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CLINICAL RESEARCH ARTICLE

Do morally injurious experiences and index events negatively impact intensive PTSD treatment outcomes among combat veterans?

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ABSTRACT

Background: It has been suggested that current frontline posttraumatic stress disorder (PTSD) treatments are not effective for the treatment of moral injury and that individuals who have experienced morally injurious events may respond differently to treatment than those who have not. However, these claims have yet to be empirically tested.

Objective: This study evaluated the rates of morally injurious event exposure and morally injurious index trauma and their impact on PTSD (PCL-5) and depression symptom (PHQ-9) reductions during intensive PTSD treatment.

Method: Data from 161 USA military combat service members and veterans (91.3% male; mean age = 39.94 years) who participated in a 3-week Cognitive Processing Therapy (CPT)-based intensive PTSD treatment programme (ITP) was utilized. Morally injurious event exposure was established via the Moral Injury Event Scale (MIES). Index traumas were also coded by the treating clinician. Linear mixed effects regression analyses were conducted to examine if differences in average effects or trends over the course of treatment existed between veterans with morally injurious event exposure or index trauma and those without.

Results: Rates of morally injurious event exposure in this treatment sample were high (59.0%-75.2%). Morally injurious event exposure and the type of index trauma did not predict changes in symptom outcomes from the ITP and veterans reported large reductions in PTSD ($d = 1.35$–1.96) and depression symptoms ($d = 0.95$–1.24) from pre- to post-treatment. Non-inferiority analyses also demonstrated equivalence across those with and without morally injurious event exposure and index events. There were no significant gender differences.

Conclusions: The present study suggests that PTSD and depression in military veterans with morally injurious event exposure histories may be successfully treated via a 3-week CPT-based ITP.

¿Tienen las experiencias moralmente dañinas y los eventos índices un impacto negativo en los resultados del tratamiento intensivo del TEPT en los veteranos de combate?

Antecedentes: Se ha sugerido que los tratamientos actuales de primera línea para el trastorno de estrés postraumático (TEPT) no son efectivos para el tratamiento del daño moral y que las personas que han experimentado eventos moralmente dañinos pueden responder de manera diferente al tratamiento que las que no lo han hecho. Sin embargo, estas afirmaciones aún no se han probado empíricamente.

Objetivo: Este estudio evaluó las tasas de exposición a eventos moralmente dañinos y trauma índice moralmente dañino y su impacto en las reducciones de síntomas del TEPT (PCL-5) y de depresión (PHQ-9) durante el tratamiento intensivo para TEPT.

Método: Se utilizaron datos de 161 miembros y veteranos del servicio militar de combate de los Estados Unidos (91,3% hombres; edad promedio = 39,94 años) que participaron en un programa de tratamiento intensivo de TEPT (ITP en su sigla en inglés) basado en la Terapia de procesamiento cognitivo (CPT en su sigla en inglés) durante 3 semanas. La exposición a eventos moralmente dañinos se estableció mediante la Escala de eventos de daño moral (MIES en su sigla en inglés). Los traumas índice también fueron codificados por el médico tratante. Se llevaron a cabo análisis de regresión de efectos mixtos lineales para examinar si existían diferencias en los efectos promedio o las tendencias durante el curso de tratamiento en los veteranos con exposición a eventos moralmente perjudiciales o trauma índice y los que no.

Resultados: Las tasas de exposición a eventos moralmente dañinos en esta muestra de tratamiento fueron altas (59,0% −75,2%). La exposición a eventos moralmente dañinos y el tipo de trauma índice no predijeron cambios en los resultados de los síntomas de la ITP y los veteranos reportaron grandes reducciones en los síntomas de TEPT (d = 1.35-1.96) y de depresión (d = 0.95-1.24) entre el pre- y post- tratamiento. Los análisis de no inferioridad también demostraron equivalencia entre aquellos con y sin exposición a eventos moralmente dañinos y eventos índice. No hubo diferencias de género significativas.

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Conclusiones: El presente estudio sugiere que el TEPT y la depresión en los veteranos militares con antecedentes de exposición a eventos moralmente dañinos pueden tratarse con éxito mediante un IPT basado en CPT de 3 semanas.

道德伤害经历和指标事件会对战斗退伍军人密集PTSD治疗结果产生负面影响吗？

背景: 当前一线创伤后应激障碍 (PTSD) 治疗已被表明对精神伤害的治疗无效，经历过精神伤害事件的人对治疗的反应可能与未遭受精神伤害的人不同。但是，这些声明尚未经过实证检验。

目的: 本研究评估了密集PTSD治疗期间道德伤害事件暴露和道德伤害指标创伤的发生率及其对PTSD症状 (PCL-5) 和抑郁症状 (PHQ-9) 减少的影响。

方法: 使用来自161名参加了3周认知加工疗法 (CPT) 的密集PTSD治疗计划 (ITP) 的美国军队战斗服役人员和退伍军人 (91.3％为男性;平均年龄为39.94岁) 的数据。通过道德伤害事件量表 (MIES) 确定了道德伤害事件的暴露程度。指标创伤也由主治临床医生编码。进行了线性混合效应回归分析，以考查治疗过程中的平均效果或趋势在经历过精神伤害事件或指标创伤的退伍军人与没有经历这些的退伍军人之间是否存在差异。

结果: 道德伤害事件在该治疗样本中暴露率很高 (59.0％-75.2％) 。精神伤害事件的暴露和指标创伤的类型不能预测ITP的症状结果变化，退伍军人报告了治疗前后PTSD症状 (d = 1.35-1.96) 和抑郁症状 (d = 0.95-1.24) 的大幅减少。非劣势性分析也表明这些效果在有无道德伤害事件暴露和指标事件方面等价。无显著性别差异。

结论: 本研究表明，有道德伤害事件暴露历史的退伍军人的PTSD和抑郁，也许可以通过3周基于CPT的ITP成功治疗。

1. Background

Litz and colleagues (Litz et al., 2009) define *moral injury* as reactions to 'perpetrating, failing to prevent, bearing witness to, or learning about acts that transgress deeply held moral beliefs and expectations' (p. 697). Situations that lead to the violation of deeply held beliefs or moral values are referred to as *morally injurious events* (Nash et al., 2013). Morally injurious events may include acts of commission or omission, as well as a betrayal by others (Drescher et al., 2011; Nash et al., 2013). Morally injurious events have been predominantly studied in military contexts (cf. Frankfurt & Frazier, 2016). Common examples include perpetration- and omission-based traumas, such as the harming or killing of non-combatants (Hoge et al., 2004; Maguen et al., 2010), and witnessing but failing to prevent adverse events (Griffin et al., 2019), which also fit the definition of a Criterion A traumatic event according to the DSM-5 definition for PTSD (American Psychological Association, 2013). The experience of morally injurious events is associated with PTSD and depression (Williamson, Stevelink, & Greenberg, 2018) and is thought to be a risk factor for the development of various mental health problems (Castro & McGurk, 2007; Held et al., 2018b; Litz et al., 2009). An initial examination of the prevalence of morally injurious experiences based on a nationally representative sample of veterans suggested that approximately 10.8% of combat veterans reported having committed transgressions themselves, 25.5% reported having witnessed others committing transgressions, and 25.5% endorsed betrayal (Wisco et al., 2017).

Many have argued that posttraumatic stress disorder (PTSD) and moral injury meaningfully differ from one another (for review see: Griffin et al., 2019). Recent research has suggested that PTSD and moral injury do share overlap in presentation (e.g., depression, anger, substance use, sleep issues), but still they have distinct symptom profiles (Bryan, Bryan, Roberge, Leifker, & Rozek, 2018). Moral injury has been uniquely associated with guilt, shame, social alienation, and anhedonia. Similarly, PTSD has been uniquely associated with physiological responses (e.g., startle), memory loss, and flashbacks. Although some have discussed the idea of a separate diagnosis of moral injury, there is not currently a category in the DSM-5 to account for this presentation (Bryan et al., 2018). Many individuals who experience moral injury are diagnosed with PTSD, yet no study has directly tested if the current frontline treatments used for PTSD can be effective for those with moral injury.

Given the unique symptom profiles of PTSD and moral injury, it has been suggested that frontline evidence-based treatments for PTSD may not be as effective among veterans with morally injurious experiences (Gray et al., 2012; Griffin et al., 2019; Steenkamp, Nash, Lebowitz, & Litz, 2013). Moreover, meta-analyses have shown that military populations demonstrate overall poorer outcomes to evidence-based psychotherapies compared to civilians (Straud, Siev, Messer, & Zalta, 2019), possibly due to morally injurious events within military populations. Alternatively, others have suggested that moral injury can be conceptualized in a theoretically congruent model and current treatments can be effective (Currier, Drescher, & Nieuwsma, 2020; Rozek & Bryan, 2020). Both cognitive and emotional processing theories of PTSD argue that exaggerated negative beliefs about the trauma play an important role in the development and maintenance of PTSD (Ehlers & Clark, 2000; Zalta, 2015). Similarly, negative event-related beliefs may play

an important role in moral injury. One cross-sectional study has shown that negative posttraumatic cognitions that are thought to play a role in the aetiology of PTSD mediate the relationship between morally injurious experiences and trauma-related psychopathology (Held et al., 2017). Additionally, several clinicians and researchers have provided theoretical arguments and case report data to suggest that existing evidence-based cognitive-behavioural interventions, such as Cognitive Processing Therapy (CPT; Resick, Monson, & Chard, 2017) and Prolonged Exposure (PE; Foa, Hembree, Rothbaum, & Rauch, 2019), may be effective for the treatment of moral injury-based PTSD (Held, Klassen, Brennan, & Zalta, 2018a; Pearce, Haynes, Rivera, & Koenig, 2018; Smith, Duax, & Rauch, 2013; Wachen, Dondanville, & Resick, 2017). Although the justification for evidenced-based treatments for PTSD being effective or not are the topic of many academic discussions, no published study to date has examined whether individuals who have experienced morally injurious events respond differently to evidence-based psychotherapies for PTSD than those who have not.

The purpose of the present study was to fill the existing gaps in the literature regarding the prevalence of and the impact of morally injurious events on veterans' responses to PTSD treatment. Individuals who have experienced morally injurious events often believe they should have acted differently and view themselves negatively as a result of their actions or inactions. Identifying and challenging such maladaptive cognitions which drive distress is the key focus of CPT, which may make it particularly well suited to address moral injury-based PTSD (Held et al., 2018a; Rozek & Bryan, 2020; Wachen et al., 2017). Using data from a 3-week Cognitive Processing Therapy (CPT)-based intensive treatment programme (ITP) for PTSD, we evaluated whether a history of morally injurious event exposure or targeting a morally injurious index event during treatment impacted symptom severity and response to treatment. Due to our a priori hypothesis that we would not observe treatment outcome differences between veterans with and without histories of morally injurious events, we also conducted non-inferiority analyses.

2. Method

2.1. Participants

The sample (N = 161) consisted of 11 service members and 150 veterans (SMVs) who participated in a 3-week Cognitive Processing Therapy-based intensive PTSD treatment programme (ITP) between June 2016 and July 2019 (Held, 2020). The sample consisted of 147 males (91.30%) and 14 females (8.70%) with an average age of 39.94 years (SD = 8.27, range = 25–65). The SMVs in the sample predominantly identified as Caucasian (n = 115, 71.43%) and non-Hispanic

(n = 126, 78.26%). Specific deployment-related information was available for 145 of the 161 veterans in the present sample. Most SMVs in the present sample (n = 138; 95.17%) served in support of either Operation Enduring Freedom (primarily Afghanistan; reported by n = 58; 40.00%) and Operation Iraqi Freedom (primarily Iraq; reported by n = 116; 80.00%). The remaining 4.83% served in support of other Operations prior to 11 September 2001, such as the Persian Gulf War (primarily Iraq). Additional sample characteristics are displayed in Table 1.

2.2. Procedures

All study procedures were approved by the Rush University Medical Center Institutional Review Board with a waiver of consent because all assessments were collected as part of routine clinical care. The Road Home Program at Rush provides outpatient and intensive outpatient mental healthcare at no cost to all SMVs regardless of their discharge or service status. All of the SMVs in the present study attended a 3-week, all-day Cognitive Processing Therapy-based ITP for PTSD. Prior to their ITP attendance, all SMVs participated in an intake evaluation which combined semi-structured interviews, diagnostic assessments, and the completion of self-report symptom measures. Acceptance into the ITP was based on a diagnosis of PTSD verified by the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers, Blake, et al., 2013). SMVs who were actively suicidal/homicidal or engaged in severe non-suicidal self-harm in the past 3 months, are diagnosed with mania or psychosis, or engage in substance use that would require medical observation were not eligible for the ITP. During the ITP, SMVs received 14 daily 50-min individual CPT and 13 120-min group CPT sessions. CPT is considered a first-line evidence-based treatment for PTSD (Resick et al., 2017). Although not developed specifically for morally injurious traumatic events, its mechanism (i.e., changes in maladaptive cognitions about oneself, others, and the world) has been suggested to be effective for reducing moral injury-based PTSD (see Held et al., 2018a; Rozek & Bryan, 2020; Wachen et al., 2017). In line with recent suggestions (e.g., Held et al., 2018a; Rozek & Bryan, 2020; Wachen et al., 2017), CPT was not modified for individuals with morally injurious experiences. In treatment, clinicians likely addressed maladaptive cognitions associated with the moral injury during treatment, when these cognitions were driving the individual's distress. In addition to CPT, SMVs received 13 daily 75-min group-based mindfulness sessions and 12 daily 50-min group yoga sessions, as well as several adjunctive services such as psychoeducation (e.g., sleep hygiene and meaning making of service) and

Table 1. Sample demographics by exposure to morally injurious events.

	Full Sample		History of Morally Injurious Event Exposure (Yes)		Morally Injurious Index Trauma (Yes)	
	n	%	n	%	n	%
Variable						
Sex						
Male	147	91.3	118	91.5	76	92.7
Ethnicity						
Hispanic or Latinx	35	21.7	22	62.9	17	48.6
Race						
Black or African American	26	16.1	22	17.1	12	14.6
Other	20	12.4	14	10.9	11	13.4
White	115	71.4	93	72.1	59	72.0
Marital Status						
Divorced/Legally Separated	41	25.5	35	27.1	22	26.8
Married/Domestic Partner	95	59	76	58.9	47	57.3
Single	25	15.5	18	14	13	15.9
Military Service Branch						
Army	122	75.8	97	75.2	60	73.2
Marines	27	16.8	23	17.8	16	19.5
Other	12	7.5	9	7.0	6	7.3
Military Pay Grade						
E1 – E3	9	5.6	9	7	4	4.9
E4 – E9	142	88.2	113	87.6	74	90.2
Officer	10	6.2	7	5.4	4	4.9
Discharge Status						
Active Duty/Reserves/ Inactive Ready Reserve/National Guard	11	6.8	5	3.9	2	2.4
Discharged/Retired/Medically Retired	150	93.2	124	96.1	80	97.6
Discharge Characterization						
Honourable	121	75.2	101	78.3	61	74.4
Medical	31	19.3	23	17.8	18	22
Other	9	5.6	5	3.9	3	3.7
Service Era						
Post-9/11	154	95.7	122	94.6	77	93.9

case management. The 3-week ITP has been established to be well tolerated (Held et al., 2020a). Moreover, participation in the ITP has been shown to produce large, rapid PTSD symptom reductions that are comparable to those reported in PTSD efficacy trials (Zalta et al., 2018) and maintained for up to 12 months following completion (Held et al., 2020b). A more detailed description of the intake process, treatment services, and treatment outcomes can be found in (Held et al., 2020a). The ITP offers tracks for PTSD that resulted from both combat-related trauma and military sexual trauma. In line with the existing literature on moral injury, which has primarily focused on combat veterans (cf. Frankfurt & Frazier, 2016), the present study only examined data from SMVs who participated in the combat trauma ITP track.

2.3 Measures

2.3.1. Demographic information

Demographic information, including sex, age, ethnicity, race, marital status, and service status were collected during the intake evaluation.

2.3.2. Moral Injury Events Scale (MIES; Nash et al., 2013)

The MIES is a 9-item self-report measure of exposure and psychological response to potentially morally injurious events and was administered to SMVs at pretreatment. Studies examining the factor structure of the MIES have suggested a three-factor solution (Bryan et al., 2016): Perceived Transgressions by Others (two items; e.g., 'I saw things that were morally wrong'), Perceived Transgressions by Self (four items; e.g., 'I acted in ways that violated my own moral code or values'), and Perceived Betrayals (three items; e.g., 'I feel betrayed by fellow service members who I once trusted'). Items are scored from 1 (strongly disagree) to 6 (strongly agree); higher scores on the MIES subscales reflect a greater amount of exposure to potentially morally injurious events. The MIES has been shown to have good psychometric properties in samples of both treatment-seeking and non-treatment-seeking veterans and active duty service members (Bryan et al., 2016; Nash et al., 2013). Internal consistency reliability for the Perceived Transgression by Others, Perceived Transgressions by Self, and Betrayal subscales of the MIES in the present sample were .85, .90, .77, respectively.

To identify SMVs who screened 'positive' for significant morally injurious experiences based on the MIES, we followed a dichotomous scoring system first used by Wisco and colleagues (Wisco et al., 2017). Based on the scoring system, SMVs who either endorsed Transgressions by Self, Transgressions by Others, or Perceived Betrayal at least 'moderately' were considered as having experienced significant morally injurious events during their military service

(Wisco et al., 2017). Given current controversies around the concept of betrayal in moral injury, we also created a separate 'Transgressions Only' score based on Wisco and colleagues' (Wisco et al., 2017) method. Any SMV who screened positive for having experienced Transgressions by Self and Transgressions by Others was classified as having experienced morally injurious events involving transgressions during their military service.

2.3.3. PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013)

The PCL-5 is a 20-item self-report measure of PTSD symptom severity. The PCL-5 was administered at pretreatment, on ITP days 2, 3, 5, 6, 8, 11, 13, and at post-treatment. Symptom severity was measured based on the past month on intake and based on the past week at each additional timepoint. Individuals were asked to rate their PTSD symptoms in relation to their index trauma that they targeted during CPT on a scale from 0 (*not at all*) to 4 (*extremely*). Scores were summed with higher PCL-5 total scores reflecting greater PTSD symptom severity. A PCL-5 total score >33 is commonly used as a cut-off to suggest 'probable PTSD' (Bovin et al., 2016). The PCL-5 has been shown to have excellent psychometric properties and has been used in a large number of studies involving veterans (cf. Bovin et al., 2016). Internal consistency reliability for the PCL-5 in the present study ranged from .88-.96.

2.3.4. Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001)

The PHQ-9 is a 9-item self-report measure that assesses depression symptom severity over the course of the past two weeks. The PHQ-9 was administered at pretreatment and ITP days 3, 5, 6, 8, 10, 11, and post-treatment. Items are scored from 0 (*not at all*) to 3 (*nearly every day*) and then added together to generate a total score with higher scores indicating greater depression severity. A PHQ-9 total score >10 is commonly used as a cut-off to suggest moderate or greater depression severity (Kroenke et al., 2001). The PHQ-9 has strong psychometric properties and is widely used for the assessment of depression symptom severity (Kroenke et al., 2001). Internal consistency reliability for the PHQ-9 in the present study ranged from .80-.88.

2.3.5. Index trauma involving moral injury

Following the completion of treatment, clinicians who delivered daily CPT were asked to rate if their SMV's index trauma was a morally injurious event or not. To make this determination, clinicians were provided with the definition of potentially morally injurious events by Litz and colleagues (Litz et al., 2009): 'perpetrating, failing to prevent, bearing witness to, or learning about acts that transgress deeply held moral beliefs and expectations' (p. 697). In addition to the dichotomous rating, clinicians were asked to briefly describe the index trauma the SMV worked on during CPT if the trauma was categorized as morally injurious. Study staff compared the dichotomous clinician ratings with the descriptions of the morally injurious events that the clinicians provided to verify the accuracy of the provided codes. There were no discrepancies between the clinician ratings and the provided descriptions.

2.4. Analyses

Basic descriptive analyses were performed to determine sample characteristics. Linear mixed effects regression analyses were conducted to determine whether differences in average effects or trends over the course of treatment existed between participants who did and did not report a history of morally injurious event exposure, or were and were not determined to have worked on an index trauma involving moral injury. This approach was chosen due to less restrictive assumptions regarding the variance-covariance structure, ease in accommodating some missing-at-random measurements during the programme, and ability to model individual change over time (for review see Hedeker & Gibbons, 2006). *P*-values based on likelihood ratio tests for model comparisons are reported here, with $p < .05$ considered significant.

Due to our a priori interest in determining whether SMVs with a history of morally injurious event exposure and SMVs who worked on index traumas involving moral injury benefited from the ITP to an equivalent extent as those who did not experience morally injurious events, we also conducted non-inferiority analyses using the two one-sided test procedure (TOST; Schuirmann, 1987) on the differences between the two groups during the post-treatment assessment. Unlike conventional comparative analyses, which can probabilistically establish group mean differences but not equivalence, the noninferiority analyses used here tested a null hypothesis that SMVs who reported morally injurious event exposure histories or were determined to have worked on index traumas involving moral injury had lower mean outcome scores at the post-treatment assessment relative to those who did not. Using this procedure, noninferiority is established if a 90% confidence interval of the difference between group means falls fully within an a priori equivalence margin. Equivalence margins were determined to be 10 points for PCL-5 scores and 5 points for PHQ-9 scores. A 5-point change on the PHQ-9 has previously been suggested to represent clinically meaningful change (Kroenke et al., 2016). There are currently no published definitions for clinically meaningful change for the PCL-5 (Weathers, Litz, et al., 2013). We adopted the 10-point change that has been suggested for a previous version of the instrument and was

recommended on the website of the National Center for PTSD when this manuscript was composed, assuming that such a symptom reduction would be noticeable to individuals. Analyses were performed using Stata version 15 (Statacorp; Stata Statistical Software: Release 14, 2014) and Supermix 1.1 (Scientific Software International; Hedeker, Gibbons, Du Toit, & Cheng, 2007).

3. Results

According to Wisco and colleagues' (Wisco et al., 2017) scoring method for the MIES, a total of 95 (59.01%) of SMVs in the present sample endorsed self-transgressions, 121 (75.16%) reported witnessing other-transgressions, and 102 (63.35%) endorsed betrayal. Using the same scoring, 129 (80.12%) SMVs endorsed either committing or witnessing transgressions during military service. The SMVs in the sample reported mean scores for the MIES subscales of self-transgression, other-transgression, and betrayal as 14.87 (SD = 6.72), 9.12 (SD = 3.16), and 11.31 (SD = 4.82), respectively. Using clinician ratings, 82 (50.93%) of the SMVs in sample worked on an index trauma involving moral injury.

At intake, neither moral injury history nor index trauma type was associated with ratings of trauma-related psychopathology, including PTSD and depression (see Table 2). There were no differences in programme completion rates (ps from .124 to .689) or number of treatment days completed (ps between .139 and .951) based on moral injury history or index trauma type (see Table 2). Symptom reduction based on PCL-5 and PHQ-9 change scores from pre- to post-treatment also did not differ based on moral injury history or index trauma type (see Table 3), or any of the demographic variables in Table 2 (all ps > .20).

Initial longitudinal mixed effects model examination suggested that random intercepts models were preferable to linear models (ps < .001), and that inclusion of a random trend led to significantly greater fit as well for all outcomes (ps < .001). Based on Akiake Information Criterion (AIC) analysis, first-order autoregressive

structure was deemed most appropriate for PCL-5 and PHQ-9 models, which was supported by examination of correlation structure of measurements over time. Both linear (ps < .001) and quadratic (ps < .001) time effects were significant in models predicting PCL-5 and PHQ-9 (see Table 4), suggesting symptom reduction across time for all outcomes and acceleration in PCL-5 reductions over time but deceleration in PHQ-9 reductions over time. Both unadjusted models and models that adjusted for sex and age were explored. In unadjusted and adjusted mixed-effects models, moral injury history and index trauma type were not significant predictors of overall differences or changes in depression and PTSD symptoms over time (see Table 4; Figures 1 and 2). We then evaluated whether morally injurious experiences predicted whether individuals were above or below established clinical cut-offs on the PCL-5 (score of 33) or PHQ-9 (score of 10) at post-treatment (i.e., achieved probable remission). Neither moral injury history nor index trauma type predicted remission status at post-treatment (PCL-5 ps > .393; PHQ-9 ps > .570).

Non-inferiority analyses at post-treatment indicated that 90% confidence intervals for the differences between the moral injury history and index trauma type groups fell within the established equivalence margins for both PCL-5 and PHQ-9 (see Table 5). This suggests that changes in PTSD and depression symptoms were not inferior for SMVs with a history of morally injurious event exposure or SMVs who worked on an index trauma compared to those without these experiences.

4. Discussion

Overall, we found high rates of morally injurious experiences in this sample; 80.12% of the SMVs reported either committing or witnessing transgressions on the MIES and 50.9% of SMVs were determined to have worked on an index trauma involving moral injury by their treating clinician. Rates of morally injurious experiences in the current sample

Table 2. Symptom severity, treatment attendance, and treatment completion by exposure to morally injurious events.

Variable	History of Morally Injurious Event Exposure (Yes: n = 129)			Morally Injurious Index Trauma (Yes: n = 82)		
	No M(SD)	Yes M(SD)	p	No M(SD)	Yes M(SD)	p
Baseline PTSD (PCL-5)	55.81 (10.85)	58.88 (10.28)	.343	58.57 (10.62)	57.98 (10.31)	.973
Endpoint PTSD (PCL-5)	30.09 (14.79)	32.33 (18.65)	.534	33.41 (18.95)	30.36 (16.74)	.305
PTSD Remission (PCL-5 Score < 33)	12 (37.50%)	41 (36.28%)		27 (38.57%)	26 (34.67%)	.626
Baseline Depression (PHQ-9)	17.31 (4.96)	18.56 (4.50)	.214	17.78 (4.77)	18.82 (4.41)	.968
Endpoint Depression (PHQ-9)	11.72 (5.28)	12.93 (6.00)	.325	13.03 (6.11)	12.32 (5.61)	.484
Depression Remission (PHQ-9 Score <10)	10 (34.48%)	34 (31.78%)	.782	24 (35.29%)	20 (29.41%)	.463
Attended Treatment Days (Max. 15 Days)	14.28 (0.81)	13.77 (1.91)	.139	13.86 (1.84)	13.88 (1.69)	.951
	No n(%)	Yes n(%)		No n(%)	Yes n(%)	
Treatment Completion	32 (100.00)	120 (93.02)	.124	74 (93.67)	78 (95.12)	.689

N = 161. No comparisons were significant at p < .05.

Table 3. PTSD and depression symptom reduction by exposure to morally injurious events.

Variable	History of Morally Injurious Event Exposure				Morally Injurious Index Trauma			
	No M (SD)	Yes M (SD)	d	p	No M (SD)	Yes M (SD)	d	p
PCL-5 pre-post decrease	25.69 (1.96)	25.18 (1.64)	0.03	.876	23.43 (1.46)	27.05 (1.95)	0.22	.179
PHQ-9 pre-post decrease	6.10 (1.13)	5.73 (1.08)	0.07	.748	5.39 (0.95)	6.24 (1.24)	0.16	.369

Pre-post decrease: larger values = greater symptom reduction. All *p*s < .001 for pre-post change in PCL-5. All *p*s < .001 for pre-post change in PHQ-9. *d* represents Cohen's *d*; the standardized difference between group means. By convention, all pre-post changes are considered large (>0.8), though differences between groups are small (<0.3).

Table 4. Adjusted model parameter estimates for models of PTSD and depression scores.

Variable	PCL-5 b(SE)	PHQ-9 b(SE)
Time	−1.27 (0.26)*	−1.08 (0.14)*
Time^2	−0.05 (0.02)*	0.03 (0.01)*
History of Morally Injurious Event Exposure	0.50 (2.46)	0.99 (1.07)
History of Morally Injurious Event Exposure x Time interaction	0.06 (0.27)	−0.01 (0.11)
Morally Injurious Index Trauma	2.81 (1.96)	0.31 (0.86)
Morally Injurious Index Trauma x Time Interaction	−0.37 (0.22)	−0.07 (0.09)

Parameter estimates reflect final outcome model estimates, which included time, quadratic time, sex, age, and both the moral injury variable and its interaction with time. Significance of parameters was the same when examining each moral injury variable separately in models including only time. *p < .05.
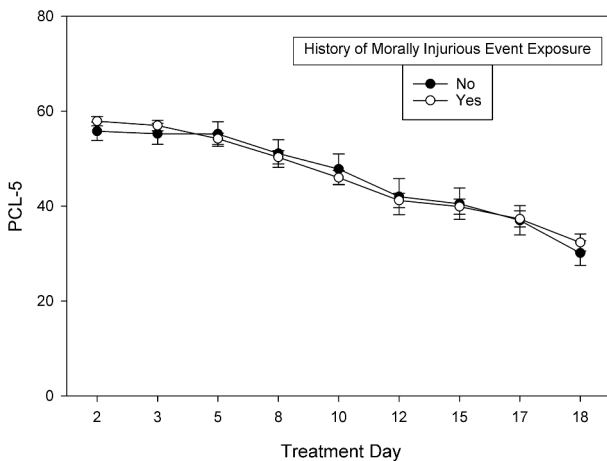

Figure 1. PTSD symptom change over time by history of morally injurious event exposure.

Notes. PCL-5: PTSD Checklist for DSM-5. Treatment Day: Treatment day during the ITP. Error bars represent standard error.
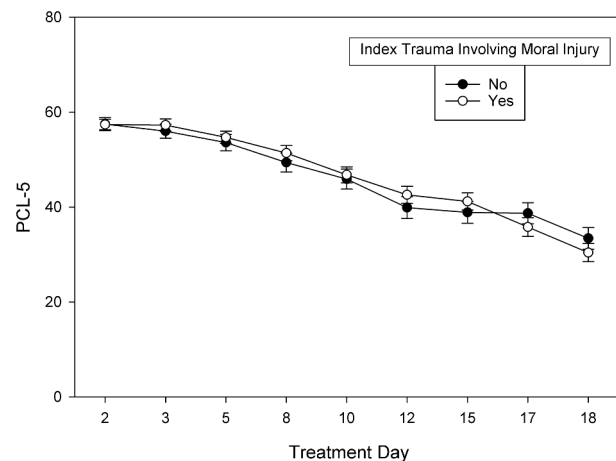

Figure 2. PTSD symptom change over time by morally injurious index trauma.

Notes. PCL-5: PTSD Checklist for DSM-5. Treatment Day: Treatment day during the ITP. Error bars represent standard error.

were higher than those previously reported for a nationally representative sample of SMVs. When applying the same scoring method of the MIES as used by Wisco and colleagues (Wisco et al., 2017), 59.0% reported self-transgressions (compared to 10.8% in the nationally representative sample), 75.2% reported witnessing other-transgressions (compared to 25.5% in the nationally representative sample), and 78.9% reported betrayal (compared to 25.5% in the nationally representative sample). The mean scores for the MIES self-transgression, other-transgressions, and betrayal subscales were comparable to those reported in other treatment-seeking samples (e.g., Bryan et al., 2016), suggesting that treatment-seeking SMVs samples are more likely to have experienced morally injurious events than non-treatment seeking

samples. This is consistent with research showing that the experience of morally injurious events is associated with psychopathology, such as PTSD severity (Williamson et al., 2018). However, it is also possible that the high self-report rates may have been the result of SMVs interpreting the items on the MIES as morally distressing events rather than more severe morally injurious events (see Litz & Kerig, 2019). Clinicians who work with SMVs who are seeking mental health care, and especially care for PTSD, may expect higher rates of morally injurious experiences than those who work with SMVs in primary care and other settings where mental health may not be the primary concern (Currier et al., 2020). Clinicians are encouraged to assess for morally injurious experiences, as this process may help identify maladaptive

Table 5. Non-inferiority comparisons by exposure to morally injurious events.

Variable	PCL-5 90% CI Lower, Upper	PHQ-9 90% CI Lower, Upper
History of Morally Injurious Event Exposure	−8.16, 3.69	−3.24, 0.82
Morally Injurious Index Trauma	−1.85, 7.96	−0.96, 2.37

10-point difference margins were determined to be clinically meaningful for PCL-5, and 5-point differences were used for PHQ-9. No confidence interval range included these values for either variable.

cognitions that are driving distress; not assessing for morally injurious experiences may limit the identification of potential treatment targets. A multifaceted approach to the assessment of morally injurious experiences that combines self-report and clinician-rated assessments may be particularly helpful, given the difference in prevalence of these two types of assessment strategies that was observed in the present sample.

In terms of treatment outcomes, our results suggested that there was no difference in response to a CPT-based intensive PTSD treatment programme based on morally injurious event exposure history or index trauma targeted during treatment. SMVs who reported a history of morally injurious events during military service and SMVs who worked on an index trauma involving moral injury reported comparable pre- and post-treatment PTSD and depression severity scores to their counterparts and showed nearly identical symptom trajectories over the course of treatment. The percentage of SMVs in each group who fell below the suggested cut-off scores for probable remission also did not significantly differ between groups for either assessment approach. Moreover, our results showed that treatment attendance and completion rates were extremely high and did not differ between the groups. The present findings are consistent with previous theoretical postulations and case reports demonstrating that moral injury-based PTSD can be effectively treated with evidence-based cognitive-behavioural treatments (Held et al., 2018a; Pearce et al., 2018; Smith et al., 2013; Wachen et al., 2017). However, it is important to note that the intensive PTSD treatment programme in this study consisted of a multitude of interventions rather than just CPT. Although CPT is considered the primary intervention and was delivered daily via groups and individual sessions, SMVs also received wellness and other adjunctive interventions, such as mindfulness and yoga. These integrative interventions may contribute to a more holistic recovery, which may be especially important for SMVs exposed to morally injurious events (Walser & Wharton, 2021). For example, it is possible that the focus on non-judgemental self-awareness in mindfulness may be particularly helpful for those struggling with moral injury (Walser & Wharton, 2021). Future research should explore whether standalone evidence-based cognitive-behavioural interventions for PTSD in the absence of adjunctive treatment services can achieve similar

outcomes for SMVs exposed to and affected by morally injurious events.

Several limitations should be noted. First, the group classifications used in this archival post-hoc observational study were made after SMVs had already completed treatment. Second, a diagnosis of PTSD was a requirement for admission to the treatment programme. As morally injurious events do not always involve Criterion A traumas, we are not able to speak to the effectiveness of the treatment for moral injury-related psychopathology that is not manifested as PTSD. Third, all staff who delivered clinical services had an advanced understanding of both moral injury and CPT. It is possible that provider knowledge of moral injury and provider CPT skill may account for the similarity in outcomes for the two groups. Fourth, although SMVs' PTSD diagnosis was established using the CAPS-5 during the intake process, only self-report measures were used to track treatment response. Fifth, study findings may be limited in their generalizability due to the relatively unique nature of the 3-week intensive PTSD programme, which combines intensively delivered evidence-based PTSD treatment with numerous adjunctive services. Lastly, the present study distinguished between those SMVs who endorsed and did not endorse exposure to morally injurious experiences in general; there is, however, emerging evidence that different kinds of morally injurious experiences may overlap with each other and that different kinds of morally injurious experiences may result in different clinical sequelae (Nieuwsma et al., 2020). Future clinical studies of moral injury should take these differences into account.

Despite these limitations, the present study is one of the first to examine the impact of exposure to morally injurious events on PTSD treatment outcomes. Overall, the present study illustrates that treatment-seeking combat SMVs with PTSD appear to have high rates of morally injurious event exposure. Thus, it is quite possible that previous clinical trials of evidence-based treatments for combat veterans included many individuals exposed to morally injurious events even though this construct was not assessed. The present study also demonstrated consistent results across two assessment strategies; neither a history of morally injurious event exposure nor working on an index trauma involving moral

injury negatively impacted intensive PTSD treatment outcomes. Future research should evaluate whether these findings hold true for standalone evidence-based cognitive-behavioural interventions and also whether the delivery format (intensive vs. weekly) affects treatment outcomes for those with and without exposure to morally injurious events. Based on the findings from the present study, clinicians are encouraged to use these established frontline interventions until additional research becomes available. Additionally, investigating how currently used frontline interventions can be modified to improve the effectiveness of treatment for moral injury may be an important area for future research. Overall, the current study provides initial evidence that there are high rates of morally injurious events among SMVs who are seeking PTSD treatment. Additionally, our results suggest that CPT, especially in the context of intensive PTSD treatment, should continue to be used for those who experience symptoms related to PTSD regardless of whether the individuals have had exposure to a morally injurious event.

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Data Availability Statement

Datasets generated and analyzed during the current study are not publicly available because they contain more than two indirect identifiers of human research participants that cannot be sufficiently anonymized for a public repository. The datasets are available from the corresponding author on reasonable request.

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References

Association, A. P. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Washington, DC: American Psychiatric Association. doi:10.1176/appi.books.9780890425596.744053.

Bovin, M. J., Marx, B. P., Weathers, F. W., Gallagher, M. W., Rodriguez, P., Schnurr, P. P., & Keane, T. M. (2016). Psychometric properties of the PTSD checklist for diagnostic and statistical manual of mental disorders-fifth edition (PCL-5) in veterans. *Psychological Assessment*, *28*(11), 1379–1391. doi:10.1037/pas0000254.

Bryan, C. J., Bryan, A. O., Anestis, M. D., Anestis, J. C., Green, B. A., Etienne, N., … Ray-Sannerud, B. (2016). Measuring moral injury: Psychometric properties of the moral injury events scale in two military samples. *Assessment*, *23*(5), 557–570. doi:10.1177/1073191115590855.

Bryan, C. J., Bryan, A. O., Roberge, E., Leifker, F. R., & Rozek, D. C. (2018). Moral injury, posttraumatic stress disorder, and suicidal behavior among National Guard personnel. *Psychological Trauma: Theory, Research, Practice, and Policy*, *10*(1), 36. doi:10.1037/tra0000290.

Castro, C. A., & McGurk, D. (2007). The intensity of combat and behavioral health status. *Traumatology*, *13*(4), 6–23. doi:10.1177/1534765607309950.

Currier, J. M., Drescher, K. D., & Nieuwsma, J. E. (2020). Addressing moral injury in clinical practice. *American Psychological Association*. doi:10.1037/0000204-015

Drescher, K. D., Foy, D. W., Kelly, C., Leshner, A., Schutz, K., & Litz, B. (2011). An exploration of the viability and usefulness of the construct of moral injury in war veterans. *Traumatology*, *17*(1), 8–13. doi:10.1177/1534765610395615.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy*, *38*(4), 319–345. doi:10.1016/S0005-7967(99)00123-0.

Foa, E. B., Hembree, E. A., Rothbaum, B. O., & Rauch, S. (2019). *Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences*. Oxford, UK: Oxford University Press.

Frankfurt, S., & Frazier, P. (2016). A review of research on moral injury in combat veterans. *Military Psychology*, *28*(5), 318–330. doi:10.1037/mil0000132.

Gray, M. J., Schorr, Y., Nash, W., Lebowitz, L., Amidon, A., Lansing, A., … Litz, B. T. (2012). Adaptive Disclosure: An open trial of a novel exposure-based intervention for

service members with combat-related psychological stress injuries. *Behavior Therapy*, 43(2), 407–415. doi:10.1016/j.beth.2011.09.001.

Griffin, B. J., Purcell, N., Burkman, K., Litz, B. T., Bryan, C. J., Schmitz, M., … Maguen, S. (2019). Moral injury: An integrative review. *Journal of Traumatic Stress*, 32(3), 350–362. doi:10.1002/jts.22362.

Hedeker, D., Gibbons, R., Du Toit, M., & Cheng, Y. (2007). *SuperMix 1.1*. Lincolnwood, IL: Scientific Software International.

Hedeker, D., & Gibbons, R. D. (2006). Missing data in longitudinal studies. In *Longitudinal data analysis* (pp. 279–312). Hoboken, NJ: John Wiley & Sons, Inc. doi:10.1002/0470036486.ch14.

Held, P. (2020). Moral Injury ITP Outcomes. Unpublished raw data.

Held, P., Klassen, B. J., Boley, R. A., Wiltsey Stirman, S., Smith, D. L., Brennan, M. B., … Zalta, A. K. (2020a). Feasibility of a 3-week intensive treatment program for service members and veterans with PTSD. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(4), 422–430.

Held, P., Klassen, B. J., Brennan, M. B., & Zalta, A. K. (2018a). Using prolonged exposure and cognitive processing therapy to treat veterans with moral injury-based PTSD: Two case examples. *Cognitive and Behavioral Practice*, 25(3), 377–390. doi:10.1037/tra0000485.

Held, P., Klassen, B. J., Hall, J. M., Friese, T. R., Bertsch-Gout, M. M., Zalta, A. K., & Pollack, M. H. (2018b). "I knew it was wrong the moment I got the order": A narrative thematic analysis of moral injury in combat veterans. *Psychological Trauma: Theory, Research, Practice, and Policy*, 11(4), 396–405. doi:10.1037/tra0000364.

Held, P., Klassen, B. J., Zou, D. S., Schroedter, B. S., Karnik, N. S., Pollack, M. H., & Zalta, A. K. (2017). Negative posttrauma cognitions mediate the association between morally injurious events and trauma-related psychopathology in treatment-seeking veterans. *Journal of Traumatic Stress*, 30(6), 698–703. doi:10.1002/jts.22234.

Held, P., Zalta, A. K., Smith, D. L., Bagley, J. M., Steigerwald, V. L., Boley, R. A., … Pollack, M. H. (2020b). Maintenance of treatment gains up to 12-months following a three-week cognitive processing therapy-based intensive PTSD treatment programme for veterans. *European Journal of Psychotraumatology*, 11(1), 1789324. doi:10.1080/20008198.2020.1789324

Hoge, C. W., Castro, C. A., Messer, S. C., McGurk, D., Cotting, D. I., & Koffman, R. L. (2004). Combat duty in Iraq and Afghanistan, mental health problems, and barriers to care. *New England Journal of Medicine*, 351(1), 13–22. doi:10.1056/NEJMoa040603.

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. doi:10.1046/j.1525-1497.2001.016009606.x.

Kroenke, K., Wu, J., Yu, Z., Bair, M. J., Kean, J., Stump, T., & Monahan, P. O. (2016). The patient health questionnaire anxiety and depression scale (PHQ-ADS): Initial validation in three clinical trials. *Psychosomatic Medicine*, 78(6), 716–727. doi:10.1097/PSY.0000000000000322.

Litz, B. T., & Kerig, P. K. (2019). Introduction to the special issue on moral injury: Conceptual challenges, methodological issues, and clinical applications. *Journal of Traumatic Stress*, 32(3), 341–349. doi:10.1002/jts.22405.

Litz, B. T., Stein, N., Delaney, E., Lebowitz, L., Nash, W. P., Silva, C., & Maguen, S. (2009). Moral injury and moral repair in war veterans: A preliminary model and intervention strategy. *Clinical Psychology Review*, 29(8), 695–706. doi:10.1016/j.cpr.2009.07.003.

Maguen, S., Lucenko, B. A., Reger, M. A., Gahm, G. A., Litz, B. T., Seal, K. H., … Marmar, C. R. (2010). The impact of reported direct and indirect killing on mental health symptoms in Iraq war veterans. *Journal of Traumatic Stress*, 23(1), 86–90. doi:10.1002/jts.20434.

Nash, W. P., Marino Carper, T. L., Mills, M. A., Au, T., Goldsmith, A., & Litz, B. T. (2013). Psychometric evaluation of the moral injury events scale. *Military Medicine*, 178(6), 646–652. doi:10.7205/MILMED-D-I3-00017.

Nieuwsma, J. A., Brancu, M., Wortmann, J., Smigelsky, M. A., King, H. A., & Meador, K. G., … (2020). Screening for moral injury and comparatively evaluating moral injury measures in relation to mental illness symptomatology and diagnosis. *Clinical Psychology & Psychotherapy*, cpp.2503. doi:10.1002/cpp.2503.

Pearce, M., Haynes, K., Rivera, N. R., & Koenig, H. G. (2018). Spiritually integrated cognitive processing therapy: A new treatment for post-traumatic stress disorder that targets moral injury. *Global Advances in Health and Medicine*, 7, 1–7. doi:10.1177/2164956118759939.

Resick, P. A., Monson, C. M., & Chard, K. M. (2017). *Cognitive processing therapy for PTSD: A comprehensive manual*. New York City, NY: The Guilford Press.

Rozek, D. C., & Bryan, C. J. (2020). A cognitive behavioral model of moral injury. In J. M. Currier, K. D. Drescher, & J. E. Nieuwsma (Eds.), *Addressing moral injury in clinical practice* (pp. 19–31). Washington, DC: American Psychological Association. doi:10.1037/0000204-015

Schuirmann, D. J. (1987). A comparison of the two one-sided tests procedure and the power approach for assessing the equivalence of average bioavailability. *Journal of Pharmacokinetics and Biopharmaceutics*, 15(6), 657–680.

Smith, E. R., Duax, J. M., & Rauch, S. A. M. (2013). Perceived perpetration during traumatic events: Clinical suggestions from experts in prolonged exposure therapy. *Cognitive and Behavioral Practice*, 20(4), 461–470.

StataCorp. (2014). *Stata statistical software: Release 14*. College Station, TX: StataCorp LLC. doi:10.2307/2234838.

Steenkamp, M. M., Nash, W. P., Lebowitz, L., & Litz, B. T. (2013). How best to treat deployment-related guilt and shame: Commentary on Smith, Duax, and Rauch (2013). *Cognitive and Behavioral Practice*, 20(4), 471–475.

Straud, C. L., Siev, J., Messer, S., & Zalta, A. K. (2019). Examining military population and trauma type as moderators of treatment outcome for first-line psychotherapies for PTSD: A meta-analysis. *Journal of Anxiety Disorders*, 67, 102133.

Wachen, J. S., Dondanville, K. A., & Resick, P. A. (2017). Correcting misperceptions about cognitive processing therapy to treat moral injury: A response to gray and colleagues. *Cognitive and Behavioral Practice*, 24(4), 388–392. doi:10.1016/J.CBPRA.2017.06.001.

Walser, R. D., & Wharton, E. (2021). Acceptance and commitment therapy: Using mindfulness and values in the treatment of moral injury. In J. M. Currier, K. D. Drescher, & J. E. Nieuwsma (Eds.), *Addressing moral injury in clinical practice* (pp. 163–181). Washington, DC: American Psychological Association. doi:10.1037/0000204-010.

Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5). *PTSD: National Center for PTSD*. Retrieved from www.ptsd.va.gov

Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). The PTSD checklist for DSM-5 (PCL-5). Retrieved from the National Center for PTSD website: www.ptsd.va.gov

Williamson, V., Stevelink, S. A. M., & Greenberg, N. (2018). Occupational moral injury and mental health: Systematic review and meta-analysis. *British Journal of Psychiatry*, 212(6), 339–346. doi:10.1192/bjp.2018.55.

Wisco, B. E., Marx, B. P., May, C. L., Martini, B., Krystal, J. H., Southwick, S. M., & Pietrzak, R. H. (2017). Moral injury in U.S. combat veterans: Results from the national health and resilience in veterans study. *Depression and Anxiety*, 34(4), 340–347. doi:10.1002/da.22614.

Zalta, A. K. (2015). Psychological mechanisms of effective cognitive–behavioral treatments for PTSD. *Current Psychiatry Reports*, 17(4), 560. doi:10.1007/s11920-015-0560-6.

Zalta, A. K., Held, P., Smith, D. L., Klassen, B. J., Lofgreen, A. M., Normand, P. S., … Karnik, N. S. (2018). Evaluating patterns and predictors of symptom change during a three-week intensive outpatient treatment for veterans with PTSD. *BMC Psychiatry*, 18(1). doi:10.1186/s12888-018-1816-6