



Dissociative symptoms predict severe illness presentation in Canadian public safety personnel with presumptive post-traumatic stress disorder (PTSD)

Anna H. Park^{a,b}, Alina Protopopescu^{a,b,c}, Michelle E. Pogue^{a,b}, Jenna E. Boyd^{b,d}, Charlene O'Connor^b, Ruth A. Lanius^{b,e,f,g} and Margaret C. McKinnon^{b,c,d}

^aDepartment of Psychology, Neuroscience & Behaviour, McMaster University, Hamilton, Canada; ^bHomewood Research Institute, Guelph, Canada; ^cMood Disorders Program, St. Joseph's Healthcare Hamilton, Hamilton, Canada; ^dDepartment of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Canada; ^eDepartment of Neuroscience, Robarts Research Institute, RRI 3203, Western University, London, Canada; ^fDepartment of Psychiatry, Parkwood Institute, Mental Health Care Building, F4-430, Western University, London, Canada; ^gLawson Health Research Institute, London, Canada

ABSTRACT

Background: Post-traumatic stress disorder affects 9% of individuals across their lifetime and increases nearly fourfold to 35% in Canadian public safety personnel (PSP). On-the-job experiences of PSP frequently meet criteria for traumatic events, making these individuals highly vulnerable to exposures of trauma and the negative consequences of PTSD. Few studies have reported on the clinical characteristics of Canadian samples of PSP and even fewer have examined the dissociative subtype of PTSD, which is associated with more severe, chronic traumatic experiences, and worse outcomes.

Objective: This study aimed to characterize dissociative symptoms, PTSD symptom severity, and other clinical variables among Canadian PSP with presumptive PTSD.

Methods: We sampled current and past PSP in Canada from both inpatient and outpatient populations ($N = 50$) that were enrolled in a psychological intervention. Only baseline testing data (prior to any intervention) were analysed in this study, such as PTSD symptom severity, dissociative symptoms, emotion dysregulation, and functional impairment.

Results: In our sample, 24.4% self-reported elevated levels of dissociation, specifically symptoms of depersonalization and derealization. Depersonalization and derealization symptoms were associated with more severe PTSD symptoms, greater emotion dysregulation, and functional impairment.

Conclusions: Nearly a quarter of this sample of Canadian PSP reported experiencing elevated levels of PTSD-related dissociation (depersonalization and derealization). These high levels of depersonalization and derealization were consistently positively associated with greater illness severity across clinical measures. It is imperative that dissociative symptoms be better recognized in patient populations that are exposed to chronic traumatic events such as PSP, so that treatment interventions can be designed to target a more severe illness presentation.

Los síntomas disociativos predicen la presentación de enfermedades graves en el personal de seguridad pública canadiense con presunto trastorno de estrés postraumático (TEPT)

Antecedentes: El trastorno de estrés postraumático afecta al 9% de los individuos a lo largo de su vida y se incrementa casi cuatro veces hasta el 35% en el personal de seguridad pública canadiense (PSP). Las experiencias en el trabajo de los PSP cumplen con frecuencia los criterios de eventos traumáticos, lo que hace que estos individuos sean muy vulnerables a la exposición al trauma y a las consecuencias negativas del TEPT. Pocos estudios han informado sobre las características clínicas de las muestras canadienses de PSP y aún menos han examinado el subtipo disociativo del TEPT, que se asocia con experiencias traumáticas más graves y crónicas, y con peores resultados.

Objetivo: Este estudio tenía como objetivo caracterizar los síntomas disociativos, la gravedad de los síntomas del TEPT y otras variables clínicas entre los PSP canadienses con presunto TEPT.

Métodos: Tomamos una muestra de PSP actuales y pasados en Canadá de poblaciones de pacientes hospitalizados y ambulatorios ($N = 50$) que se inscribieron en una intervención psicológica. En este estudio sólo se analizaron los datos de las pruebas de referencia (antes de cualquier intervención), como la gravedad de los síntomas del TEPT, los síntomas disociativos, la desregulación de las emociones y el deterioro funcional.

Resultados: En nuestra muestra, el 24,4% auto-reportó niveles elevados de disociación, específicamente síntomas de despersonalización y des-realización. Los síntomas de

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HIGHLIGHTS

- 24.4% of traumatized Canadian public safety personnel reported elevated levels of depersonalization and derealization, which was associated with a severe illness profile characterized by greater trauma symptoms, emotional dysregulation, and difficulty with life tasks.

despersonalización y des-realización se asociaron con síntomas de TEPT más graves, mayor desregulación de la emoción y deterioro funcional.

Conclusiones: Casi una cuarta parte de esta muestra de PSP canadiense reportó experimentar niveles elevados de disociación relacionada con el TEPT (despersonalización y des-realización). Estos niveles elevados de despersonalización y des-realización se asociaron positivamente de forma consistente con una mayor gravedad de la enfermedad en las medidas clínicas. Es imperativo que se reconozcan mejor los síntomas disociativos en las poblaciones de pacientes que están expuestos a eventos traumáticos crónicos como el PSP, para que las intervenciones de tratamiento puedan ser diseñadas para dirigirse a una presentación de la enfermedad más severa.

解离症状可预测患有推断创伤后应激障碍 (PTSD) 的加拿大公共安全人员的严重疾病表现

背景: 创伤后应激障碍对个体终身影响率为9%, 在加拿大公共安全人员 (PSP) 中增加近四倍至35%。; PSP 的在职经历经常符合创伤性事件的标准, 使其极易受到创伤和 PTSD 的负性影响。; 很少有研究报告加拿大 PSP 样本的临床特征, 对与更严重慢性创伤经历和更差结果相关的 PTSD 解离亚型的研究甚至更少。;

目的: 本研究旨在刻画患有推断 PTSD 的加拿大 PSP 的解离症状, PTSD 症状严重程度和其他临床变量。;

方法: 我们从参加心理干预的住院和门诊人群中加拿大当前和过去的 PSP 进行抽样 (N = 50)。; 本研究仅分析了基线测试数据 (在任何干预之前), 例如 PTSD 症状严重程度, 解离症状, 情绪失调和功能障碍。;

结果: 在我们的样本中, 24.4%自我报告了解离升高, 特别是人格解体和现实解体的症状。; 人格解体和现实解体症状与更严重的 PTSD 症状, 更严重的情绪失调和功能障碍有关。;

结论: 近四分之一的加拿大 PSP 样本报告经历了与 PTSD 相关的解离 (人格解体和现实解体) 水平升高。; 这些高水平的人格解体和现实解体始终与临床测量中更大的疾病严重程度呈正相关。; 必须在暴露于慢性创伤事件的患者群体 (如 PSP) 中更好地识别解离症状, 以便可以设计针对更严重疾病表现的治疗干预措施。;

1. Introduction

Public safety personnel (PSP), which include firefighters, police officers, paramedics, search and rescue personnel, emergency service workers, and ambulance personnel have a higher prevalence of post-traumatic stress disorder (PTSD) than civilian populations (Berger et al., 2012; Petrie et al., 2018). In Canada, PSP also include correctional employees, dispatch personnel, operational and intelligence personnel, Indigenous emergency managers, and the Royal Canadian Mounted Police (RCMP). The pervasiveness of PTSD in PSP is not surprising given many of the events experienced on-the-job, such as witnessing multiple casualties and human violence, meet the DSM-5 criteria for traumatic events (American Psychiatric Association, A., 2013; Berger et al., 2012; Carleton et al., 2019; Neuner et al., 2004). A systematic review comprising 20,424 rescue workers from 40 samples found that their pooled prevalence rate of PTSD worldwide is 10%, with rates reaching 46% in some studies (Berger et al., 2012; Stewart, Mitchell, Wright, & Loba, 2004). In a large Canadian sample, 44.5% of PSP screened positively for a mental disorder, including PTSD, anxiety, panic disorder, and persistent depressive disorder, with 23.2% specifically meeting criteria for PTSD (Carleton, Afifi, Turner, Duranceau, et al., 2018a). It is estimated that 10–35% of PSP in Canada will meet criteria for PTSD, with the Standing committee on Public Safety and National

Security (2016) having declared PTSD in PSP as a foremost public safety issue.

Direct and repeated exposure to highly traumatic events is a risk factor for greater PTSD symptom severity and for *dissociation*, which is present in 15–30% of individuals with PTSD (Armour, Karstoft, & Richardson, 2014; Lanius, Bluhm, Lanius, & Pain, 2006; Lanius et al., 2001; McKinnon et al., 2016; Tsai, Armour, Southwick, & Pietrzak, 2015; Wolf et al., 2012a, 2012b). Dissociation is thought to be a psychological response to cope with or escape from extremely severe or chronic traumatic experiences. The dissociative subtype of PTSD, characterized by a sense of *depersonalization* and *derealization*, involves feeling detached from one's own body or feeling as if the outside world is not real (American Psychiatric Association, A., 2013). Among the 1484 U.S. military veterans, those with the dissociative subtype of PTSD had experienced significantly more potentially traumatic events compared to those without the subtype and trauma-exposed controls (Tsai et al., 2015). Dissociation experienced during the occurrence of or immediately after the traumatic event (peritraumatic dissociation) is also predictive of the development of PTSD, particularly among treatment-seeking samples (Ozer, Best, Lipsey, & Weiss, 2003). In a sample of 223 junior police officers and 132 Canadian police officers, respectively, peritraumatic dissociation has been identified as the most significant

risk factor for developing post-traumatic stress symptoms (Hodgins, Creamer, & Bell, 2001), as well as both full and sub-syndromal PTSD (Martin, Marchand, Boyer, & Martin, 2009). Moreover, in a Canadian sample of 432 treatment seeking military veterans, greater dissociation severity was associated with greater PTSD severity (Armour et al., 2014).

Dissociation and PTSD symptom severity are also significantly higher among individuals who have experienced childhood sexual abuse than those without this history (Carlson, Yates, & Sroufe, 2009; Frewen, Zhu, Lanius, & Frewen, 2019; Rivera-Vélez, González-Viruet, Martínez-Taboas, & Pérez-Mojica, 2014; Steuwe, Lanius, & Frewen, 2012). Findings that early childhood adversity positively correlates with dissociation in adulthood (Wolf et al., 2012b) suggest that the early onset of trauma in vulnerable youth populations may be associated with the development of psychopathological patterns of coping and emotion regulation (D'Andrea, Ford, Stolbach, Spinazzola, & van der Kolk, 2012). Emotion regulation is particularly impaired in those with dissociative symptoms (Bennett, Modrowski, Kerig, & Chaplo, 2015; Lanius et al., 2010; Powers, Cross, Fani, & Bradley, 2015) and compelling neuroimaging research demonstrates that dissociative symptoms may arise from emotion overmodulation due to prefrontal inhibition of limbic regions (Lanius et al., 2018, 2010). Abnormally high activation in the prefrontal regions that modulate arousal and regulate emotion are specifically thought to be a response mechanism to deal with the overwhelming experience of trauma.

The above findings linking greater trauma severity in PTSD with high dissociation to a more severe illness course are consistent with evidence from the World Mental Health Surveys (Stein et al., 2013), demonstrating that dissociation is associated with increased PTSD symptoms and functional impairment, as well as self-harm and suicidality (Foote, Smolin, Neft, & Lipschitz, 2008). Recently, Boyd et al. (2018) identified dissociative symptoms as mediating the relation between PTSD symptom severity and functional impairment, underlining the importance of addressing dissociative symptoms for successful recovery and resumption of functional roles. Moreover, differences in symptom profiles between individuals with and without elevated levels of dissociative symptoms suggest that treatment efficacy and response may differ across subtypes (Cloitre, Petkova, Wang, & Lu, 2012; Lanius, Brand, Vermetten, Frewen, & Spiegel, 2012). Further complicating treatment is the finding that PTSD characterized by dissociative symptoms may be accompanied by psychiatric comorbidities. In fact, individuals diagnosed as having PTSD with dissociation are more likely than those without dissociation to meet criteria for depression, anxiety, and alcohol use problems, even when PTSD symptoms are controlled for (Tsai et al., 2015). Although in treatment-seeking samples,

rates of psychiatric comorbidities are expected to be higher, little is known about rates of dissociation in Canadian PSP seeking treatment for PTSD.

Currently, there are only a few studies that have investigated PTSD and trauma-related mental health in a Canadian PSP sample (Carleton, Afifi, Turner, Duranceau, et al., 2018a; Carleton et al., 2019, 2018), and only one study to date has reported on dissociation and related clinical characteristics of treatment-seeking Canadian PSP with PTSD (Boyd et al., 2018). We found that total dissociative symptoms and derealization significantly mediated the relation between PTSD symptoms and functional impairment in a sample of Canadian PSP, military members, and veterans (Boyd et al., 2018). We identified dissociative symptoms as the strongest correlate of functional impairment across our sample. However, only 27 participants were PSP, highlighting the importance of conducting this research among Canadian PSP who may be experiencing significantly reduced functional roles. Even within North America, Canada differs from the USA in the organizational structure of public safety, law enforcement, and use of emergency powers (Hebdon & Jalette, 2008; Scheppele, 2006), making it crucial to explore how post-traumatic stress affects Canadian front-line personnel. As a result, there is an urgent need to assess the relations between dissociative symptoms, PTSD severity, and other clinical characteristics among highly traumatized populations like Canadian PSP to better understand how individuals present and respond to PTSD treatment. The current study is designed to address such characteristics in a sample of Canadian PSP with a presumptive diagnosis of PTSD with the prediction that dissociation will be associated with a severe illness presentation. Specifically, it was hypothesized that PSP with higher levels of depersonalization and derealization would demonstrate more severe PTSD symptoms, elevated levels of emotion dysregulation, and reduced functional roles.

2. Method

2.1. Participants

This study investigated 50 patients who self-identified as current or former PSP (e.g. police, firefighters, paramedics) seeking treatment related to trauma exposure. The data were combined from a feasibility study in an inpatient unit, and a randomized control trial (RCT) within an outpatient programme, both at the Post-Traumatic Stress Recovery programme at Homewood Health Centre, examining the efficacy of the same psychological intervention (i.e. Goal Management Training; Levine et al., 2011). Both studies were approved by the Homewood Health Centre Research Ethics board (REB #17-03 and REB #15-29, respectively). All individuals gave written consent to participate and those data discussed here were

obtained from the baseline testing session prior to group commencement and group assignment. Individuals were eligible for the study if they were between the age of 18–65, could provide written informed consent, were fluent in written and spoken English, and had a presumptive diagnosis of PTSD as indicated by a score of 33 or higher on the PTSD Checklist for DSM-5 (PCL-5; Wortmann et al., 2016). Participants were ineligible if they had a medical disorder within the past 12 months known to adversely affect cognition. In the first dataset, inpatients were also ineligible if they were receiving treatment with anti-cholinergic or anti-psychotic medication, or have had electroconvulsive therapy within the past year ($n = 24$). In the second dataset, outpatients were ineligible if they indicated alcohol and/or substance abuse within the past 3 months ($n = 64$). These participants were recruited from multiple sites across Ontario including: The Post-Traumatic Stress Recovery (PTSR) programme at Homewood Health Centre, Homewood Health's outpatient clinics (e.g. Mississauga Clinic), PTSR programme's external referral agencies that also serve clients via outpatient services/programmes (e.g. Military Family Resource Centres), external community agencies and support groups (e.g. KW Counselling Services, Military Casualty Support Foundation, Project Trauma Support, etc.), and social media (e.g. Facebook groups, Twitter, etc.). From these two studies, 16 of the 24 inpatients and 34 of the 64 outpatients identified as being current and former PSP and denied they were a current or former military member or veteran. Therefore, a total of 50 individuals were eligible for and included in the current study.

2.2. Design

The baseline testing session lasted approximately four to six hours where a clinician obtained demographic information (age, sex, race, and years of education), and an estimate of premorbid intelligence using the Wechsler Test of Adult Reading (WTAR; Wechsler, 2001). An extensive battery of functional and clinical symptom measures was also administered.

Functional measures included the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0; World Health Organization, 2000). The WHODAS 2.0 is a 12-item self-report questionnaire on a 5-point Likert scale (1 = *none*, 5 = *extreme/cannot do*) that assesses difficulties in six functional domains including (1) cognition, (2) mobility, (3) self-care, (4) getting along with others, (5) life activities, and (6) participation in the community. Domain 1 assesses difficulties understanding and communicating with others, such as finding solutions to problems, understanding what people say, and starting and maintaining conversations. Domain 2 probes how

difficult it is to stand up, sit down, move around inside the home, as well as get out of the home. Domain 3 asks about challenges in eating and being alone for a few days. Domain 4 assesses difficulties getting along with people, making new friends, and sexual activities. Domain 5 examines difficulties related to completing household tasks, including doing such tasks well and as quickly as needed. Finally, domain 6 probes problems related to barriers in their world, living with dignity, time spent on their health condition, financial drain, and family problems related to their health condition.

Other symptom-based measures included the PCL-5 (Weathers et al., 2013), a 20-item self-report questionnaire assessing the severity of DSM-5 PTSD symptom clusters. Intrusive symptoms included items related to memories, dreams, flashbacks, cued distress, and cued physical reactions. Avoidance symptoms referred to avoidance of internal and external reminders. Negative alterations in mood and cognitions held items related to dissociative amnesia, negative beliefs, blame, negative feelings, loss of interest, detachment or estrangement, and numbing. Alterations of arousal and reactivity contained items related to irritability or aggressive behaviour, reckless behaviour, hypervigilance, startle, concentration, and sleep. The PCL-5 has been found to be a reliable and valid tool for detecting a PTSD diagnosis using a cut-off score of 33 (Wortmann et al., 2016). Among military veteran samples, the gold standard Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) has shown good convergent validity with the PCL-5 ($r = 0.66$) for total PTSD severity scores, and signal detection analyses demonstrated that PCL-5 scores between 31 and 33 were optimally efficient in predicting a CAPS-5 diagnosis according to DSM-5 PTSD Criteria A-G (Bovin et al., 2016; Weathers et al., 2018).

The Multiscale Dissociation Inventory (MDI; Brière, 2002), a 30-item self-report inventory on a 5-point Likert scale (1 = *never*, 5 = *very often*), was used to measure dissociation. The MDI measures six domains of dissociation including disengagement (e.g. staring into space without thinking), depersonalization (e.g. feeling like you don't belong in your body), derealization (e.g. feeling like you were in a dream), emotional constriction (e.g. not being able to feel emotions), memory disturbance (e.g. having blank spells), and identity dissociation (e.g. different people taking charge inside of your mind). Because the MDI assesses dissociation symptoms more broadly, our study focused on the two subscales of depersonalization and derealization symptoms, which are specifically indicated in the diagnostic criteria for the dissociative subtype of PTSD (American Psychiatric Association, 2013; Dorahy & van der Hart, 2015; Lanius et al., 2012). Notably, the combined items of the depersonalization and derealization subscales of

the MDI have been found to represent a single underlying dimension (Briere, Weathers, & Runtz, 2005).

Finally, the Difficulties in Emotion Regulation Scale (DERS; Roemer & Gratz, 2004) is a 36-item multidimensional measure on a 5-point Likert scale (1 = *almost never*, 5 = *almost always*) of difficulties in emotion regulation including nonacceptance of emotional responses, difficulty engaging in goal-directed behaviour, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity.

2.3. Statistical analyses

Statistical analyses were conducted using R version 4.0.0 (R Core Team, 2019). Missing values in the data were considered to be missing at random, with a total of 11.1% missing data. There were 21 out of 50 patients (42%) with incomplete data, of which patients were missing 2.3–72.1% of the values. The percentage of missing values across all variables ranged from 0.0% to 0.22%. Missing data were multiply imputed using multivariate imputation by chained equations using the ‘mice’ package (van Buuren & Groothuis-Oudshoorn, 2011). Multiple imputation replaces each missing value by a set of $m > 1$ plausible values and generates m complete datasets. Superior to a single imputation, multiple imputation with $m = 20$ has been reviewed as a highly effective way to estimate missing data points while accounting for uncertainty due to missing values (Graham, Olchowski, & Gilreath, 2007; Schafer & Graham, 2002). The following results were obtained from pooling the results of each of the 20 imputed datasets and combined using Rubin’s rules (Rubin, 1987). Continuous variables in all regression models were scaled (mean set to 0) to allow for easier interpretation of the magnitude of effects, and all R^2 values were adjusted to account for multiple predictors. Due to the nature of multiple imputation, some patients for whom values were imputed may have been classified as having elevated levels of dissociation in some imputed datasets while not in others. As a result, the n referring to a subset of the sample was not always a whole number. Hence, percentages of the sample were additionally reported.

Table 1. Demographic characteristics of the study sample.

Characteristics	Mean (SD)			% of sample (n)
	Age	Education	WTAR	
Dissociation				
≥ $M + 1SD$	44.9 (6.4)	16.6 (2.1)	108.9 (10.8)	24.4 (12.2)
< $M + 1SD$	44.9 (6.7)	16.9 (2.6)	111.1 (7.9)	75.6 (37.8)
Sex				
Female	44.1 (6.3)	17.1 (3.0)	110.8 (7.8)	38.2 (19.1)
Male	45.3 (7.0)	16.6 (2.2)	110.4 (9.4)	61.8 (30.9)
Patient status				
Inpatient	46.7 (6.2)	15.8 (2.3)	103.1 (9.8)	32.0 (16)
Outpatient	44.0 (6.8)	17.3 (2.5)	114.1 (5.4)	68.0 (34)

To examine levels of PTSD-related dissociation in the sample, we identified individuals as having elevated levels of dissociation if they had a depersonalization or derealization score that was 1 SD above the mean. Multiple linear regressions were conducted to test whether dissociation scores (derealization and depersonalization) significantly predict numerous clinical variables, while controlling for sex and patient status. Therefore, multiple linear regression models included dissociation score, sex (0 = *female*, 1 = *male*), and patient status (0 = *inpatient*, 1 = *outpatient*) as predictors, and the dependent variables tested are listed in Table 3. All the statistical tests were 2-tailed at $\alpha = 0.05$, 95% CI, $p < .05$, while the significance level for subscales were set at $p < .01$ to reduce Type I error.

3. Results

3.1. Demographic characteristics

Age ranged from 34 to 60 years ($M = 44.9 \pm 6.7$), total years of education from 12 to 24 years ($M = 16.8 \pm 2.5$), and females made up 38.2% ($n = 19.1$) of the sample (Table 1). In this sample, 24.4% ($n = 12.2$) of individuals were identified as having elevated levels of dissociation, such that their depersonalization or derealization scores were at least 1 SD above their respective means (Table 2). Elevated levels of dissociation were present in 28.3% ($n = 14.2$) of females and in 22.0% ($n = 11$) of males. Inpatients accounted for 32.0% ($n = 16$) of the sample, within which 38.8% ($n = 6.2$) were classified as having elevated dissociation. Outpatients made up 68.0% ($n = 34$) of the sample, of which 17.6% ($n = 6$) had elevated dissociation. Age, years of education, and estimated premorbid intelligence (WTAR) did not significantly differ between the those with and without elevated dissociation ($p > .40$). Mean values are reported in Table 1 broken down by dissociation score, sex, and patient status.

3.2. Clinical characteristics

Multiple regression results revealed that the dissociation score (depersonalization and derealization) significantly predicted total PCL-5 score ($\beta = .43$, $p = .003$) and explained 28.7% of the variance, controlling for sex and patient status (Table 3). Dissociation scores did not significantly predict PCL-5 subscales assessing

Table 2. Mean depersonalization and derealization scores of individuals with and without elevated levels of dissociation.

Dissociation	Mean (SD)		
	≥ $M + 1SD$	< $M + 1SD$	Total
Depersonalization	13.1 (3.8)	6.4 (1.7)	8.0 (3.8)
Derealization	14.5 (3.8)	6.9 (2.0)	8.7 (4.1)

Table 3. Regression analyses summary for dissociation (depersonalization and derealization) predicting PTSD symptom severity (PCL-5), controlling for sex and patient status, $N = 50$.

PTSD symptom severity	Adj R^2	Predictor	β	SE	CI	$t(p)$
PCL-5 total	0.287	Dissociation	.43	.14	0.16–0.71	3.18 (.003)**
		Sex	-.21	.26	-0.74–0.32	-0.81 (.424)
		Patient status	-.69	.29	-1.28–-0.11	-2.41 (.022)*
PCL-5 reactivity/arousal	0.216	Dissociation	.36	.16	0.04–0.69	2.32 (.029)*
		Sex	-.11	.32	-0.77–0.56	-0.33 (.741)
		Patient status	-.65	.32	-1.31–0.01	-2.02 (.053)
PCL-5 mood/cognitions	0.189	Dissociation	.31	.17	-0.05–0.68	1.81 (.086)
		Sex	-.15	.29	-0.74–0.44	-0.51 (.614)
		Patient status	-.68	.35	-1.40–0.03	-1.97 (.061)
PCL-5 intrusions	0.158	Dissociation	.36	.18	-0.02–0.73	1.98 (.062)
		Sex	-.27	.31	-0.90–0.35	-0.89 (.378)
		Patient status	-.40	.34	-1.10–0.31	-1.16 (.256)
PCL-5 avoidance	0.112	Dissociation	.28	.19	-0.11–0.68	1.49 (.153)
		Sex	-.23	.31	-0.86–0.40	-0.75 (.460)
		Patient status	-.44	.33	-1.11–0.23	-1.34 (.189)

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

reactivity/arousal, negative mood and cognition, intrusion, or avoidance symptoms ($p \geq .029$).

Total and subscale scores on the DERS were entered into multiple regression models, again controlling for sex and patient status (Table 4). Dissociation (depersonalization and derealization) significantly predicted the total DERS score ($\beta = .44$, $p = .002$) accounting for 21.3% of the variance. Depersonalization and derealization also significantly predicted DERS strategies subscale score ($\beta = .39$, $p = .008$), accounting for 18.2% of the variance. DERS subscales assessing impulse control, clarity, nonacceptance, awareness, and goals were not significantly predicted by dissociation score ($p \geq .022$).

On measures of functional impairment using the WHODAS 2.0, dissociation (depersonalization and derealization) significantly predicted total impairment score ($\beta = .48$, $p = .001$; Table 5) and accounted for 22.3% of the variance. WHODAS 2.0 subscales measuring getting along with people, understanding and communicating, life/household activities, participation in society, interference of difficulties on life, overall health, experiencing difficulty in the past 30 days, self-care, getting around were not significantly predicted by dissociation score ($p \geq .011$).

Table 4. Regression analyses summary for dissociation (depersonalization and derealization) predicting emotion dysregulation (DERS), controlling for sex and patient status, $N = 50$.

Emotion dysregulation	Adj R^2	Predictor	β	SE	CI	$t(p)$
DERS total	0.213	Dissociation	.44	.14	0.17–0.72	3.26 (.002)**
		Sex	.20	.28	-0.37–0.77	0.71 (.482)
		Patient status	-.45	.29	-1.04–0.15	-1.52 (.136)
DERS strategies	0.182	Dissociation	.39	.14	0.11–0.67	2.82 (.008)**
		Sex	.22	.30	-0.39–0.84	0.74 (.464)
		Patient status	-.47	.32	-1.12–0.18	-1.48 (.150)
DERS impulse control	0.149	Dissociation	.32	.15	0.01–0.63	2.14 (.040)*
		Sex	.40	.31	-0.22–1.02	1.32 (.196)
		Patient status	-.45	.34	-1.15–0.26	-1.30 (.206)
DERS clarity	0.129	Dissociation	.36	.15	0.06–0.66	2.41 (.022)*
		Sex	.20	.31	-0.42–0.82	0.64 (.525)
		Patient status	-.36	.34	-1.07–0.35	-1.05 (.303)
DERS nonacceptance	0.077	Dissociation	.33	.16	0.00–0.66	2.05 (.050)*
		Sex	-.20	.31	-0.84–0.43	-0.65 (.520)
		Patient status	-.05	.33	-0.72–0.62	-0.15 (.879)
DERS awareness	0.013	Dissociation	.24	.16	-0.08–0.55	1.52 (.138)
		Sex	-.02	.32	-0.67–0.63	-0.06 (.955)
		Patient status	-.08	.39	-0.89–0.73	-0.20 (.844)
DERS goals	0.069	Dissociation	.16	.16	-0.17–0.49	1.01 (.323)
		Sex	.29	.30	-0.32–0.89	0.96 (.342)
		Patient status	-.53	.34	-1.22–0.16	-1.57 (.126)

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

4. Discussion

In line with previous research that estimates 15–30% of individuals with PTSD experience the dissociative subtype, we found that 24.4% of individuals in our sample were characterized as having elevated levels of dissociation (Armour et al., 2014; Lanius et al., 2006, 2010, 2001; McKinnon et al., 2016; Stein et al., 2013; Tsai et al., 2015; Wolf et al., 2012a, 2012b). The prevalence of dissociative symptoms in our sample suggests that PSP may, like military samples, experience a high burden of PTSD-related illness. Moreover, we found that more severe symptoms of depersonalization and derealization were associated with a heightened burden of illness, including greater PTSD symptom severity, emotion dysregulation, and functional impairment, a finding that was maintained after controlling for sex.

Importantly, PSP who experienced elevated depersonalization and derealization symptoms appeared to

Table 5. Regression analyses summary for dissociation (depersonalization and derealization) predicting functional impairment (WHODAS 2.0), controlling for sex and patient status, $N = 50$.

Functional impairment	Adj R^2	Predictor	β	SE	CI	$t(p)$
WHODAS 2.0 total	0.223	Dissociation	.48	.13	0.21–0.74	3.63 (.001)***
		Sex	–.20	.28	–0.77–0.38	–0.70 (.491)
		Patient status	–.26	.29	–0.86–0.34	–0.88 (.384)
WHODAS 2.0 getting along	0.164	Dissociation	.40	.15	0.10–0.71	2.70 (.011)*
		Sex	.26	.30	–0.36–0.88	0.86 (.398)
		Patient status	–.32	.33	–1.01–0.36	–0.96 (.343)
WHODAS 2.0 understanding	0.143	Dissociation	.38	.16	0.04–0.72	2.31 (.029)*
		Sex	–.32	.30	–0.92–0.28	–1.07 (.290)
		Patient status	.12	.37	–0.65–0.88	0.31 (.757)
WHODAS 2.0 life activities	0.119	Dissociation	.28	.15	–0.03–0.59	1.84 (.075)
		Sex	–.40	.30	–1.01–0.21	–1.33 (.193)
		Patient status	–.40	.35	–1.12–0.32	–1.15 (.259)
WHODAS 2.0 society participation	0.108	Dissociation	.38	.15	0.07–0.70	2.48 (.019)*
		Sex	–.01	.31	–0.63–0.61	–0.03 (.978)
		Patient status	–.07	.34	–0.77–0.63	–0.20 (.841)
WHODAS 2.0 interference	0.107	Dissociation	.26	.16	–0.08–0.59	1.58 (.127)
		Sex	.04	.30	–0.57–0.65	0.14 (.888)
		Patient status	–.56	.39	–1.38–0.26	–1.42 (.171)
WHODAS 2.0 difficulty 30 days	0.052	Dissociation	.17	.18	–0.19–0.54	0.99 (.333)
		Sex	–.42	.32	–1.08–0.24	–1.29 (.206)
		Patient status	–.19	.39	–1.00–0.62	–0.49 (.630)
WHODAS 2.0 self-care	0.007	Dissociation	.23	.16	–0.10–0.55	1.43 (.161)
		Sex	–.05	.32	–0.70–0.61	–0.14 (.889)
		Patient status	–.10	.35	–0.81–0.61	–0.29 (.772)
WHODAS 2.0 getting around	0.005	Dissociation	.17	.15	–0.15–0.48	1.09 (.284)
		Sex	–.29	.31	–0.92–0.35	–0.92 (.365)
		Patient status	–.14	.36	–0.89–0.60	–0.40 (.694)
WHODAS 2.0 overall health	0.000	Dissociation	.07	.17	–0.28–0.42	0.43 (.672)
		Sex	–.02	.32	–0.68–0.64	–0.05 (.958)
		Patient status	.05	.40	–0.78–0.87	0.12 (.905)

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

experience greater difficulty regulating their emotions, suggesting that dissociative symptoms may impact upon emotional regulation in this population. Our results suggest that those who experience depersonalization and derealization symptoms may be less able

to regulate their emotions (DERS strategies). Interestingly, Powers et al. (2015) found that both strategies and clarity were the only DERS subscales significantly predicting dissociative symptoms in a sample of 154 trauma-exposed individuals. These findings are in line with the common symptom profile of the dissociative subtype of PTSD, which is marked by emotional detachment, numbness, and blunted arousal. Such notions would also be consistent with dissociation being strongly negatively correlated with self-concept clarity (Evans, Reid, Preston, Palmier-Claus, & Sellwood, 2015), as well as cognitive reappraisal gains being partially dependent on having increased emotional clarity (Boden, Bonn-Miller, Kashdan, Alvarez, & Gross, 2012). This appears to be supported by an RCT evaluating changes in PTSD symptoms and diagnosis among 121 chronic PTSD patients randomly assigned to cognitive therapy, waitlist, or emotion-focused supportive therapy, which targeted clarifying the patient's emotions without cognitive restructuring or elaboration of the trauma memories (Ehlers et al., 2014). They found that 43% of the patients that received 12-week emotion-focused supportive therapy no longer met criteria for PTSD post-treatment, and 40% did not meet criteria for PTSD at week 40. Individuals with elevated levels of trauma-related dissociation may therefore benefit from treatment building strategies that facilitate emotional awareness (e.g. through the use of body scans; Frewen & Lanius, 2015) and regulation of emotions.

One such treatment targeting emotion regulation is dialectical behaviour therapy (DBT) which was developed, and remains the gold standard treatment, for individuals with borderline personality disorder (BPD; Lynch, Trost, Salsman, & Linehan, 2007). Individuals with BPD who receive DBT have demonstrated significantly steeper declines in both emotional dysregulation and self-harm incidents compared to those receiving treatment focused on mentalizing (mentalization-based therapy) the states of self and of others (Barnicot & Crawford, 2019). This treatment has also been adapted for individuals suffering from PTSD (Bohus et al., 2013, 2020) and has been shown to be effective in reducing emotion dysregulation. Here, Bohus et al. (2013) evaluated the efficacy of a 12-week residential programme of DBT for PTSD in a sample of treatment-resistant female patients with an index trauma of childhood sexual abuse. Although approximately half of these patients had comorbid BPD, their PTSD symptoms improved substantially after treatment completion as compared to a treatment-as-usual waitlist control group. More recently, Bohus et al. (2020) conducted a multicentre RCT comparing the efficacy of DBT for PTSD to Cognitive Processing Therapy (CPT), a leading

evidence-based treatment for PTSD targeting unhelpful trauma-related cognitions (Resick et al., 2008; Watts et al., 2013). Researchers randomized a sample of 193 treatment-seeking women with childhood abuse-related PTSD, BPD symptoms, and affective instability, to either DBT-PTSD or CPT, and found that both groups showed significant improvements in PTSD symptoms. Interestingly, DBT-PTSD outperformed CPT on several other measures, with more pronounced improvements in PTSD symptoms, significantly steeper decreases in the intensity of dissociative symptoms, and greater rates of symptom remission (Bohus et al., 2020). Taken together, these findings highlight the potential efficacy of therapies facilitating emotion regulation, such as DBT, in reducing dissociative symptoms in severe PTSD, even in the presence of other complex clinical conditions.

In the present study, functional impairment (WHODAS 2.0) was also strongly associated with depersonalization and derealization symptoms, accounting for nearly a quarter of the variance in functional outcomes in this sample. Here, a number of specific functional subdomains approached significance ($.011 \leq p \leq .029$), including getting along with other people, understanding and communicating, and participation in society, all of which concern social life (e.g. the ability to deal with people they did not know, maintaining friendships, finding solutions to problems, understanding what people say, starting and maintaining conversations, joining in community activities). Given these findings, it appears probable that individuals with severe dissociative symptoms may experience difficulties, in particular, with social functioning. Studies by Nazarov et al. (2014, 2015) found impaired performance on tests of social cognition among those with PTSD experiencing dissociative symptoms. Specifically, identity dissociation, amnesia, and disengagement symptoms were associated with reduced accuracy in identifying positive and neutral mental states from facial expressions, poor performance in accurately identifying kinship relationships using verbal and non-verbal cues from a social scene (Nazarov et al., 2014). Identity dissociation and depersonalization (and derealization, marginally) were also associated with reduced accuracy in identifying emotions based on prosody (Nazarov et al., 2015). Interestingly, the odds of screening positively for social anxiety disorder has been associated with increased frequency of exposure to traumatic events among Canadian PSP (Carleton et al., 2019). Accordingly, it will be important to carefully assess levels of social resources and social functioning among individuals with PTSD who present clinically, particularly when dissociative symptoms are prominent. This is particularly concerning as social support and seeking support coping have been found to contribute

to posttraumatic growth (Prati & Pietrantonio, 2009) as well as recovery from PTSD (Dai et al., 2016).

Despite careful design of the study, it comes with its limitations. We did not employ a clinician-administered interview to diagnose PTSD and instead relied on a self-report PCL-5 for a provisional PTSD diagnosis. Although the PCL-5 is considered a reliable and valid method of detecting PTSD, our study may have been strengthened by a clinician-confirmed diagnosis of PTSD using a more structured interview (Wortmann et al., 2016). Due to the small sample size, this study collapsed all PSP into one group (including firefighters, police officers, and ambulance personnel). As a result, the effect of subgroups could not be further explored, thus limiting our ability to determine whether some occupations may be at greater risk of developing dissociative symptoms than others. A recent study suggestive of differential rates of mental disorders among Canadian PSP where RCMP, paramedics, and correctional workers were at greater risk of developing most mental disorders than firefighters and police officers (Carleton, Afifi, Turner, Duranceau, et al., 2018a). Systematic reviews of the literature also indicate that PTSD prevalence rates may vary slightly by occupational group: 7–19% in law enforcement, 17–22% in firefighters, 13.34–15.56% in dispatchers (Klimley, Van Hasselt, & Stripling, 2018), and 20% in ambulance service populations (Sterud, Ekeberg, & Hem, 2006). A larger sample size may also have enhanced our ability to detect the dissociative subtype using the conservative T-score cut-off greater than or equal to 80 on subscales of the MDI (Brière, 2002; Herzog, DePierro, & D'Andrea, 2018). This would have created an expectedly greater variance in dissociative symptom presentations that may have allowed for a greater range of MDI scores.

In addition, we were unable to study histories of childhood trauma because the two inpatient and outpatient samples employed different measures which could not be reliably compared. Childhood emotional, physical, and sexual abuse are considered to play important roles in dissociative symptoms and PTSD severity and would have been highly relevant to our study (Bennett et al., 2015; Herzog et al., 2018; Powers et al., 2015). Nonetheless, we investigated other variables that have been indirectly associated with childhood trauma such as emotion regulation, which was found to be significantly dysregulated among those who experience elevated levels of dissociation.

Despite these limitations, our data point towards a severe clinical symptom presentation among traumatized PSP who experience dissociative symptoms, with consistent patterns observed across clinical measures assessing PTSD symptom severity, emotion regulation skills, and impairment in important life domains. Our findings are in line with existing

literature where we report comparable proportions of individuals diagnosed with and without the dissociative subtype of PTSD, as have been observed in past samples. The complexity of treating and managing a severe illness presentation such as highly dissociative PTSD is compounded by the high comorbidity rates of psychiatric disorders. Rates of comorbidity in PTSD range from 62% to 92%, and commonly include major depressive disorder, panic disorder, generalized anxiety disorder, social anxiety disorder, specific phobias, and alcohol and substance use disorders (Brown, Campbell, Lehman, Grisham, & Mancill, 2001). Certain dual diagnoses like social anxiety disorder with dissociative PTSD may pose a serious risk if they make social support less accessible or relationships more difficult to manage, especially if dissociative symptoms are already associated with significantly reduced functional roles and severe emotion dysregulation as found in our study. Our findings capture an important population in Canada that is understudied yet experience persistent traumatic events that have severe implications for individual well-being and the healthcare system. Improving our understanding of how dissociative symptoms impact emotional adjustment, functioning in daily life, and vulnerability to other mental illnesses will have important implications for identifying specific treatment needs when PTSD presents with dissociation.

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ORCID

Anna H. Park  <http://orcid.org/0000-0002-6195-5789>
 Alina Protopopescu  <http://orcid.org/0000-0001-8896-0281>
 Jenna E. Boyd  <http://orcid.org/0000-0001-8710-2066>
 Ruth A. Lanius  <http://orcid.org/0000-0002-3758-1393>
 Margaret C. McKinnon  <http://orcid.org/0000-0002-8315-7657>

Data availability statement

Due to the ethical concerns of publicly sharing private patient data, supporting data from this study is not available.

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