



Anxiety-related psychopathology and chronic pain comorbidity among public safety personnel



R.N. Carleton^{a,*}, T.O. Afifi^b, T. Taillieu^b, S. Turner^b, R. El-Gabalawy^b, J. Sareen^b, G.J.G. Asmundson^a

^a Anxiety and Illness Behaviour Laboratory, Department of Psychology, University of Regina, Regina, SK, S4S 0A2, Canada

^b Rady Faculty of Health Sciences, University of Manitoba, Winnipeg, MB, R3E 0W3, Canada

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ABSTRACT

Canadian Public Safety Personnel (PSP; e.g., correctional service officers, dispatchers, firefighters, paramedics, police officers) regularly experience potentially traumatic, painful, and injurious events. Such exposures increase risk for developing mental disorders and chronic pain, which both involve substantial personal and social costs. The interrelationship between mental disorders and chronic pain is well-established, and both can be mutually maintaining; accordingly, understanding the relationship between mental health and chronic pain among PSP is important for improving health care. Unfortunately, the available research on such comorbidity for PSP is sparse. The current study was designed to provide initial estimates of comorbidities between mental disorders and chronic pain across diverse PSP. Participants included 5093 PSP (32% women) in six categories (i.e., Call Center Operators/Dispatchers, Correctional Workers, Firefighters, Municipal/Provincial Police, Paramedics, Royal Canadian Mounted Police) who participated in a large PSP mental health survey. The survey included established self-report measures for mental disorders and chronic pain. In the total sample, 23.1% of respondents self-reported clinically significant comorbid concerns with both mental disorders and chronic pain. The results indicated PSP who reported chronic pain were significantly more likely to screen positive for posttraumatic stress disorder (PTSD), major depressive disorder, generalized anxiety disorder, social anxiety disorder, and alcohol use disorder. There were differences between PSP categories; but, the most consistent indications of comorbidity were for chronic pain, PTSD, and major depressive disorder. Comorbidity between chronic pain and mental disorders among PSP is prevalent. Health care providers should regularly assess PSP for both symptom domains.

1. Introduction

Public Safety Personnel (PSP) can include, but are not limited to, persons working as Correctional Workers (security and non-security roles), Call Center Operators/Dispatchers, Firefighters, Paramedics, and Police Officers (Oliphant, 2016). The nature of PSP employment inherently involves exposure to emotionally and physically stressful events (e.g., fires, resuscitations, arrests), many of which may be traumatic or injurious (American Psychiatric Association, 2013; Galatzer-Levy, Madan, Neylan, Henn-Haase, & Marmar, 2011; Komarovskaya et al., 2011). Indeed, such exposures appear to increase risk for several mental disorders (e.g., posttraumatic stress disorder; PTSD), major depressive disorder, panic disorder, generalized anxiety disorder, social anxiety disorder, alcohol use disorder; American Psychiatric Association, 2013; Carleton, Afifi, Turner, Taillieu, Duranceau et al., 2018; Fetzner, McMillan, Sareen, & Asmundson,

2011; Sareen et al., 2007). PSP employment typically involves regular periods of substantial physical stress (e.g., engaging with public safety incidents such as fires, resuscitations, arrests), as well as extended periods of potential inactivity (e.g., time between duty calls; Parsons, 2004). The result can be increased risk for physical injuries (e.g., Corbeil et al., 2017; Frost, Beach, Crosby, & McGill, 2015; Lyons, Radburn, Orr, & Pope, 2017) and chronic pain (i.e., pain persisting longer than three months; International Association for the Study of Pain, 1994) for PSP (Carleton et al., 2017).

International estimates of mental disorders among PSP are relatively uncommon and the available estimates range from 10% to 35% (Haugen, Evces, & Weiss, 2012; Oliphant, 2016); however, most available estimates have been based on single categories of PSP (e.g., assessing only police) and often with relatively small samples (Asmundson & Stapleton, 2008; Haugen et al., 2012; Horswill, Jones, & Carleton, 2015; Oliphant, 2016). Recent Canadian research with a large

* Corresponding author.

E-mail addresses: Carleton@uregina.ca (R.N. Carleton), Tracie.Affifi@umanitoba.ca (T.O. Afifi), Tamara.Taillieu@umanitoba.ca (T. Taillieu), Sarah.Turner@umanitoba.ca (S. Turner), Renee.El-Gabalawy@umanitoba.ca (R. El-Gabalawy), Jitender.Sareen@umanitoba.ca (J. Sareen), Gordon.Asmundson@uregina.ca (G.J.G. Asmundson).

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sample of diverse PSP suggests many (i.e., 44.5%) screen positive for one or more mental disorders based on established self-report measures (Carleton, Afifi, Turner, Taillieu, Duranceau et al., 2018). The results for PSP mental disorder estimates starkly contrast global epidemiology meta-analytic estimates that are based on interviews for Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) criteria instead of self-report screening measures from the general global population (i.e., 17.6%; Steel et al., 2014) and from Canada specifically (i.e., ~10.1%; Statistics Canada, 2012). Mental illness accounts for approximately one third of global disability (Vigo, Thornicroft, & Atun, 2016), with associated annual economic costs for mental disorders in Canada estimated in the billions (Whiteford et al., 2013) and in the USA estimated in the hundreds of billions (Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015).

International estimates of chronic pain among PSP are also relatively uncommon and the available estimates vary greatly. Among samples of police officers, 1-year prevalence estimates range between 44% and 62%, with many reporting their chronic pain began after joining the police force (Beaton, Murphy, & Pike, 1996; Brown, Wells, Trottier, Bonneau, & Ferris, 1998; Cho, Jeon, Lee, Seok, & Cho, 2014; Gershon, Lin, & Li, 2002). Paramedics and emergency medical technicians have self-reported similarly high rates of chronic pain, ranging from 48% to 71% or more (Beaton et al., 1996; Rahimi, Vazini, Alhani, & Anooosheh, 2015; Studnek, Crawford, Wilkins, & Pennell, 2010). Firefighters have reported a broader range, from 16 to 47%, with evidence that the prevalence of chronic pain increases with length of service (Beaton et al., 1996; Bos, Mol, Visser, & Frings-Dresen, 2004; Lusa, Miranda, Luukkonen, & Punakallio, 2015; Punakallio, Lusa, Luukkonen, Airila, & Leino-Arjas, 2014). Recent Canadian PSP estimates suggest chronic pain may be experienced by as many as 54.9% of PSP (Brown et al., 1998). The results for PSP chronic pain estimates also starkly contrast epidemiology estimates from the general population. A pooled global estimate suggests approximately 31% of people report chronic pain (Steingrimsdottir, Landmark, Macfarlane, & Nielsen, 2017), with 11.1% of a large American sample ($n = 8781$) reporting having pain most days and another 20.2% reporting having pain every day (Nahin, 2015). In Canada, approximately 25% of the general population reports chronic pain (Boulanger, Clark, Squire, Cui, & Horbay, 2007), with 12-year incidence rates up to 39% (Reitsma, Tranmer, Buchanan, & VanDenKerkhof, 2012), point prevalence rates of 12%, and 1-month prevalence rates of 23% (Hoy et al., 2012). The associated annual economic costs for chronic pain in Canada are estimated in the billions (Park et al., 2015) and in the United States are estimated in the hundreds of billions (Gatchel, McGeary, McGeary, & Lippe, 2014).

There is substantial evidence of comorbidity between chronic pain and mental disorders (Demmytenaere et al., 2007; McWilliams, Cox, & Enns, 2003). Contemporary pain and trauma theories (Asmundson & Katz, 2009) as well as DSM-5 classifications (American Psychiatric Association, 2013) suggest an important and interactive relationship between PTSD and chronic pain (Asmundson, Coons, Taylor, & Katz, 2002; Asmundson, Norton, Allardings, Norton, & Larsen, 1998; Sharp & Harvey, 2001). Comorbidity between PTSD and chronic pain appears particularly high, ranging up to 80% (Brennstuhl, Tarquinio, & Montel, 2014), argued as potentiated by shared underlying vulnerabilities and mutual maintenance (Asmundson et al., 2002; Sharp & Harvey, 2001). Indeed, a recent meta-analysis underscored the broad importance of the shared underlying vulnerabilities for PTSD throughout the general population (Pacella, Hruska, & Delahanty, 2013).

The shared vulnerability model (Asmundson et al., 2002) posits psychological and biological vulnerabilities interact with potentially traumatic exposures to produce emotional responses characterized by hypervigilance, cognitive biases, and avoidance. The mutual maintenance model posits that pain cues memories of exposures to potential traumas, and memories of exposures to potential traumas cue experiences of pain (Sharp & Harvey, 2001). Accordingly, understanding the relationship between mental disorders and chronic pain may be

particularly important for PSP who appear regularly exposed to potentially traumatic and injurious stressors (American Psychiatric Association, 2013).

Previous PSP research on the comorbidity between mental disorders and chronic pain has been limited by small sample sizes, work with a single category of PSP (e.g., only police officers), small geographic catchment areas, use of exclusively clinical samples, the use of diverse measurement tools, and a focus on PTSD. The current study was designed to overcome such limitations by using a large, national, diverse sample of PSP assessed using broadly-accepted and validated screening measures. The results are intended to provide initial PSP estimates of the comorbidities between mental disorder symptoms and chronic pain. Doing so will help inform growing efforts in support of PSP (Oliphant, 2016), provide insights for assessment recommendations to health professionals working with PSP as well as PSP leaders, and inform efforts at bolstering PSP resilience (Varker & Devilly, 2012).

2. Methods

2.1. Data and sample

Data were collected using web-based survey methods using established guidelines for web-based survey research (Ashbaugh, Herbert, Butler, & Brunet, 2010). The survey was available in English or French from September 1, 2016 to January 31, 2017. Participants were recruited using several strategies, including email invitations to PSP from the Public Safety Steering Committee (PSSC) of the Canadian Institute for Public Safety Research and Treatment (CIPSRT), provincial and municipal public safety organizations, and several advocacy organizations. A video invitation to participate was also prepared by the Minister of Public Safety and Emergency Preparedness. Further details of participant recruitment and data collection methods have been published elsewhere (Carleton, Afifi, Turner, Taillieu, Duranceau et al., 2018; Carleton et al., 2017).

A total of $n = 8520$ began the survey and answered at least the first question (i.e., “Please indicate which category of First Responders or other Public Safety Personnel you feel best describes your current occupation”); however, only $n = 5093$ (59.8%) persons progressed far enough through the survey to complete the sections required for the current analysis (i.e., chronic pain and mental disorder symptoms modules) and could be definitively placed into one of the six PSP categories of interest (i.e., Municipal/Provincial Police, RCMP, Corrections, Firefighters, Paramedics, and Call Centre Operators/Dispatchers) in this study. The data collection procedure prohibited an accurate estimate of the response rate; however, based on the 2011 Statistics Canada National Household Survey data, there are approximately 161,000 Canadians working as PSP (Statistics Canada, 2011). The study was approved by the University of Regina Institutional Research Ethics Board (File #2016-107).

2.2. Measures

2.2.1. Chronic pain

Current chronic pain experiences were assessed with self-report items based on work done by the International Association for the Study of Pain (Loeser & Treede, 2008) and previous reviews (Katz, Rosenbloom, & Fashler, 2015; Steingrimsdottir et al., 2017); as such, in all cases chronic pain was based on self-report, even when referred to only as chronic pain. In the current study we asked participants to self-report on the following questions: “Do you experience chronic pain defined by pain more days than not, lasting longer than 3 months?”, with response categories including “Yes” ($n = 1859$), “Yes, but I’d rather not discuss it” ($n = 176$), “No” ($n = 3030$), and “Prefer not to answer” ($n = 28$). Dichotomous coding was used to compute the chronic pain variable: Participants who reported “Yes” or “Yes, but I’d rather not discuss it” were coded as experiencing chronic pain

Table 1
Association between Sociodemographic Covariates and Chronic Pain Among Public Safety Personnel in Canada, $n = 5093$.

| | No Chronic Pain% (n) | Any Chronic Pain% (n) | OR (95% CI) |
|---|----------------------|-----------------------|----------------------|
| Sex | | | |
| Male | 59.7 (2038) | 40.3 (1373) | 1.00 |
| Female | 60.2 (985) | 39.8 (652) | 0.98 (0.87, 1.11) |
| Age | | | |
| 19–29 | 73.6 (279) | 26.4 (100) | 1.00 |
| 30–39 | 65.8 (930) | 34.2 (483) | 1.45 (1.13, 1.87)** |
| 40–49 | 58.7 (1087) | 41.3 (766) | 1.97 (1.54, 2.52)*** |
| 50–59 | 51.3 (630) | 48.7 (598) | 2.65 (2.05, 3.42)*** |
| 60 and older | 52.7 (87) | 47.3 (78) | 2.50 (1.71, 3.66)*** |
| Marital Status | | | |
| Married/Common-law | 60.6 (2314) | 39.4 (1503) | 1.00 |
| Single | 65.4 (332) | 34.6 (176) | 0.82 (0.67, 0.99)* |
| Separated/Divorced/Widowed | 51.7 (271) | 48.3 (253) | 1.44 (1.20, 1.73)*** |
| Remarried | 49.2 (87) | 50.8 (90) | 1.59 (1.18, 2.15)** |
| Ethnicity | | | |
| White | 60.6 (2780) | 39.4 (1809) | 1.00 |
| Other | 51.2 (216) | 48.8 (206) | 1.47 (1.20, 1.79)** |
| Education | | | |
| High school or less | 56.2 (253) | 43.8 (197) | 1.00 |
| Some post-secondary (less than 4 year college/university program) | 58.6 (1574) | 41.4 (1113) | 0.91 (0.74, 1.11) |
| University degree/4 year college or higher | 62.9 (1137) | 37.1 (670) | 0.76 (0.61, 0.93)** |
| Province of Residence | | | |
| Western Canada (BC, AB, SK, MB) | 59.8 (1577) | 40.2 (1059) | 1.00 |
| Eastern Canada (ON, QC) | 60.8 (1047) | 39.2 (675) | 0.96 (0.85, 1.09) |
| Atlantic Canada (PEI, NS, NB, NFL) | 57.5 (345) | 42.5 (255) | 1.10 (0.92, 1.32) |
| Northern Territories (YK, NWT, NVT) | 66.7 (40) | 33.3 (20) | 0.75 (0.43, 1.28) |
| Urban/Rural Work Location | | | |
| Urban | 60.3 (2797) | 39.7 (1843) | 1.00 |
| Rural | 57.7 (172) | 42.3 (126) | 1.11 (0.88, 1.41) |
| Years of Service | | | |
| Less than 4 years | 80.7 (197) | 19.3 (47) | 1.00 |
| 4 to 9 years | 69.1 (604) | 30.9 (270) | 1.87 (1.32, 2.66)*** |
| 10 to 15 years | 59.3 (690) | 40.7 (474) | 2.88 (2.05, 4.04)*** |
| More than 15 years | 55.1 (1504) | 44.9 (1226) | 3.42 (2.46, 4.74)*** |
| Public Safety Personnel Category | | | |
| Municipal/provincial police | 64.1 (860) | 35.9 (482) | 1.00 |
| RCMP | 56.6 (733) | 43.4 (563) | 1.37 (1.17, 1.60)*** |
| Correctional workers | 54.6 (383) | 45.4 (318) | 1.48 (1.23, 1.78)*** |
| Firefighters | 64.7 (520) | 35.3 (284) | 0.97 (0.81, 1.17) |
| Paramedics | 55.9 (377) | 44.1 (297) | 1.41 (1.16, 1.70)*** |
| Call centre operators/dispatchers | 63.3 (157) | 36.7 (91) | 1.03 (0.78, 1.37) |

Notes. OR = Odds ratio; BC = British Columbia; AB = Alberta; SK = Saskatchewan; MB = Manitoba; ON = Ontario; QC = Quebec; PEI = Prince Edward Island; NS = Nova Scotia; NB = New Brunswick; NFL = Newfoundland; YK = Yukon; NWT = Northwest Territories; NVT = Nunavut.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

($n = 2035$) and participants who reported “No” were coded as not experiencing chronic pain ($n = 3030$). Participants reporting that they “Prefer not to answer” were excluded from analyses (0.5% of the sample used in the current analyses).

2.3. Mental disorder symptoms

Current mental disorder symptoms were assessed with several validated self-report mental disorder screening measures. PTSD (past-month) was assessed with the PTSD Check List 5 (PCL-5; Ashbaugh, Houle-Johnson, Herbert, El-Hage, & Brunet, 2016; Blevins, Weathers, Davis, Witte, & Domino, 2015; Weathers et al., 2013). A positive PTSD screen was indicated if the participant met minimum criteria for each PTSD cluster and exceeded the minimum clinical cut-off score of > 32 on the PCL-5 (Weathers et al., 2013). Depression (past 14 days) was assessed with the 9-item Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001; Kroenke, Spitzer, Williams, & Lowe, 2010). A positive depression screen was indicated if the participant had a total score > 9 on the PHQ-9 (Manea, Gilbody, & McMillan, 2015). Generalized anxiety disorder (past 14 days) was assessed with the 7-item Generalized Anxiety Disorder scale (GAD-7; Beard & Bjorgvinsson, 2014; Kroenke et al., 2010; Spitzer, Kroenke,

Williams, & Lowe, 2006). A positive generalized anxiety disorder screen was indicated if the participant had a total score > 9 on the GAD-7 (Swinson, 2006). Social anxiety disorder (current, with no specific time window) was assessed with the Social Interaction Phobia scale (SIPS; Carleton et al., 2009; Duranceau, Peluso, Collimore, Asmundson, & Carleton, 2014; Menatti et al., 2015). A positive social anxiety disorder screen was indicated if the participant had a total score > 20 on the SIPS (Carleton et al., 2009). Panic disorder (past 7 days) was assessed with the Panic Disorder Symptoms Severity scale, Self-Report (PDSS-SR; Furukawa et al., 2009; Shear et al., 1997; Shear et al., 2001). A positive panic disorder screen was indicated if the participant had a total score > 7 on the PDSS-SR (Shear et al., 1997). Alcohol use disorder (past year) was assessed with the Alcohol Use Disorders Identification Test (AUDIT; Gache et al., 2005; Saunders, Aasland, Babor, Delafuente, & Grant, 1993). A positive alcohol use disorder screen was indicated if the participant reported a total score > 15 on the AUDIT (Gache et al., 2005). The survey also allowed participants to report having been previously diagnosed with several other mental disorders, including obsessive-compulsive disorder, persistent depressive disorder, bipolar I, bipolar II, and cyclothymic disorder. The low prevalence of these self-reported disorders precluded examining each individual disorder in relation to chronic pain. As such, these self-reported mental disorders

were grouped into an any self-reported mental disorder variable (yes or no). We also computed an any positive mental disorder screen based on whether the respondent met screening criteria for any of the screen-based mental disorders and/or self-reported being diagnosed with any mental disorder (yes or no).

2.4. Sociodemographic covariates

Sociodemographic covariates included sex, age, marital status, ethnicity, education, province of residence, urban versus rural work location, and years of service. Participants were also placed into one of six PSP categories (i.e., Municipal/Provincial Police, RCMP, Corrections, Firefighters, Paramedics, Call Centre Operators/Dispatchers). The category groupings allowed for examination of potential differences in the relationship between chronic pain and mental disorders across PSP groups.

2.5. Statistical analyses

First, descriptive statistics using cross tabulations were computed to examine the distribution of chronic pain by sociodemographic variables. Logistic regression models were run to examine the association of sociodemographic variables and any chronic pain. Second, descriptive statistics using cross tabulations were computed to examine the distribution of chronic pain by mental disorders in the total sample and individual PSP categories. Third, a series of nested logistic regression models were run to examine the association of each type of mental disorder (independent variable) with any chronic pain (dependent variable). Logistic regression models were first adjusted for sociodemographic covariates (AOR-1). Due to a lack of variance in some of the covariates in the PSP stratified models, with the exception of participant sex, we only adjusted for sociodemographic covariates that were significantly associated with chronic pain at the bivariate level (i.e., age, marital status, ethnicity, education, and total years of service). We then further adjusted logistic regression models for comorbid mental conditions (AOR-2); that is, all the individual mental disorders were entered into the AOR-2 models simultaneously (along with AOR-1 sociodemographic covariates).

3. Results

The associations between sociodemographic covariates and chronic pain are provided in [Table 1](#). There were several statistically significant differences in chronic pain reporting based on age, marital status, ethnicity, education, and years of service. There were also several significant differences between PSP categories. Sex, province of residence, and urban versus rural work location were not significantly associated with chronic pain in the current sample.

Across the entire sample approximately 23.1% of participants self-reported clinically significant comorbid concerns with mental disorders and chronic pain. Within each PSP category participants reported different levels of comorbidity. Specifically, municipal/provincial police (18.5%), RCMP (27.5%), Correctional workers (29.6%), Firefighters (16.6%), Paramedics (25.8%), and Call centre operators/dispatchers (20.8%), all reported different rates of comorbid mental disorders and chronic pain.

The associations between mental disorder symptoms and chronic pain in the total sample and among PSP categories are provided in [Table 2](#). Using the total sample, after adjustment for sociodemographic covariates, participants screening positive for each individual mental disorder (i.e., PTSD, depression, generalized anxiety, social anxiety, panic disorder, alcohol use disorder) were more likely to report experiencing chronic pain than participants who did not screen positive for each individual mental disorder (AOR-1 ranged from 1.65 to 3.23). Similar patterns were found when assessing each PSP category; however, some of the relationships failed to reach statistical significance,

likely due to insufficient power for detecting differences in some of the models. When all mental disorders were entered into the logistic regression models simultaneously, only positive screens for PTSD (AOR-2 = 1.71, 95% CI = 1.42, 2.05), depression (AOR-2 = 1.62, 95% CI = 1.34, 1.95), social anxiety (AOR-2 = 1.30, 95% CI = 1.07, 1.59), and panic disorder (AOR-2 = 1.44, 95% CI = 1.10, 1.89) were associated with significantly increased odds of chronic pain in the total sample.

Differences in the association of mental disorder symptoms with chronic pain were identified across PSP categories. Among Municipal/Provincial police, positive screens for depression (AOR-2 = 1.69, 95% CI = 1.13, 2.54), generalized anxiety (AOR-2 = 1.64, 95% CI = 1.06, 2.55), and alcohol use disorder (AOR-2 = 1.79, 95% CI = 1.03, 3.10) were associated with significantly increased odds of chronic pain after adjustment for sociodemographic covariates and comorbid mental disorders. Among RCMP, positive screens for PTSD (AOR-2 = 1.64, 95% CI = 1.17, 2.32), depression (AOR-2 = 1.87, 95% CI = 1.29, 2.73), and panic disorder (AOR-2 = 1.85, 95% CI = 1.13, 3.03) were associated with significantly increased odds of chronic pain after adjustment for sociodemographic covariates and comorbid mental disorders. Among both Correctional workers and Firefighters, only a positive screen for PTSD (AOR-2 = 1.73, 95% CI = 1.08, 2.79, and AOR-2 = 2.04, 95% CI = 1.15, 3.61, respectively) was associated with significantly increased odds of chronic pain after adjustment for sociodemographic covariates and comorbid mental disorders. Among Paramedics, positive screens for PTSD (AOR-2 = 1.65, 95% CI = 1.01, 2.70) and depression (AOR-2 = 1.90, 95% CI = 1.14, 3.18) were associated with significantly increased odds of chronic pain after adjustment for sociodemographic covariates and comorbid mental disorders. None of the relationships between mental disorders and chronic pain reached significance in the Call Centre Operator/Dispatcher models, likely due to a lack of power to detect differences in this subsample.

4. Discussion

Chronic pain and mental disorders have significant individual and economic impact, which might be mitigated by better understanding the correlates of each as recently emphasized for PTSD and chronic pain ([Asmundson, 2014](#); [Asmundson & Katz, 2009](#); [Pacella et al., 2013](#)). Results from the current study provide initial information on the comorbidity between multiple mental disorders and chronic pain among and across a diverse sample of PSP. Across the entire sample nearly one quarter of PSP self-reported comorbid mental disorders and self-reported chronic pain. The comorbidity rates ranged from 18.5% for Municipal/Provincial police to 29.6% for Correctional workers. After adjusting for significant sociodemographic covariates, participants with chronic pain across the entire sample were significantly and substantially – based on the effect sizes – more likely to screen positive for PTSD, major depressive disorder, social anxiety disorder, panic disorder, and alcohol use disorder. The results were consistent with previous research indicating significant comorbidity between chronic pain and mental disorders ([Bernik, Sampaio, & Gandarela, 2013](#); [Demyttenaere et al., 2007](#)). The largest odds ratio was for panic disorder, which is consistent with previous population research ([McWilliams et al., 2003](#)), and the smallest was for alcohol use disorder. After also adjusting for the presence of comorbidity among mental disorder screenings, participants reporting chronic pain were significantly more likely to screen positive for PTSD, major depressive disorder, social anxiety disorder, and panic disorder. The current results are consistent with previous research ([Tunks, Crook, & Weir, 2008](#)) and the large effect sizes underscore the importance of understanding the comorbidity.

The pattern of comorbidity after adjusting for significant sociodemographic covariates appeared fairly consistent between the total sample and each of the PSP categories, suggesting broad similarities. For example, chronic pain was fairly consistently comorbid with PTSD

Table 2
Association between Comorbid Mental Disorders and Chronic Pain in Total Sample and by Public Safety Personnel Category.

| | No Chronic Pain% (n) | Any Chronic Pain% (n) | AOR-1 (95% CI) | AOR-2 (95% CI) |
|--|----------------------|-----------------------|-----------------------|----------------------|
| Total Sample | | | | |
| PTSD | 39.9 (452) | 60.1 (682) | 2.69 (2.33, 3.10)*** | 1.71 (1.42, 2.05)*** |
| Depression | 42.1 (558) | 57.9 (766) | 2.61 (2.28, 2.98)*** | 1.62 (1.34, 1.95)*** |
| Generalized anxiety | 41.9 (387) | 58.1 (536) | 2.44 (2.09, 2.84)*** | 1.09 (0.87, 1.35) |
| Social anxiety | 43.7 (331) | 56.3 (426) | 2.17 (1.84, 2.55)*** | 1.30 (1.07, 1.59)** |
| Panic disorder | 33.5 (140) | 66.5 (278) | 3.23 (2.59, 4.03)*** | 1.44 (1.10, 1.89)** |
| Alcohol use disorder | 47.8 (139) | 52.2 (152) | 1.65 (1.29, 2.12)*** | 1.30 (0.99, 1.71) |
| Other self-reported mental disorder ^a | 50.0 (64) | 50.0 (64) | 1.43 (0.995, 2.06) | 1.15 (0.77, 1.72) |
| Any mental disorder | 47.7 (937) | 52.3 (1028) | 2.52 (2.21, 2.87)*** | — |
| Municipal/Provincial Police | | | | |
| PTSD | 43.7 (110) | 56.3 (142) | 2.83 (2.11, 3.79)*** | 1.45 (0.98, 2.14) |
| Depression | 41.8 (110) | 58.2 (153) | 3.14 (2.35, 4.20)*** | 1.69 (1.13, 2.54)* |
| Generalized anxiety | 39.0 (76) | 61.0 (119) | 3.35 (2.41, 4.66)*** | 1.64 (1.06, 2.55)* |
| Social anxiety | 43.6 (58) | 56.4 (75) | 2.50 (1.72, 3.65)*** | 1.28 (0.79, 2.07) |
| Panic disorder | 26.0 (19) | 74.0 (54) | 5.76 (3.31, 10.02)*** | 1.82 (0.95, 3.49) |
| Alcohol use disorder | 45.3 (34) | 54.7 (41) | 2.48 (1.51, 4.07)*** | 1.78 (1.03, 3.10)* |
| Other self-reported mental disorder ^a | 45.5 (10) | 54.5 (12) | 2.02 (0.83, 4.92) | 1.62 (0.55, 4.73) |
| Any mental disorder | 49.5 (216) | 50.5 (220) | 2.70 (2.08, 3.51)*** | — |
| RCMP | | | | |
| PTSD | 36.9 (140) | 63.1 (239) | 2.87 (2.20, 3.74)*** | 1.64 (1.17, 2.32)** |
| Depression | 38.4 (156) | 61.6 (250) | 2.91 (2.25, 3.77)*** | 1.87 (1.29, 2.73)*** |
| Generalized anxiety | 38.6 (114) | 61.4 (181) | 2.57 (1.92, 3.42)*** | 0.93 (0.61, 1.43) |
| Social anxiety | 40.9 (97) | 59.1 (140) | 2.25 (1.66, 3.06)*** | 1.43 (0.98, 2.11) |
| Panic disorder | 29.6 (42) | 70.4 (100) | 3.70 (2.47, 5.55)*** | 1.85 (1.13, 3.03)* |
| Alcohol use disorder | 36.7 (18) | 63.3 (31) | 2.15 (1.15, 4.04)* | 1.53 (0.75, 3.14) |
| Other self-reported mental disorder ^a | 44.8 (13) | 55.2 (16) | 1.62 (0.75, 3.52) | 1.35 (0.55, 3.31) |
| Any mental disorder | 44.6 (246) | 55.4 (306) | 2.94 (2.26, 3.82)*** | — |
| Corrections Workers | | | | |
| PTSD | 35.7 (71) | 64.3 (128) | 2.46 (1.68, 3.60)*** | 1.73 (1.08, 2.79)* |
| Depression | 39.4 (86) | 60.6 (132) | 2.35 (1.63, 3.38)*** | 1.59 (0.97, 2.61) |
| Generalized anxiety | 43.8 (71) | 56.2 (91) | 1.75 (1.18, 2.60)** | 0.84 (0.48, 1.47) |
| Social anxiety | 47.6 (60) | 52.4 (66) | 1.55 (0.999, 2.40) | 0.87 (0.51, 1.48) |
| Panic disorder | 33.8 (27) | 66.3 (53) | 2.33 (1.34, 4.05)** | 1.51 (0.74, 3.07) |
| Alcohol use disorder | 40.4 (19) | 59.6 (28) | 1.84 (0.96, 3.50) | 1.91 (0.91, 3.99) |
| Other self-reported mental disorder ^a | 54.1 (20) | 45.9 (17) | 1.17 (0.58, 2.39) | 1.09 (0.51, 2.36) |
| Any mental disorder | 45.8 (151) | 54.2 (179) | 2.11 (1.47, 3.03)*** | — |
| Firefighters | | | | |
| PTSD | 44.0 (44) | 56.0 (56) | 3.04 (1.94, 4.76)*** | 2.04 (1.15, 3.61)* |
| Depression | 48.1 (77) | 51.9 (83) | 2.46 (1.69, 3.57)*** | 1.28 (0.77, 2.13) |
| Generalized anxiety | 43.3 (39) | 56.7 (51) | 3.29 (2.05, 5.30)*** | 1.61 (0.82, 3.16) |
| Social anxiety | 46.1 (41) | 53.9 (48) | 2.59 (1.61, 4.17)*** | 1.38 (0.75, 2.53) |
| Panic disorder | 38.5 (15) | 61.5 (24) | 3.80 (1.89, 7.63)*** | 1.09 (0.45, 2.66) |
| Alcohol use disorder | 58.7 (37) | 41.3 (26) | 1.23 (0.71, 2.14) | 1.00 (0.55, 1.83) |
| Other self-reported mental disorder ¹ | 56.3 (9) | 43.8 (7) | 1.44 (0.52, 3.98) | 0.92 (0.29, 2.88) |
| Any mental disorder | 50.8 (120) | 49.2 (116) | 2.65 (1.87, 3.75)*** | — |
| Paramedics | | | | |
| PTSD | 40.5 (64) | 59.5 (94) | 2.02 (1.36, 3.01)*** | 1.65 (1.01, 2.70)* |
| Depression | 43.9 (87) | 56.1 (111) | 1.91 (1.32, 2.75)*** | 1.90 (1.14, 3.18)* |
| Generalized anxiety | 46.7 (64) | 53.3 (73) | 1.48 (0.99, 2.21) | 0.71 (0.39, 1.29) |
| Social anxiety | 43.8 (57) | 56.2 (73) | 1.71 (1.13, 2.59)* | 1.26 (0.77, 2.07) |
| Panic disorder | 40.3 (27) | 59.7 (40) | 1.66 (0.95, 2.89) | 0.97 (0.49, 1.95) |
| Alcohol use disorder | 47.5 (19) | 52.5 (21) | 1.53 (0.77, 3.05) | 1.44 (0.70, 3.00) |
| Other self-reported mental disorder ^a | 41.2 (7) | 58.8 (10) | 1.25 (0.44, 3.54) | 1.10 (0.33, 3.71) |
| Any mental disorder | 47.2 (145) | 52.8 (162) | 1.88 (1.32, 2.66)*** | — |
| Call Centre Operators/Dispatchers^b | | | | |
| PTSD | 50.0 (23) | 50.0 (23) | 1.52 (0.73, 3.16) | 1.36 (0.46, 4.08) |
| Depression | 53.2 (42) | 46.8 (37) | 1.75 (0.95, 3.23) | 1.45 (0.63, 3.34) |
| Generalized anxiety | 52.3 (23) | 47.7 (21) | 1.51 (0.73, 3.13) | 1.09 (0.32, 3.69) |
| Social anxiety | 42.9 (18) | 57.1 (24) | 2.41 (1.12, 5.19)* | 2.22 (0.85, 5.77) |
| Panic disorder | 58.8 (10) | 41.2 (7) | 0.78 (0.24, 2.49) | 0.24 (0.05, 1.22) |
| Alcohol use disorder | 70.6 (12) | 29.4 (5) | 0.56 (0.16, 1.98) | 0.72 (0.18, 2.81) |
| Other self-reported mental disorder ^a | 71.4 (5) | — | 0.63 (0.10, 4.20) | 0.44 (0.06, 3.08) |
| Any mental disorder | 56.7 (59) | 43.3 (45) | 1.63 (0.87, 3.08) | — |

Notes. PTSD = post-traumatic stress disorder. AOR-1 = odds ratios adjusted for sociodemographic covariates (sex, age, marital status, ethnicity, education, and years of service). AOR-2 = odds ratios adjusted for AOR-1 and all individual mental disorders (PTSD, depression, generalized anxiety, social anxiety, panic disorder, alcohol use disorder, and other self-reported mental disorder).

^a Other self-reported mental disorders include persistent depressive disorder, bipolar I, bipolar II, cyclothymic disorder, and obsessive-compulsive disorder.

^b In the logistic regression models for call centre operators/dispatchers, marital status was collapsed into a 3-category variable (married/common-law; single; separated/divorced/widowed/remarried) to ensure model stability.

* $p \leq .05$.

** $p \leq .01$.

*** $p \leq .001$.

and major depressive disorder. In addition, there were some potentially important differences identified after also adjusting for the presence of comorbid mental disorders. For Municipal/Provincial police, chronic pain was associated with positive screens for major depressive disorder, generalized anxiety disorder, and alcohol use disorder, all with substantial effect sizes; in contrast, for RCMP, chronic pain was associated with positive screens for PTSD, major depressive disorder, and panic disorder. Paramedics demonstrated associations between chronic pain and positive screens for PTSD and major depressive disorder. Firefighters and Correctional workers only demonstrated associations between chronic pain and positive screens for PTSD. There were no significant associations identified between chronic pain and positive screens for mental disorders among Call centre operators/Dispatchers. The divergent patterns may be due to insufficient power, which certainly appears defensible for Call centre operators/Dispatchers; however, there may also be underlying differences in how their PSP careers are experienced (e.g., differences in physical demands), in available resources, in employed coping mechanisms, or in some other confluence of variables.

Across the groups and for the entire sample, the results further highlight the pervasive relationship between chronic pain and PTSD (Asmundson et al., 2002; Asmundson et al., 1998; McWilliams et al., 2003; Sharp & Harvey, 2001), but also suggest that PSP who report chronic pain should also be assessed for a broad range of comorbid mental disorders. The substantial effect sizes indicate the clinical importance of such assessments when providing health care for PSP. Doing so may help to circumvent stigma impeding reports of mental health difficulties (Corrigan, Druss, & Perlick, 2014), expedite access to mental health care, and mitigate the potential of symptoms becoming mutually maintaining (Asmundson et al., 2002; Sharp & Harvey, 2001). Health care professionals should also consider that, despite high levels of comorbidity, the most robust associations may still be focused on chronic pain, PTSD, and major depressive disorder.

Finally, the current results also provide further details regarding trends in the sociodemographic covariates of chronic pain for a diverse sample of PSP. Unlike some of the previous results evidencing differences in symptoms based on sex, or geography (e.g., Carleton, Afifi, Turner, Taillieu, Duranceau et al., 2018; Carleton et al., in press), there were no such differences identified with respect to chronic pain. Demographic differences in chronic pain were otherwise consistent with prior research. Participants who were older (Elliott, Smith, Penny, Smith, & Chambers, 1999), who self-reported an ethnicity other than White (Jimenez, Garrouste, Kundu, Morales, & Buchwald, 2011), or those without post-secondary education (Ozer, Best, Lipsey, & Weiss, 2008) were all more likely to report chronic pain; accordingly, the current demographic differences may reflect similar pain-related challenges identified in the general population.

Recent research has evidenced the mediating role of modifiable constructs, such as anxiety sensitivity, in the relationship between PTSD and suicide among a sample of firefighters (Stanley, Hom, Spencer-Thomas, & Joiner, 2017). There is also evidence of a relationship between PTSD and panic attacks (Cogle, Feldner, Keogh, Hawkins, & Fitch, 2010). As such, researchers should evaluate whether a similar relationship exists between each of the mental disorders and chronic pain. Pending evidence of such a relationship, researchers could assess the clinical efficacy of targeting anxiety sensitivity – and perhaps other fundamental constructs (e.g., intolerance of uncertainty; Carleton, 2016) to create transdiagnostic reductions in risk for all PSP (Boswell et al., 2013).

4.1. Limitations

Our study has several limitations. First, the sample was self-selected rather than random and stratified design; as such, the results may not be representative of the PSP population or categories therein. Second, responses were based on anonymous self-report, which allowed for

biased responding, erroneous responding, and missing data. Relatedly, in the absence of diagnostic interviews assessments of chronic pain, mental disorders, and comorbidity results may not replicate due to limitations of using screening tools. Future researchers should consider using diagnostic assessment interviews instead of relying entirely on self-report screening tools. Third, there is evidence people underreport clinical symptoms, even on anonymous self-report scales (e.g., Hunt, Auriemma, & Cashaw, 2003). If so, PSP concerns with stigma may have facilitated such underreporting (e.g., Halpern, Gurevich, Schwartz, & Brazeau, 2009; Henderson, Van Hasselt, Leduc, & Couwels, 2016; Karaffa & Koch, 2016). Fourth, participants self-reported diverse pain locations, pain durations, and causal mechanisms, any of which may be important influencing factors for understanding comorbidity. Despite the relatively large sample, there was still insufficient power to assess such nuanced relationships. Future researchers should consider the influence of such variables on comorbidity. Fifth, there was insufficient data to understand the diverse patterns of relationships between chronic pain and mental disorders across PSP categories; as such, future researchers should explore the underlying causes of such differences. Sixth, the cross-sectional nature of the data prohibits discussions of causality. Future researchers should consider assessing participants longitudinally to better understand how the presence of chronic pain or mental disorder symptoms influence the risk for comorbid symptom development. Seventh, none of the participants were on disability leave, which suggests that despite their challenges the participating PSP were coping well enough to remain at work. Future researchers should consider assessing for different patterns among PSP who are off work due to disabling levels of pain or mental disorder symptoms. Eighth, the sample size for Call centre operators/Dispatchers may have obscured important comorbidities. Similarly, the PSP category and demographic groupings may have obscured other important differences that could have been identified with a much larger sample. Ninth, the current data did not allow for assessing whether the current patterns remain evident after adjusting for other relative variables, such as medical illnesses. Future researchers should include such parameters in their data collections and test for associated changes in the patterns. Tenth, despite the large sample size, there were many non-responders and non-completers, which makes robust estimates of prevalence or incidence impossible; however, the current results offer an important staging point in the absence of a Canadian baseline and further justify investing in an interview-based epidemiological study. Finally, the use of a Canadian sample means the results may not generalize to other regions, particularly for regions with different levels of access to health care. Future researchers should assess whether the current results replicate in other countries.

5. Conclusion

The current results indicate substantial proportions of PSP report significant difficulties with chronic pain and comorbid mental disorder symptoms. Participating PSP who reported chronic pain were substantially more likely to screen positive for PTSD, major depressive disorder, social anxiety disorder, panic disorder, and alcohol use disorder. There also appear to be significant differences between PSP categories, the impetus for which warrants further investigation. Persons responsible for the health and wellbeing of PSP should regularly assess for difficulties with chronic pain and mental disorders, and be cognizant that reports of one set of symptoms may also indicate risk of another set. Given the intensely physically and mentally demanding nature of PSP careers, early treatment for either pain or mental disorder symptoms may be particularly beneficial for reducing long-term disability and improving quality of life. Per recent recommendations, clinicians also need to ensure tailored treatments that address mental disorders and comorbid chronic pain (Asmundson, 2014; Otis, Keane, Kerns, Monson, & Scioli, 2009; Scioli-Salter et al., 2016). Researchers should also explore whether transdiagnostic preventative actions can be

employed to better protect PSP health.

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