaard and Heir[10] found that quality of life and posttraumatic stress symptoms were negatively related but also reported, despite a longitudinal design, that there was no evidence of the direction of causality between these two variables (quality of life and posttraumatic stress symptoms), suggesting a possible interactional process or other mental health qualities.

Presently, only a small amount of literature has been designated for the examination of the relationships between trauma, PTSD diagnosis, and both global scores and their breakdown to specific domains of quality of life. This dearth of information, especially within large community-based samples, is another significant gap in the present literature.[3,6,11] Recently, Monson et al.[12] examined quality of life in more depth across a full trauma spectrum, from healthy individuals, those with PTSD, those with remitted PTSD, and those exposed to trauma but did not develop PTSD. Data from an epidemiological catchment area survey was used to compare global scores as well as specific domains of quality of life across these groups using a large representative sample from the general population. The study reported that those currently suffering from PTSD had significantly poorer quality of life, both globally and across all subscales of quality of life, compared to those with no trauma history. Furthermore, the remitted PTSD group had better overall quality of life than those with current PTSD, in addition to scoring better in domains of daily life/social relationships, autonomy, and spare time activities. Remitted and no trauma groups (resilient) showed no differences in quality of life scores. However, the two PTSD groups did score similarly for subscales of housing/neighbourhood and personal relationships.

This paper aims to provide an essential longitudinal examination of the effects of trauma and PTSD diagnosis on global as well as specific domains of quality of life in order to paint a fuller picture of the diagnosis and direct possible routes of research and successful treatment methods for the future.

Method

Setting. Data was drawn from the initial two waves of *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM), an epidemiological catchment area study based in southwest Montreal. ZEPSOM is comparable to other psychiatric epidemiological zones studied in U.S. cities with similar population sizes.[13,14] The study area has a population of 269,720, and is varied in socio-economic status, social structures, education level, neighbourhood dynamics, and security.

Participants.

Wave 1. A geographically representative sample of 2,433 individuals took part in the first wave of the study, reflecting a cooperation rate of 48.7% - superior to median cooperation rates reported in epidemiological studies since 2000.[15] This included sampling from five neighbourhoods: Saint-Henri/Pointe St-Charles (n = 612), Lachine/Dorval (n = 603), LaSalle (n = 584), and Verdun (n = 635).

Within the sample, the mean age was 40.73 (SD = 14.08). Of the total participants, 48% were male (weighted), 38% of participants were single, 45% were married or common law, and 12% were divorced or separated; 71% had post-secondary education; 79% had been employed in the last year. Immigrants made up 25% of the sample. French was spoken as the first language for 55% of the participants, whereas 21% claimed English as their mother-tongue. 82% of participants were Caucasian. The average personal income of the sample was CAN $31,192 ($SD$

= $33,151), and the average household income was CAN $59,056 (*SD* = $49,581); 33.4% of the population met the classification for low-income.

Wave 2. The 2,433 participants who were involved with Wave 1 of the ZEPSOM study were again contacted between June 2009 and December 2010 to take part in the second wave. Of these, 1,823 participants were retained. The primary causes of attrition were participants moving out of the study area (9.4%, *n* = 230), and participants being unreachable (9.4%, *n* = 230). A further 138 (5.7%) refused to continue participating, and 12 participants died, making for 610 total who were excluded or lost at follow-up. Attrition rates were highest for participants who were single, of younger age, with lower levels of education, lesser income, and had substance abuse issues.

In Wave 2, 36.9% was male. Of the total number of participants, 34% were single, 31% were married, 15.6% were common-law, 13.8% were divorced, 3% were separated, and 2.1% were widowed. Of educational status, 67.6% had a post-secondary degree, and 13.3% had less than a secondary education. French was the first language for 66.3% of the sample, compared to 33.7% for English. On average, the annual income per household was CAN $52,849 (*SD* = $56,047).

Study type or design. After receiving a complete description of the study, participants provided written, informed consent. Participants then took part in an in-person interview, in either English or French, given by a trained layperson. These interviews lasted anywhere between 90 minutes to 3 hours, depending largely on the number of mental illnesses indicated by the participant. All measures were transculturally validated in French, and the Research Ethics Board of the Douglas Mental Health University Institute granted approval for all procedures of the study.

Measures. Demographic information considered at the start of each interview included: age, gender, education, marital status, race/ethnicity, immigration, first language, personal and household income, employment status, ownership of accommodations, duration of residence at current address, and region.

In Wave 1, PTSD diagnosis was determined with the use of a slightly modified form of the Canadian Community Health Survey – Canadian Forces Supplement (CCHS-CFS). At Wave 2, the unmodified form was used. The CCHS-CFS considers a wide range of potentially traumatic events through a diagnostic interview based on the World Health Organization Composite International Diagnostic Interview (CIDI) Version 2.1; diagnoses achieved through the CCHS-CFS follow the criteria and definitions of PTSD for both the *International Classification of Diseases*, Tenth Revision (*ICD-10*), and the *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition (*DSM-IV*).[16,17]

In the first wave, participants were given a general screener question to determine trauma exposure ("Over the course of your life, have you ever experienced or witnessed a traumatic event that included threatened or actual death, serious injury or another kind of threat to your physical integrity or that of others?"), but in the second wave, a list of 28 possible traumatic events was provided. As the survey allows participants to report multiple traumatic events, PTSD diagnosis was assessed based on individuals' "worst" event – or if unknown (as occurred in one case), most recent. PTSD diagnostic status and trauma exposure were classified as the following: 'Current PTSD' (past-year diagnosis of PTSD), 'Remitted PTSD' (lifetime diagnosis of PTSD but not meeting the criteria in the past 12 months), 'Trauma, No PTSD' (having suffered at least one potentially traumatic event but never meeting the criteria for diagnosis of PTSD), and 'No Trauma' (never having suffered a potentially traumatic event).

To determine perceived quality of life, the study utilized a modified form of the Satisfaction with Life Domains Scale.[18] The scale has 20 items with 5 dimensions: *daily life/social relations* (which considers daily activities, clothing, friends, food, health, and getting along with other people), *housing/neighbourhood* (house/apartment, neighbourhood, local services, and facilities), *personal relationships* (family, people they live with, and love life), *spare time activities* (hobbies and recreational activities), and *autonomy* (freedom, economic situation, self confidence, what others think about them, and life in general). Participants indicated their responses by choosing one of seven faces, ranking 1-7, with 7 indicating a more positive score. As each of the 20 items on the scale were endorsed in this method, total score ranged from 20-140. For subscales, the score ranges were as follows: housing/neighbourhood 3-21; daily life/social relations 6-42; personal relationships 3-21; spare time activities 2-14; and autonomy 6-42. The Satisfaction of Life Domains Scale has a Cronbach's alpha of 0.92 for the full scale, and a range of alphas for 0.72 to 0.84 for the subscales. The relative independence of the five subscales has been confirmed through factor analysis.[19] In the first wave of the study, the global quality of life had an internal consistency score of .91 and ranged from .66-.83 for the subscales. In the second wave, the internal consistence of the global quality of life score was .90 and ranged from .64-.82 for subscales.

Social support was assessed using the Social Provisions Scale.[20] The scale uses both questions determining satisfaction with provisions and others that measure the lack of provision. The items of the scale are scored from 1-7, in which a 1 indicates the lowest level of support, and respondents used a 4-point Likert scale to endorse levels of agreement with each statement. The range of possible scores was from 4 to 96, in which a higher number indicates greater perceived social support. In total, scores range from 24 to 96. For the first wave of the study, the global

social support score had an internal consistency of .93; in Wave 2, the internal consistency for the global social support score was .92.

Data analysis. Estimation were done using structural equation modeling using statistical software STATA 13.[21] A sequential equation model was run as all dependent variables are continuous. As a check, analyses were run using ordinary least squares (OLS) estimator equation by equation and obtained the same result. Thus, all analyses were tested using full information maximum likelihood estimation,[22] allowing for parameter estimation based on all available data from respondents. The first equation estimated the Wave 1 quality of life using Wave 1 specific variables and time constant variables (Figure 1).

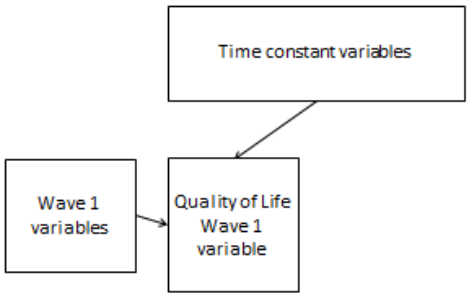

Figure 1. Equation 1

Second, Wave 2 Quality of life was regressed on Wave 1 and 2 time varying variables, as well as time constant variables and Wave 1 quality of life (Figure 2).

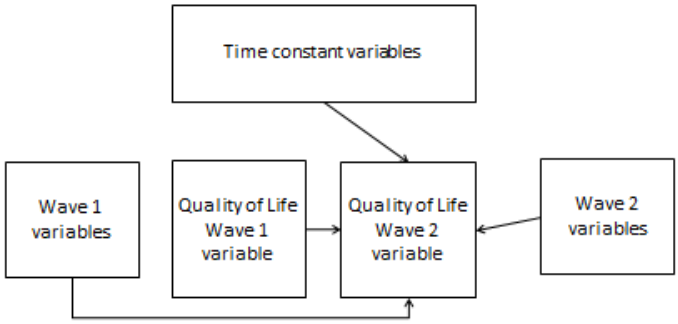

Figure 2. Equation 2

Thus, for equation 1 that meant effects on Wave 1 (Figure 1) and for equation 2 the effects on Wave 2 were estimated. The final model ran both equations in parallel (Figure 3). Direct effects of Wave 1 variables were considered to potentially have a direct effect on Wave 2 quality of life and perhaps an indirect effect through quality of life at Wave 1.

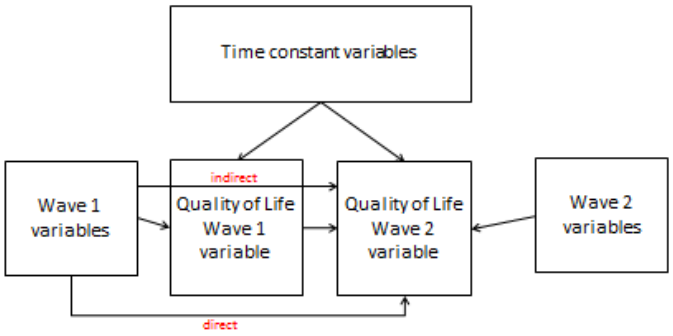

Figure 3. Full Model Run

The aim of the final model was to know the sum of the direct and indirect effects (i.e., total effects). This would answer the question of whether there was a lasting effect of PTSD/trauma on quality of life. If there was this effect, it would be expected that the total effect be significantly different than zero. Decomposition of effects into total, direct, and indirect (i.e., estat teffects) were subsequently run. This method reports direct, indirect and total effects for each path, along with standard errors obtained by the data method. Indirect effects are all mediating effects.[23]

Separate models were tested for total quality of life, and each of the quality of life subscales. Each model demographic characteristics that were considered constant including gender (female as reference), language (French as reference), age (15-24 as reference), education (less than secondary school graduation as reference), as well as variables that might be time dependent (thus both Wave 1 and 2 were included) such as PTSD status ('No Trauma' group as reference), marital status (single as reference), employment (not employed in the past year as reference) and total perceived social support. Quality of life at Wave 1, as well as Wave 1 and Wave 2 social support scores, a known risk factor of PTSD[24] were also accounted for within each of the models.

Of the 1,823 participants who were retained for Wave 2, 11 did not complete the PTSD section of the questionnaire at both Wave 1 and 2 and were thus excluded from these analyses. Thus, 1812 participants were included in analyses (Table 1).

Results

Direct Effects. Direct effects on quality of life outcomes are detailed in Table 2. Cross-sectional Wave 1 analyses demonstrated that the 'Current PTSD' group, when compared to the 'No Trauma' group, was significantly and negatively correlated with all Wave 1 measures of

quality of life (i.e., global as well as subscales). Similarly, Wave 2 cross-sectional analyses revealed that the ‘Current PTSD’ group was significantly and negatively correlated with Wave 2 global quality of life and three of the five subscales (personal relationships, housing/neighbourhood, as well as, daily life/social relationships). Wave 1 trauma/PTSD status did not demonstrate significant direct effects on quality of life outcomes at Wave 2.

The Wave 1 ‘Remitted PTSD’ group, when compared to 'No Trauma, PTSD' group, only yielded one significant negative association, for the Wave 1 housing/neighbourhood subscale. The Wave 2 ‘Remitted PTSD’ reported a significant negative association with at Wave 2 for global quality of life, as well as, personal relationships and daily life/social relationships subscales.

Individuals having experienced one, or more, traumatic events at Wave 1, but who did not have a history of PTSD (i.e., resilient) were negatively and significantly associated with Wave 1 global quality of life, as well as, personal relationships, autonomy, and housing/neighbourhood subscales. Wave 2 trauma resilient participants were negatively and significantly associated with only the daily life/social relationships subscale. Results also revealed a positive and significant correlation between all measures of quality of life at Wave 1 and Wave 2 (Table 2).

Indirect Effects. The Wave 1 ‘Current PTSD’ group had negative and significant indirect effects on all Wave 2 quality of life outcomes (Table 3). In contrast, the ‘Remitted PTSD’ group only demonstrated negative and significant indirect effects at Wave 2 for the housing/neighbourhood subscale. The Wave 1 ‘Trauma, No PTSD’ group presented negative and significant indirect effects for global quality of life as well as three subscales: personal relationships, housing/neighbourhood, and autonomy.

Social Support. Direct effects concerning Wave 1 total social support yielded a positive and significant association with quality of life at Wave 1. At Wave 2, total social support demonstrated almost identical highly significant, cross-sectional positive associations across all quality of life outcomes (Table 2). Wave 1 total social support did not demonstrate significant direct effects on any quality of life outcomes at Wave 2, although, total social support at Wave 1 did exhibit positive and highly significant indirect effects for all Wave 2 quality of life outcomes (Table 3).

Interpretation

Existing research findings paint a consistent, negative picture,[25] concerning quality of life and trauma/PTSD. While for the most part this study's findings confirm, longitudinally, previous work, they also prompted the view that there may be a shortage of studies examining quality of life beyond global indices and across the full trauma/PTSD spectrum.

A table of total effects is presented within the result section above (Table 4) and while it establishes a basic summary of the study findings, the relationships observed between trauma/PTSD diagnostic status can be said to be more than the sum of their parts. It is for this reason that the discussion will primarily focus on the direct and indirect relationships reported above.

Current PTSD diagnosis. This manuscripts findings support previous empirical literature demonstrating that currently suffering from PTSD has an immediate and negative impact on quality of life. Moreover, they replicate and extend results from the initial cross-sectional analyses done by the ZEPSOM project that yielded a significant between-groups contrast for global and subscale quality of life between the individuals currently suffering from

PTSD and those who had not experienced a traumatic event.[12] These findings are further confirmed by Wave 2 global quality of life cross-sectional results. The exception of significant associations at Wave 2 for spare time activities and autonomy subscales are potentially a result of Wave 2 direct association analyses accounting for Wave 1 quality of life and Wave 1 trauma/PTSD status. Still, they highlight the need for more research that looks beyond global indices of quality of life to fully understand the effects of trauma and PTSD diagnosis on specific domains of quality of life.

Another unsurprising, yet noteworthy confirmation, is that quality of life at Wave 1 has a positive and significant effect on quality of life at Wave 2. This reaffirms previous empirical literature that has found previous quality of life to influence both present and future quality of life.[26]

Perhaps the most important result of all analyses was the confirmation that current diagnosis of PTSD demonstrates a long lasting effect on all quality of life outcomes. Indeed, diagnosis of current PTSD reduced immediate quality of life and this negative impact remained significant even after an extended period of time. Furthermore, longitudinal results remained significant even if symptoms associated with PTSD are in remission at Wave 2 (shown by controlling for trauma/PTSD status at Wave 2). Thus, the effects of current PTSD diagnosis on quality of life continue indirectly over time through its influence on Wave 1 quality of life.

Remitted PTSD. In contrast to ‘Current PTSD’, ‘Remitted PTSD’ did not show the same association at Wave 1 for global quality of life when compared to ‘No Trauma’. Indeed the ‘Remitted PTSD’ group had only significant findings for the housing and neighbourhood scale. Additionally, Wave 1 PTSD only had significant indirect effects through Wave 1 housing/neighbourhood quality of life on Wave 2 housing/neighbourhood quality of life. Again,

these findings align with previous findings that emphasize how individuals in remission from PTSD may contrast those with a current diagnosis of PTSD for global indices of quality of life, but can display similar outcomes to current PTSD individuals for specific domains. Monson and colleagues[12] showed similar contrasting results in subscale results when comparing 'Current PTSD' and 'Remitted PTSD' groups. In that case, 'Current PTSD' and 'Remitted PTSD' groups showed significant between-differences for global quality of life that were *not* replicated for the housing/neighbourhood subscale. Together, these findings may, in part, support a failed recovery model of PTSD, which suggests that those remit from PTSD may be more similar to those resilient to PTSD than those with a current diagnosis.

The 'Remitted PTSD' group at Wave 2 did demonstrate significant and negative associations with quality of life at Wave 2 for global as well as two out of the five subscales. As mentioned above, this is probably due to controlling for Wave 1 quality of life and Wave 1 trauma/PTSD status. One future direction might be to further consider the length of time since initial remission from PTSD, as well as the length of current diagnosis of PTSD to further illuminate these complex relationships.

Cross-sectional analysis at Wave 1 for trauma exposure also reaffirmed previous findings that trauma had a significant association with total quality of life.[12] Longitudinal analyses confirmed these findings, though the significance of the indirect relationships was weaker between these specific groups.

The role of social support. As low social support is a known risk factor for PTSD, it was accounted for in all models. Furthermore, social support was found to have opposite effects on quality of life over time to those of trauma/PTSD. This is in line with previous findings from a cross-sectional study, where Zhao, Wu, and Xu[27] published one of few studies examining how

the negative relationship between PTSD and quality of life is moderated (affected in the direction and/or strength of the relation), with respect to social support. Although their sample was only representative of Wenchuan earthquake survivors, their findings were consistent with other studies that found a negative association between PTSD and quality of life. Moreover, they found that social support, in particular subjective social support, moderated the PTSD-quality of life relationship in a way that suggests social support may alleviate posttraumatic stress symptoms on quality of life.

Strengths and Limitations. A major strength of this study is its longitudinal design. Additionally, each statistical model run accounted for multiple demographic characteristics as well as variables that were time specific such as wave specific PTSD status, marital status, employment and total perceived social support and Wave 1 quality of life. Furthermore, data were drawn from a large, representative, geographically-defined population which strengthens the generalizability of the study findings Finally, another large strength was the inclusion of the full spectrum of PTSD diagnostic status and the use of unabridged measures that allowed for in depth examination of not only global but also specific domains of quality of life. The study is not without it's limitations. Future research should consider use of additional waves of data to examine the effects of trauma and PTSD diagnosis on quality of life outcome trajectories and, if possible, control for length of current diagnosis and length of time since remission from PTSD.

Conclusion

Diagnosis of current PTSD at Wave 1 has a significant negative effect for on total quality of life at Wave 2 indirectly through quality of life at Wave 1. Thus, previous findings by Monson et al.[12] are confirmed longitudinally. Differences between individuals who had and had not suffered a traumatic event were also confirmed longitudinally for global quality of life.

Findings highlight the need to go beyond global indices of quality of life to understand the effects of trauma/PTSD on specific domains. Indeed, subscale findings did not always mimic global quality of life which reaffirms previous empirical literature that argues against using only global indices which may potentially dilute the impact of severe dysfunction in particular domains of quality of life.[4, 12] Subscale findings confirm in many ways that looking beyond these global indices allows for a more complete picture of the etiology and impact of PTSD as a multidimensional disorder. For practical purposes, understanding specific areas of quality of life affected by trauma and PTSD has the potential to suggest new directions to improve effective treatment strategies, in which some areas of quality of life may require more support than others for individuals having undergone trauma or suffering from PTSD.

Future directions within these lines of research should focus on what the effects of Wave 1 current PTSD has on total social support at Wave 2 in order to confirm or contrast whether social support should be considered a currency expended or a renewable resource. While this was not within the scope of this paper's analyses, it is definitely something that could be considered for a follow-up manuscript. Similarly, while the importance of researching the full trauma spectrum, from individuals who have never experience a traumatic event to those currently suffering from PTSD, has been highlighted within this manuscript, there are more questions that are in need of exploration. For example, how does current diagnosis of PTSD differ from remitted diagnosis of PTSD over time? Again, these questions could not be confined to one sole manuscript, but would be of great contribution to existing research concerning quality of life across the trauma spectrum. Still, this manuscript findings build on prior theory and research by providing a more nuanced understanding of how differing placement along the trauma spectrum exists as ongoing risk factor for lower quality of life.

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Table 1 Sociodemographic characteristics of the sample ($N = 1812$)

	N
Gender	
Female (reference)	1,142
Male	670
Age	
15-24(reference)	183
25-44	781
45-64	821
65+	27
Highest Level of Education	
Less than secondary school graduation (reference)	241
Secondary school graduate	210
Some post-secondary school	135
Post-secondary school graduate/diploma	1224
Missing	2
Language	
French (reference)	1,111
English	388
Other	299
Missing	14
Marital Status (Wave 1)	
Single (reference)	614
Married/Common-law	865
Separated/Divorced	295
Widowed	35
Missing	3
Marital Status (Wave 2)	
Single (reference)	615
Married/Common-law	852
Separated/ Divorced	305
Widowed	38
Missing	2
Employed (past 12 months) – Wave 1	
Yes	1,483
No (reference)	316
Missing	13

Employed (past 12 months) – Wave 2	
Yes	1,578
No (reference)	232
Missing	2

	M (SD)	Min	Max
Quality of life – Wave 1 (*n*=1812)	110.34 (15.74134)	26	140
Social Support – Wave 1 (*n*=1812)	80.62209 (9.883793)	42	96
Quality of life– Wave 2 (*n*=1812)	110.4596 (14.66336)	30	140
Social support– Wave 2 *(n*=1812)	81.00229 (9.839679)	32	96

Table 2. Direct Effects on Quality of Life Outcomes at Wave 1 and Wave 2

	Total	Spare Time Activities	Personal Relationships	Housing and Neighbourhood	Daily Life and Social Relationships	Autonomy
Wave 1 Quality of Life Outcome	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Wave 1 - Current PTSD	-17.08 ***	-1.37 *	-2.52 **	-2.02 **	-4.79 ***	-6.30 ***
Wave 1 - Remitted PTSD	-3.07	0.18	-0.60	-0.90 *	-0.35	-1.44
Wave 1 - Trauma No PTSD	-1.92 **	-0.12	-0.37 *	-0.27 *	-0.38	-0.85 **
Male	0.84	0.21	0.18	-0.43 **	0.07	0.82 **
Age 25-44	-1.79	-0.18	-0.64 *	-0.02	-1.12 **	0.02
Age 45-64	1.54	0.39	-0.80 **	0.80 **	-0.22	1.17 *
Age 65+	7.25 *	1.50 **	-0.91	2.16 ***	1.31	2.57 *
Education - Secondary school graduate	-0.33	-0.47 *	0.16	0.51	-0.38	-0.23
Education - Some post-secondary school	-1.40	-0.59 *	0.08	0.01	-0.87	-0.06
Education - Post-secondary school graduate/diploma	-1.40	-0.73 ***	-0.18	0.37	-0.50	-0.41
Language - English	-0.47	-0.29 *	0.09	-0.14	0.27	-0.37
Language - Other	2.56 **	0.16	0.76 ***	-0.03	0.89 **	0.84 *
Wave 1 - Employed	-1.23	-0.13	-0.25	0.09	-0.32	-0.64 *
Wave 1 - Total Social Support	0.72 ***	0.08 ***	0.13 ***	0.08 ***	0.20 ***	0.23 ***
Wave 1 - Married	3.00 ***	-0.12	2.15 ***	0.16	0.53 *	0.49
Wave 1 - Divorced	0.08	-0.45 *	0.29	0.08	0.13	0.14
Wave 1 - Widowed	2.89	0.27	0.05	1.07 *	0.26	1.23
Wave 2 Quality of Life Outcome						
Wave 1 Quality of Life Outcome	0.57 ***	0.48 ***	0.47 ***	0.54 ***	0.49 ***	0.52 ***
Wave 1 - Current PTSD	2.09	0.53	1.29	-0.69	0.11	0.11
Wave 1 - Remitted PTSD	1.68	0.43	0.74	0.07	0.98	-0.52
Wave 1 -Trauma No PTSD	-0.27	0.08	-0.09	-0.06	-0.17	-0.11
Male	0.54	0.26 **	0.14	-0.13	0.10	0.27
Age 25-44	-1.36	-0.40 *	-0.20	-0.26	-0.59	-0.04

Age 45-64	0.46		-0.09		-0.14		0.14		0.01		0.58	
Age 65+	-0.11		0.02		-0.89		-0.01		0.02		0.76	
Education - Secondary school graduate	-0.65		-0.15		-0.54	*	0.05		0.06		-0.20	
Education - Some post-secondary school	0.19		0.07		-0.20		0.28		0.16		-0.27	
Education - Post-secondary school graduate/diploma	0.57		0.14		-0.37		0.14		0.34		0.09	
Language - English	0.54		-0.10		0.26		0.09		0.33		-0.02	
Language - Other	1.92	**	0.15		0.44	*	0.09		0.91	***	0.54	*
Wave 1 - Employed	0.22		0.19		-0.08		-0.20		0.10		0.17	
Wave 1 - Total Social Support	-0.04		0.01		0.00		0.00		0.02		-0.02	
Wave 1 - Married	1.21		0.14		0.24		0.54	**	0.21		0.29	
Wave 1 - Divorced	2.10		0.62	*	0.98	**	0.30		0.01		0.43	
Wave 1 - Widowed	-0.29		0.51		-1.07		0.16		0.40		-0.65	
Wave 2 - Current PTSD	-8.94	**	-0.33		-3.64	***	-1.77	**	-2.77	**	-1.40	
Wave 2 - Remitted PTSD	-2.56	*	-0.20		-1.00	**	-0.31		-1.31	**	-0.35	
Wave 2 - Trauma No PTSD	-1.02		-0.14		-0.25		-0.17		-0.49	*	-0.12	
Wave 2 - Employed	-2.07	**	-0.51	***	-0.10		-0.10		-0.43		-0.91	**
Wave 2 - Total Social Support	0.35	***	0.04	***	0.08	***	0.03	***	0.09	***	0.12	***
Wave 2 - Married	-0.62		-0.34	*	0.55	*	-0.29		-0.25		-0.17	
Wave 2 - Divorced	-2.04		-0.67	**	-0.79	*	-0.10		-0.22		-0.44	
Wave 2 - Widowed	0.00		-0.34		0.74		-0.03		-0.87		0.86	

Reference groups: gender (female), language (French), age (15-24), education (less than secondary school graduation), PTSD status (no trauma group), marital status (single), employment (not employed)
*p < .05 ** p <.01 *** p <.001

Table 3. Indirect Effects on Quality of Life Outcomes at Wave 1 and Wave 2

	Total	Spare Time Activities	Personal Relationships	Housing and Neighbourhood	Daily Life and Social Relationships	Autonomy
Wave 1 Quality of Life Outcome	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Wave 1 - Current PTSD	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Remitted PTSD	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Trauma No PTSD	0.00	0.00	0.00	0.00	0.00	0.00
Male	0.00	0.00	0.00	0.00	0.00	0.00
Age 25-44	0.00	0.00	0.00	0.00	0.00	0.00
Age 45-64	0.00	0.00	0.00	0.00	0.00	0.00
Age 65+	0.00	0.00	0.00	0.00	0.00	0.00
Education - Secondary school graduate	0.00	0.00	0.00	0.00	0.00	0.00
Education - Some post-secondary school	0.00	0.00	0.00	0.00	0.00	0.00
Education - Post-secondary school graduate/diploma	0.00	0.00	0.00	0.00	0.00	0.00
Language - English	0.00	0.00	0.00	0.00	0.00	0.00
Language - Other	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Employed	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Total Social Support	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Married	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Divorced	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Widowed	0.00	0.00	0.00	0.00	0.00	0.00
Wave 2 Quality of Life Outcome						
Wave 1 - Quality of Life Outcome	0.00	0.00	0.00	0.00	0.00	0.00
Wave 1 - Current PTSD	-9.72 ***	-0.66 *	-1.17 **	-1.09 **	-2.37 ***	-3.30 ***
Wave 1 - Remitted PTSD	-1.75	0.09	-0.28	-0.49 *	-0.17	-0.75
Wave 1 - Trauma No PTSD	-1.10 **	-0.06	-0.17 *	-0.15 *	-0.19	-0.44 **
Male	0.48	0.10	0.08	-0.23 **	0.04	0.43 **
Age 25-44	-1.02	-0.09	-0.30 *	-0.01	-0.56 **	0.01

Age 45-64	0.88		0.19		-0.37	**	0.43	**	-0.11		0.61	*
Age 65+	4.13	*	0.72	**	-0.43		1.16	***	0.65		1.35	*
Education - Secondary school graduate	-0.19		-0.23	*	0.07		0.28		-0.19		-0.12	
Education - Some post-secondary school	-0.79		-0.28	*	0.04		0.01		-0.43		-0.03	
Education - Post-secondary school graduate/diploma	-0.80		-0.35	***	-0.08		0.20		-0.25		-0.22	
Language - English	-0.27		-0.14	*	0.04		-0.08		0.13		-0.19	
Language - Other	1.46	**	0.08		0.35	***	-0.01		0.44	**	0.44	*
Wave 1 - Employed	-0.70		-0.06		-0.12		0.05		-0.16		-0.33	*
Wave 1 - Total Social Support	0.41	***	0.04	***	0.06	***	0.05	***	0.10	***	0.12	***
Wave 1 - Married	1.71	***	-0.06		1.00	***	0.08		0.26	*	0.26	
Wave 1 - Divorced	0.04		-0.22	*	0.14		0.04		0.06		0.08	
Wave 1 - Widowed	1.64		0.13		0.02		0.58	*	0.13		0.65	
Wave 2 - Current PTSD	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Remitted PTSD	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Trauma No PTSD	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Employed	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Total Social Support	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Married	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Divorced	0.00		0.00		0.00		0.00		0.00		0.00	
Wave 2 - Widowed	0.00		0.00		0.00		0.00		0.00		0.00	

Reference groups: gender (female), language (French), age (15-24), education (less than secondary school graduation), PTSD status (no trauma group), marital status (single), employment (not employed)
*p < .05 ** p <.01 *** p <.001

Table 4. Total Effects on Quality of Life Outcomes at Wave 1 and Wave 2

	Total	Spare Time Activities	Personal Relationships	Housing and Neighbourhood	Daily Life and Social Relationships	Autonomy
Wave 1 Quality of Life Outcome	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
Wave 1 - Current PTSD	-17.08 ***	-1.37 *	-2.52 **	-2.02 **	-4.79 ***	-6.30 ***
Wave 1 - Remitted PTSD	-3.07	0.18	-0.60	-0.90 *	-0.35	-1.44
Wave 1 -Trauma No PTSD	-1.92 **	-0.12	-0.37 *	-0.27 *	-0.38	-0.85 **
Male	0.84	0.21	0.18	-0.43 **	0.07	0.82 **
Age 25-44	-1.79	-0.18	-0.64 *	-0.02	-1.12 **	0.02
Age 45-64	1.54	0.39	-0.80 **	0.80 **	-0.22	1.17 *
Age 65+	7.25 *	1.50 **	-0.91	2.16 ***	1.31	2.57 *
Education - Secondary school graduate	-0.33	-0.47 *	0.16	0.51	-0.38	-0.23
Education - Some post-secondary school	-1.40	-0.59 *	0.08	0.01	-0.87	-0.06
Education - Post-secondary school graduate/diploma	-1.40	-0.73 ***	-0.18	0.37	-0.50	-0.41
Language - English	-0.47	-0.29 *	0.09	-0.14	0.27	-0.37
Language - Other	2.56 **	0.16	0.76 ***	-0.03	0.89 **	0.84 *
Wave 1 - Employed	-1.23	-0.13	-0.25	0.09	-0.32	-0.64 *
Wave 1 - Total Social Support	0.72 ***	0.08 ***	0.13 ***	0.08 ***	0.20 ***	0.23 ***
Wave 1 - Married	3.00 ***	-0.12	2.15 ***	0.16	0.53 *	0.49
Wave 1 - Divorced	0.08	-0.45 *	0.29	0.08	0.13	0.14
Wave 1 - Widowed	2.89	0.27	0.05	1.07 *	0.26	1.23
Wave 2 Quality of Life Outcome						
Wave 1 - Quality of Life Outcome	0.57 ***	0.48 ***	0.47 ***	0.54 ***	0.49 ***	0.52 ***
Wave 1 - Current PTSD	-7.63 *	-0.13	0.11	-1.78 *	-2.26 *	-3.19 *
Wave 1 - Remitted PTSD	-0.07	0.52	0.46	-0.42	0.81	-1.27
Wave 1 - Trauma No PTSD	-1.37 *	0.03	-0.27	-0.21	-0.36	-0.56 *

Male	1.02		0.35	**	0.22		-0.36	**	0.14		0.70	**
Age 25-44	-2.38	*	-0.49	*	-0.50		-0.27		-1.15	**	-0.03	
Age 45-64	1.34		0.10		-0.51		0.57	*	-0.10		1.19	**
Age 65+	4.01		0.74		-1.32	*	1.16	*	0.67		2.11	*
Education - Secondary school graduate	-0.84		-0.38		-0.46		0.32		-0.13		-0.32	
Education - Some post-secondary school	-0.60		-0.21		-0.17		0.29		-0.27		-0.30	
Education - Post-secondary school graduate/diploma	-0.23		-0.21		-0.45	*	0.34		0.09		-0.12	
Language - English	0.28		-0.24		0.30		0.01		0.46		-0.21	
Language - Other	3.37	***	0.23		0.79	***	0.08		1.35	***	0.98	**
Wave 1 - Employed	-0.48		0.13		-0.20		-0.16		-0.05		-0.17	
Wave 1 - Total Social Support	0.37	***	0.05	***	0.06	***	0.04	***	0.12	***	0.10	***
Wave 1 - Married	2.92	**	0.08		1.24	***	0.62	**	0.48		0.55	
Wave 1 - Divorced	2.14		0.41		1.11	**	0.34		0.07		0.50	
Wave 1 - Widowed	1.36		0.65		-1.05		0.73		0.53		-0.01	
Wave 2 - Current PTSD	-8.94	**	-0.33		-3.64	***	-1.77	**	-2.77	**	-1.40	
Wave 2 - Remitted PTSD	-2.56	*	-0.20		-1.00	**	-0.31		-1.31	**	-0.35	
Wave 2 - Trauma No PTSD	-1.02		-0.14		-0.25		-0.17		-0.49	*	-0.12	
Wave 2 - Employed	-2.07	**	-0.51	***	-0.10		-0.10		-0.43		-0.91	**
Wave 2 - Total Social Support	0.35	***	0.04	***	0.08	***	0.03	***	0.09	***	0.12	***
Wave 2 - Married	-0.62		-0.34	*	0.55	*	-0.29		-0.25		-0.17	
Wave 2 - Divorced	-2.04		-0.67	**	-0.79	*	-0.10		-0.22		-0.44	
Wave 2 - Widowed	0.00		-0.34		0.74		-0.03		-0.87		0.86	

Reference groups: gender (female), language (French), age (15-24), education (less than secondary school graduation), PTSD status (no trauma group), marital status (single), employment (not employed)
*p < .05 ** p <.01 *** p <.001

Chapter 6: General Conclusions and Future Directions

The three empirical investigations comprising this dissertation aimed to broaden the existing knowledge of trauma assessment methods, perceived neighbourhood risk factors, and the longitudinal effects of trauma and posttraumatic stress disorder (PTSD) on quality of life. The first study sought to validate as well as explore potentially underreported trauma rates previously found within the *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) project data (Monson, Brunet, & Caron, 2015). The Canadian rates of trauma exposure and conditional PTSD reported by van Ameringen et al. (2008) and Stein, Walker, Hazen, and Forde (1997) have been found to be comparable to those from U.S. epidemiological samples (Breslau et al., 1998). In contrast, rates from the first wave of the ZEPSOM study seem to be more in line with previous *theorized* rates across Canada (van Ameringen et al., 2008) and empirical findings from European countries (Blanco, 2011). To this end, the study considered the effects of using single-question and list-based interviews when determining self-reported trauma exposure. This study is, to our knowledge, the first study to examine single-question and list-based trauma assessment measures using a within-subject design in a general population sample.

Results from the first study reaffirmed previous findings (Elhai, Gray, Kashdan & Franklin, 2005; Franklin, Sheeran & Zimmerman, 2002; Peirce et al., 2009; Weaver, 1998) that demonstrated, within convenience samples, clear increases in reported trauma from the single-question assessment to the list-based inventory. Furthermore, the results indicated particular increases for certain demographic groups, specifically; more dramatic increases were found for women and younger participants. While the finding that women had more pronounced increases in reported trauma exposure in the list-based question is supported by previous literature (Mills

et al. 2011; Peirce et al., 2009), no previous literature exists examining gender differences within different age categories. Importantly, young people aged 15-24 were found to be the age group most at risk of underreporting trauma with single-question methodology. However, it is specifically young women aged 15-24 who are driving this finding as there was a staggering difference between list-based and single-question assessment types. In fact, young men in the same age category show no significant difference between the two assessment types. These findings add to a growing literature that contradicts the widespread belief that men are more likely experience trauma than women (Breslau, 2002; Creamer, Burgess, & McFarlane, 2001; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Norris, 1992).

Findings such as these also have clear clinical implications for prevention and treatment strategies in bringing attention to groups of people that may be overlooked within primary health care settings (ie., general practitioners) when single-question methodology is used to asses trauma exposure. While from an epidemiological standpoint one might argue that the total number of individuals for whom a current diagnosis of PTSD was missed in the single-question assessment is negligible, the finding has considerable epidemiological and social implications because of the fact that all individuals who were missed with single-question methodology were females. This suggests that while in epidemiological settings, the time and financial costs of implementing list-based assessments may not be offset by statistical benefits, in a clinical setting, women, specifically young women, may be most at risk of not receiving needed treatment when diagnosed with single-question trauma assessments. A further gender difference to note is that while young women, aged 15-24 years, are most at risk of being overlooked by single-question assessments, young men of the same age group were the only group of any gender or age to not show significant increases in reports of trauma exposure in the list-based assessments. The

reasons for this finding are unclear; further research should investigate whether this result is due to generational differences, or other societal factors heretofore unconsidered.

The second study further considered individual perception in relation to trauma through an examination of perceived neighbourhood contexts and their association with trauma and PTSD. There has been a considerable lack of research focusing on social contextual factors in relation to trauma and PTSD, which is problematic because by its own nature, PTSD requires a specific etiological factor to develop. Previous research has suggested that mental health is related to environmental factors, and the results of the second study of this dissertation are consistent with those findings (Echeverría et al., 2008; Ross & Mirowsky, 1999; Ross, 2000;). The results showed a clear association between trauma and both neighbourhood disorder and social cohesion in which neighbourhood disorder was associated with a greater likelihood of having experienced a trauma (and in turn lifetime PTSD), and perceived social cohesion was associated with lower likelihood of having current PTSD and higher odds of remission. It is thus evident that neighbourhood factors affect the development and progression of PTSD both through increasing likelihood of exposure (as with neighbourhood disorder) and affecting the odds of development and remission of PTSD post-event (as with perceived neighbourhood social cohesion). Such findings provide significant insights into the development of the disorder and imply a need for research and clinical settings to consider environmental contexts in relation to trauma and PTSD, which until now has been a relatively unexplored relationship.

The third, and final, study of this dissertation strove to use two waves of the ZEPSOM study to replicate previous findings (Monson et al., 2015) regarding quality of life in the context of trauma and PTSD, both globally and across specific domains. This study longitudinally confirmed that, consistent with previous research, individual trauma and PTSD diagnostic

history has significant impacts on quality of life, and that that effect is not consistent across all domains (Monson et al., 2015). This provides important clues regarding ongoing effects of trauma and the disorder across an individual's life and highlights the importance of considering specific domains as well as global scores for quality life when considering the effects of PTSD. Causality, however, was not established, and should be considered in future research paths.

There are multiple major strengths that can be found across all three manuscripts due to the use of data drawn from a large, representative, geographically-defined population strengthens the generalizability of the study findings and controls for potential biases found with convenience sampling (e.g., self-selection which produces bias in treatment seeking populations). A second key strength is its consideration of the full spectrum of PTSD diagnostic status, which allows for the consideration of the progression of the disorder and differing responses to experiencing traumatic events.

Moving forward, future research on traumatic stress should consider the findings highlighted in these three studies: (i) single-question and list-based assessments, particularly regarding age and gender differences; (ii) environmental contexts; and (iii) specific domains as well as global scales of quality of life. Limitations of these studies should also be considered. Findings from both of the first two studies would benefit from longitudinal replication to allow for causality inferences. Further, as subjective measures do not always correspond with objective measures, future research should consider the relationship between objective measures of the factors considered for future studies, concerning trauma/PTSD and neighbourhood contexts. Biological and genetic confounding factors were additionally not considered in the scope of the studies presented in this dissertation, and may provide paths of inquiry for further research.

Trauma and PTSD are psychological issues entangled with countless factors that impact individuals' responses and outcomes throughout their lives. It is the intention that the papers presented in this dissertation help to a foster deeper understanding of experiences of trauma, PTSD, and a selection of these factors in a way that will provide researchers and clinicians with the tools to better consider the full effects of trauma.

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Appendices

Appendix A: Detailed Methods

Data were taken from three waves of responses collected from an ongoing study on the development of an epidemiological catchment area in Southwest Montreal. The *Zone d'étude en épidémiologie sociale et psychiatrique du sud-ouest de Montréal* (ZEPSOM) was established in 2006 via funding from the Canadian Institutes in Health Research (CIHR). The specific objective in the establishment of ZEPSOM was to examine the effects of social determinants of mental health and well- being. This thesis examines aspects of the population-based surveys that took place from April 2007 to November 2008 (Wave 1), June 2009 to November 2010 (Wave 2), June 2012 to June 2013 (Wave 3).

Table 1. ZEPSOM data collection breakdown

Wave	Year Collected	*N* Value (Overall)	*N* Value (Used)	Related Chapter(s)
1	April 2007 - November 2008	2433	2392	4 & 5
2	June 2009 - November 2010	1823	1812	5
3	June 2012 - June 2013	1029		3

Epidemiological Catchment Area

Mental health research within an epidemiological catchment area (ECA) such as the ZEPSOM aims to capture the prevalence, incidence, and occurrence of various mental disorders in a specified area and timeframe. As in the current study, areas and timeframes can be quite large, with multiple waves of data being collected over time. Studying mental disorders in an ECA allows researchers to learn about the factors contributing to the fluctuation in mental disorder prevalence, such as socioeconomic status, gender, income level, education level, etcetera. Many ECAs are based primarily on community surveys that capture its socioeconomic

and demographic characteristics (Regier et al., 1984). The prevalence of ECA studies in the present literature is heavily influenced by the decision of the National Institute of Mental Health (NIMH) in the early 1980s to begin supporting studies of ECAs. The first of these studies included roughly 20,000 people and used the *DSM-III* (*Diagnostic and Statistical Manual of Mental Disorders;* 3rd ed.; APA, 1980), third edition as reference for diagnosing and categorizing mental disorders (Regier et al., 1984). One limitation of these large sample sizes is that, since they provide data on a large sample of a specific city or region, the generalizability of the results obtained from them is quite limited. For example, a study conducted on an ECA in New York City gives researchers considerable information about social and psychological phenomena of that region, but does not speak to the phenomena occurring in other cities such as Vancouver or Chicago. Because of the regional specificity of ECA research, it becomes difficult to compare findings across different regions. By nature of their focus of study, the data acquired from these types of populations is usually most appropriate for creating interventions within the community being studied.

ZEPSOM is the only ECA in Canada that serves both psychiatric and social research purposes. The catchment area has a population of 269,720, representing approximately 15% of the total population of Montreal, Canada. The study area has 198,585 inhabitants falling within our ages of interest (15-69) and is subdivided into four boroughs: Saint-Henri/Pointe-Saint-Charles (29,680), Lachine/Dorval (42,850), Lasalle (53,635), and Verdun (72,420; 2006 Census data). The Southwest region of Montreal was chosen as the area of interest due to its characteristics of varied sociodemographic and ethnic composition, its socioeconomic profile and community organization, and its widespread poverty, which is defined as having an adjusted-family income lower than 50% of the median level (Caron & Liu, 2010). The Montreal

ECA has a sample size comparable to those of the psychiatric epidemiological zones that have been developed and studied in American cities with similarly sized populations (Kaelber & Regier, 1995; Tohen, Bromet, Murphy, & Tsuang, 2000).

Participants and Recruitment

Wave 1. Prior to commencing recruitment, a publicity campaign was implemented in the target study area to promote participation. Information about the study was featured on television, radio, and in local newspaper advertisements. Information pamphlets were circulated in convenience stores, community organizations, pharmacies, and medical clinics.

Recruitment was carried out in two phases. In order to obtain a representative sample of the target population, proportional to the population density in terms of geography (i.e., recruited from all areas of the territory) and socioeconomic status (i.e., representative of the educational attainment structure of the territory), a target sample of 3,708 addresses was constructed for recruitment. Response rates were expected to vary with the neighbourhood's educational attainment. The list of addresses was provided by the 2004 evaluation role and attributed expected response rates were based on the 2001 Census educational attainment of the Enumeration Area, the smallest census unit, which had an average of 427 individuals aged 15-69. It was expected that the response rates would be 70% in the enumeration areas in the highest education tertile, 65% for those in the median tertile, and 60% for those in the lowest tertile. Phone numbers for this list of 3,708 addresses were provided by an external company, allowing initial recruitment to take place via phone contact. Potential participants were contacted by phone to enquire about interest in participating. The initial phase, conducted between April and October, 2007, resulted in the recruitment of 261 participants. However, due to the relative inefficiency and low response rates (30%) obtained by telephone recruitment, a second phase of

door-to-door recruitment ensued. To improve efficiency of the door-to-door recruitment, each original target address was extended to a range of 14 neighbouring addresses. This range of 14 potential addresses comprised the original address, the three closest addresses on each side of the original address, and the seven addresses on the opposite side of the street. Teams of two recruiters, one male and one female were instructed to visit the range of addresses sequentially starting with the original address. If contact at the original address resulted in no response or refusal to participate, recruiters would then visit the neighbouring addresses. Once an individual was recruited from within a particular range of addresses, it was considered completed and no other addresses were visited in that particular range.

A total of 3,447 "original addresses" (3,708 addresses minus the 261 addresses that resulted in participants from the phone recruitment phase) were used for door-to-door recruitment. Of the 3,447 addresses, 39 were obtained through nonconventional recruitment (eg. through a participant's friends or family) bringing the number of addresses that needed a calculated "range" to 3,408. If no one was home at these addresses, or its inhabitants refused to participate, the teams would then visit the 14 neighbouring addresses for recruitment. These clusters of 14 addresses made for a potential of 47,712 (14 times 3408) addresses of possible participants. Among these, 2,947 original addresses were visited, and a variable number of neighbouring doors were visited, depending on response rates. Overall, door-to-door recruiters knocked, or tried to knock, on 22,582 doors. Among the addresses for potential recruitment, 4,910 (21.7%) were non-existent or not accessible (building locked, security at the entrance, etc.). Some 8,825 doors knocked on resulted in no response, and were coded as "occupant of the dwelling absent" (39.1%). Some adjacent neighbourhoods had overlapping addresses, which resulted in 1,582 addresses (7%) being visited by two recruitment teams. Of the persons

responding to the door-to-door recruitment teams, 2,996 were not eligible for the study (13.3%). Eligibility to partake in the survey included being between the ages of 15 and 65 at baseline and living within the catchment area. Potential participants were contacted at 4,269 different addresses (18.9%). Of the 4,269 potentially eligible candidates, 1,405 declined to participate (32.9%). A total of 730 respondents initially agreed to participate in the study on first contact with the door-to-door recruitment team but later declined (17%). Once an individual was recruited from an address, no other address within its 14-address range was considered. The final sample (N = 2,433) yielded an overall cooperation rate (48.7%) superior to median rates reported in epidemiological studies conducted since 2000 (Morton, Cahill, & Hartge, 2006).

Of the 2,433 individuals selected, the mean age was 40.73 (SD = 14.08). Within the sample (weighted), 48% were male, 38% were single, 45% were married or common law, and 12% were divorced or separated, 71% had post-secondary education, 79% had held a job in the last 12 months, and 25% were immigrants. Individuals whose first language is French represent 55% of the population, with 21% whose first language is English, and a total of 82% of participants being Caucasian. Average personal annual income was CAN $31,192 ($SD$ = $33,151), average family income was CAN $59,056 ($SD$ = $49,851), with 33.4% of the population classified as low-income.

Wave 2. All participants that took part in Wave 1 of the ZEPSOM study (n = 2,433) were contacted between June 2009 and November 2010 to participate in the second wave of the study (n =1,823). Of those lost or excluded at follow-up (n = 610), 5.7% (n = 138) refused to continue participating, 9.4% (n = 230) had moved outside of the study area, 9.4% (n = 230) were unreachable, and 12 participants were deceased at time of follow-up. Wave 2 had 1,823 respondents, a retention rate of 74.9%. As seen with previous studies (de Graaf, Bijl, Smit,

Vollebergh, & Spijker, 2002; Eaton, Anthony, Tepper, & Dryman, 1992), attrition rates were higher among participants who were single, of younger age, with less education and/or income, and with substance use issues.

As in Wave 1, females represented a larger percentage of the population in Wave 2 (63.1%) than men (36.9%). Of all participants in the study, marital status was as follows: 34% single, 31% married, 15.6% common law, 13.8% divorced, 3% separated, and 2.1% widowed. The average age of participants was 44.39 (*SD* = 13.18). When evaluating educational background, those with a post-secondary degree represented the largest sample at 67.6%, with those less than secondary education representing the next-highest percentile (13.3%). Native French speakers comprised 66.3% of the population, while those whose first language was English represented 33.7%. Average annual income per household was CAN $52,849 (*SD* = $56,047).

Wave 3. Wave 3 data used in this thesis consisted of a cohort of 1,029 respondents, newly recruited for the third cycle of the ECA (baseline interviewed from January 2012 to June 2013). A second cohort was introduced at Wave 3; a similar recruitment strategy to Wave 1 was used, with a target sample of addresses selected and door-to-door recruitment undertaken. A target sample of addresses was selected and a door-to-door recruitment strategy was undertaken. A total of **1029** new participants were recruited and interviewed at T3..

The mean participants' age was 37.85 (*SE* = .43). 54.1% were women, 43.6% were single, 43.6% were married or in a relationship, 10.8% were divorced or separated, 1.9% were widowed and 81.1% had graduated high school; 77.6% were employed in the last 12 months; French was the primary language spoken by 54.4% of the respondents, followed by English as the primary language for 22.5%; Caucasians accounted for 69.1% of the sample. The average

personal income was $34,011.72 CAD (*SE* = 1,266.03) and the average family income $62,412.51 CAD (*SE* = 1,751.86).

Procedure

The Research Ethics Board of the Douglas Mental Health University Institute approved all study procedures. In the event that a possible mental health problem was detected during the interview, participants were asked if they wanted to be contacted again by the research team in order to be referred to the appropriate mental health services and resources.

Respondents who agreed to participate in the study were contacted by telephone in the same week to schedule an in-person interview either at the participant's home or in a designated office at the Douglas Mental Health University Institute. Most interviews were conducted in the participants' homes. After a complete description of the study, participants' written, informed consent was obtained. In-person interviews were then conducted by interviewers trained to administer questions of a sensitive nature and who received a full-day of training led by an expert in the field of traumatic stress. Interviews were conducted either English or French.

Interview time ranged in duration from 90 minutes to 3 hours, depending primarily on the number of mental disorders indicated. Interview time varied widely depending on the number of diagnostic sections for which the respondent screened positive. This is because the survey allows early termination of a representative subsample of respondents who show no evidence of lifetime psychopathology. For example, if a participant did not meet the first set of criteria for PTSD the rest of the module was negated and the following section of questions would begin.

Data gathered from the interview was collected using laptop computers with a program to allow for the transfer of information directly to a central database. Each laptop was pre-programmed to avoid copying errors and minimize interviewer variability. The nature of the

program allowed for the protection of participant anonymity as well as the confidentiality of their responses through randomized ID numbers, which were stored separately from participant names and addresses. The data were conserved in a computer's hard drive in a locked location accessible only to the personnel working on the project.

Near identical procedures to those used at Wave 1 were applied for Waves 2 and 3. In summary, consenting participants were contacted by telephone within one week of initial contact in order to schedule a follow-up in-person interview. Interviews were again conducted either at the participant's home or in a designated office at the research center of the Douglas Mental Health University Institute. Individual consent was required before the start of each interview for all waves of collection.

Measures

At the start of each interview, through all waves, the participant was asked a series of demographic questions pertaining to age, gender, education, marital status, race/ethnicity, immigration, first language, personal and household income, employment status, ownership of accommodations, duration of residence at current address, and region. All measures underwent transcultural validation in French and were administered to participants by interviewers trained to administer questions of a sensitive nature.

Mental Disorders. Originating from the Diagnostic Interview Schedule (DIS; Robins et al., 1981), the diagnostic interview used in the present study was made to be given by trained laypersons and was designed to be used in ECA research. During each interview, major Axis I mental disorders, including PTSD, were identified using the Canadian Community Health Survey Cycle 1.2 and the Canadian Community Health Survey: Mental Health and Well-Being Canadian Forces Supplement (CCHS 1.2 and CCHS-CFS, respectively; Statistics Canada, 2002)

which use the World Health Organization (WHO) Composite International Diagnostic Interview short-form (CIDI-SF) version 2.1 (Kessler, Andrews, Mroczek, Üstün, & Wittchen, 1998) to generate diagnoses according to the criteria of both the *International Classification of Diseases,* tenth revision (ICD-10), and *DSM-IV-TR* (American Psychiatric Association, 2000). The disorders studied were limited to those with sufficiently high prevalence. Several mood disorders and some anxiety disorders were identified: major depression, mania, panic attacks, social phobia, agoraphobia as well as alcohol and drug dependence. The Composite International Diagnostic Interview, or CIDI (WHO, 1997), is perhaps the most well-known diagnostic interview, allowing for many countries to use the same structured questionnaire and obtain comparable results, despite cultural differences. The most recent expansion of the CIDI is the WMH-CIDI (World Mental Health-Composite International Diagnostic Interview; Kessler & Üstün, 2004), which includes risk factors and more general assessment criteria. The CIDI is a fully structured instrument for use by lay interviewers without clinical experience and has been shown to have high levels of reliability and consistency with clinician-based diagnoses of the *DSM-IV-TR* disorders. The level of concordance between the CIDI and the ICD-10 is generally good (kappa ranging from 0.58 to 0.97). The level of sensitivity varies from 0.43 to 1, and the specificity ranging from 0.84 to 0.99, depending on the diagnosis.

PTSD Diagnosis. For all waves, the diagnosis of PTSD was based on assessment of symptoms and functional disability stemming from exposure to one (or more) of 28 possible traumatic events. As the survey allows for endorsement of multiple traumatic events, individuals are assessed on their "worst" event, or if unknown (in one case only), most recent. In the present study, individuals were classified by PTSD diagnostic status and trauma exposure as follows: "current" (past-year diagnosis of PTSD), "remitted" (lifetime diagnosis of PTSD but not meeting

the criteria in the past 12 months), "resilient" (having suffered at least one potentially traumatic event but never meeting the criteria for diagnosis of PTSD) and "no trauma" (never having suffered a potentially traumatic event).

Trauma exposure. At the beginning of the initial collection (Wave 1) of the ZEPSOM, the PTSD module was completed in full by each participant with the interviewer. When interviews began to run too long, an additional 2 screening questions were added to the interview. These questions were used as a method of vetting individuals who most likely did not have PTSD. They included:

1) Have you ever experienced or witnessed a traumatic event that included threatened or actual death, serious injury or another kind of threat to your physical integrity or that of others?
2) Since then, have you ever re-experienced the event in a distressing way, such as (1) having bad dreams, (2) intense unwanted recollection, (3) flashbacks, or (4) physical reactions when something reminded you of the event?

Responses for both questions were coded in the following way: Yes, No, Don't Know, Refusal. For the second wave, these screening questions were removed and the original questionnaire was given in full.

For the third wave, at the beginning of the PTSD module, each newly recruited participant was asked the following single-question trauma exposure assessment:

> In this next part of the interview, we ask about how people react to traumatic events that might have happened any time during their life. Some questions might be a little more sensitive than others but it is important for you to know that you will not be asked to describe in detail any traumatic experience. Over the course of your life, have you ever

experienced or witnessed a traumatic event that included threatened or actual death, serious injury or another kind of threat to your physical integrity or that of others?

Regardless of how an individual responded to the single-question assessment, they were then handed a sheet with the complete event inventory of the CCHS-CFS questionnaire. All participants were then asked report, without identifying which ones specifically, if they had experienced, during their lifetime, any of the events on the list of 28 traumatic events. If a participant said yes then they were asked about exposure to each of the 28 potentially traumatic events. The list is comprised of 27 different events as well as an "other" category abstracted from the PTSD section of the WMH version of the CIDI.

Quality of life measures. Perceived quality of life was assessed using an adapted form of the Satisfaction with Life Domains Scale (Andrews & Withey, 1976). Originally the scale was modified by Baker and Intagliata (1982) for psychiatric patients to assesses an individual's satisfaction with current health, living conditions, social relations, and lifestyle. The scale was translated into French by Corten, Mercier, and Pelc (1994), who added five domains to the original 15 and psychometrics were assessed by Caron, Mercier and Tempier (1997). Factor analysis has identified a five-factor structure. The 20-item scale has five dimensions: *daily life and social relations* (which includes getting along with other people, clothing, daily activities, friends, food and health), *housing/neighbourhood* (house/apartment, neighbourhood, local services and facilities), *personal relationships* (family, people they live with, and love life), *spare time activities* (hobbies and recreational activities), and *autonomy* (what people think about them, freedom, life in general, responsibility, economic situation and self-confidence). Respondents are asked to indicate their feelings by choosing one of seven faces ranging from a "delighted" face with a large upturned smile (scored 7) to a "terrible" face with a deep frown

(scored 1). Each of the scale's 20 items are endorsed on a scale from 1 (poorest quality of life) to 7 (best quality of life). Score ranges are for total (20-140), and for subscales (housing/neighbourhood 3-21; daily life/social relations 6-42; personal relationships 3-21; spare time activities 2-14 and autonomy 6-42). The internal consistency of the Satisfaction with Life Domains Scale has previously been found to be excellent, with a Cronbach's alpha (α) of .92 for the entire scale and the range of the alphas varying from .72 to .84 (Caron, 2012) Factorial analysis has confirmed that the five subscales are independent (Caron, 2012). In Wave 1, the internal consistency of the global quality of life score was .91 and ranged from .66-.83 for subscales. In Wave 2, the internal consistency of the global quality of life score was .90 and ranged from .64-.82 for subscales.

Social support measures. Weiss' (1974) six functions of social relationships were assessed using the the Social Provisions Scale (SPS; Cutrona, 1986). The 24-item scale can be broken down into six specific subscales: the six functions are *attachment* (perceived emotional closeness and security), *social integration* (perceived belonging to group of people with shared interests and recreational activities), *reassurance of worth* (perceived acknowledgment by others of one's competence), *reliable alliance* (perception that one can count on others for tangible assistance), *guidance* (perception that one will receive advice and information from others if desired), *and opportunity for nurturance* (perceived responsibility for the well-being of another person). Examples include "there are people I can depend on to help me if I need it" and "I lack a feeling of intimacy with another person". Each component is evaluated using four questions; two assessing satisfaction with provisions and two others ascertaining the lack of provision. Each item is scored on a scale from 1 (poorest support) to 7 (best support). The respondents used a 4-point Likert scale (1 being strongly disagree; 4 being strongly agree) to indicate agreement with

each statement as related to current social relationships. Possible scores range from 4 to 96; a higher score indicates a greater perception of social support. Score ranges are 24-96 for total, and 4-16 for each of the subscales. Internal consistencies for total scores range from .85 to .92; alpha coefficients for subscales range from .64 to .76. Factor analysis has confirmed a six-factor structure corresponding to the six social provisions. French translated version of the Social Provisions Scale was validated in Quebec by Caron (1996). It has an internal consistency of .87 for total score and alpha coefficients from .56 to .76 for the subscales. The test-retest reliability is good (r = .73). The non-response rate for the various questions in the rating scale was roughly 2.0%, whereas for the total score, a non-response rate of 2.2% was obtained.

In Wave 1, internal consistencies for the global social support score were .93 and .69-.84 for subscales. In Wave 2, internal consistencies for the global social support score were .92 and .75-.85 for subscales.

Neighbourhood measures (Wave 1). Additional measures were analysed for the "Place and Posttraumatic Stress Disorder" manuscript (Chapter 4). Perceived neighbourhood characteristics were assessed through self-reported responses to questionnaires. Also, as perceptions of neighbourhood disorder and social cohesion had the potential to be related to the socioeconomic position of the neighbourhood, analysis included as a covariate an area-level measure of socioeconomic deprivation expressed at the census tract level using 2006 Canada Census data, operationalized as the proportion of households spending 20% or more on food, shelter and clothing, than the average household of similar size, region, and resident density (Statistics Canada, 2007).

Perceived neighbourhood disorder. The neighbourhood disorder scale measured resident's perception of disruptive elements in the neighbourhood (Nario-Redmond, Coulton, &

Milligan, 2000). The scale includes eleven items assessing levels of visible disorder in the neighbourhood, such as poor maintenance, defaced public structures, abandoned property, loitering and disorderly conduct (e.g., "garbage or waste on sidewalks or streets"). Item responses were scored on a ten-point Likert scale with responses ranging from 'rarely' to 'frequently' (scored from one to ten respectively). Total score ranges from 11 to 110. Cronbach's alpha for the neighbourhood disorder scale in this sample was .91.

Perceived neighbourhood social cohesion. Social cohesion represents a sense of community, trust and unity among residents and is a generalised, intra-psychic reflection of the quality of neighbourhood life (Perkins & Long, 2002). This was a subscale of the Sense of Collective Efficacy Scale (Sampson, Raudenbush, & Earls, 1997), was measured using five items assessing individuals' perceptions of shared values and trust amongst neighbours, three positive (e.g., "people here are willing to help their neighbours") and two negative (e.g., "people in this neighbourhood generally don't get along with one another"). Item responses were scored on a five-point Likert scale with responses from 'strongly agree' to 'strongly disagree' (scored one to five, respectively). The three positive items were reverse coded so that higher total scores represented greater social cohesion. Total score ranges five to 25. Cronbach's alpha for the social cohesion scale in this sample was .77.

Data Imputation

To address spotty missing data, standard practice cross-sectional imputation was employed; i.e., mean substitution for missing items when > 50% response was achieved (Hawthorne & Elliot, 2005). Imputation was used for total and subscale scores for quality of life and social support, and for total scores of perceived neighbourhood disorder and social cohesion. At Wave 1, missing data after imputation were sparse or non-existent for total and subscale

scores for quality of life (< 0.5%) and social support (< 0.5%) and neighbourhood disorder (< 0.5%) and social cohesion (1.1%). For Wave 2, missing data was similarly sparse for total social support (< 0.5%), quality of life (< 0.5%), neighbourhood disorder (< 0.2%), and social cohesion (< 1.5%).

Some participants declined to answer, or gave a "don't know" response for individual items in the neighbourhood disorder and social cohesion scales. For these individuals, scores were calculated from the number of items answered if the participant had a response rate above 50% for the subscale or total score (Hawthorne & Elliot, 2005).

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