

GRATITUDE AS A MODERATOR OF PTSD SYMPTOMS AND HEALTH-
RELATED QUALITY OF LIFE ASSOCIATED WITH POTENTIALLY MORALLY
INJURIOUS EVENTS IN FIRST RESPONDERS

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GRATITUDE AS A MODERATOR OF PTSD SYMPTOMS AND HEALTH-
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DEDICATION

Dedicated to my sister for her constant dedication to service and excellence in a frontline field.

ABSTRACT

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First responders may experience potentially morally injurious events (PMIEs) due to the nature of their occupation. Furthermore, gratitude has been shown to buffer the effect of traumatic events on PTSD symptoms. The current study seeks to address gaps in the literature by 1) establishing that PMIEs exist in a first responder population, 2) examining the association of PMIEs with PTSD symptoms and health related quality of life (HRQoL) in a first responder population, and 3) investigating gratitude as a moderator of PMIEs' association with PTSD symptoms and HRQoL. 294 participants were recruited from multiple first responder agencies/departments within southeastern Texas (in-person) and nationwide (online). Participants completed the Moral Injury Events Scale (MIES), the Posttraumatic Stress Checklist for Civilians (PCL-C), the Gratitude, Resentment, and Appreciation Short Form (GRAT-S), and a modified version of the SF-12 v.2[®]. Average rates of PMIEs in first responders were higher than military samples with an overall average of 40.65% for the sample. Regression analyses indicate PMIEs are significantly associated with PTSD symptoms in first responders ($\beta = .39, p < .001$), but gratitude was not a significant moderator of PMIEs' association with PTSD symptoms or HRQoL. We discuss potential treatment approaches for first responders who have experienced PMIEs as well as potential outreach strategies to increase access to mental healthcare.

KEY WORDS: Gratitude; Moral injury; Posttraumatic stress; First responders; Health-related quality of life

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CHAPTER I

Introduction

First responders, including law enforcement, firefighters, and emergency medical personnel, face a myriad of challenges on a daily basis in their occupation. From natural disasters to witnessing tragedies such as car wrecks, families losing their homes to fire, or domestic abuse, the constant exposure to traumatic events eventually takes a toll (Marmar et al., 2006). One of the potential repercussions of continually witnessing traumatic events is developing post-traumatic stress disorder (PTSD; Marmar et al., 2006). PTSD prevalence rates are estimated to be relatively high among first responders compared to the general population, with estimates for law enforcement officers ranging between 3%-16% (Maia et al., 2007; Marchand et al., 2015), 8%-31.8% for firefighters (Boffa et al., 2017; Del Ben et al., 2006; Wagner et al., 1998), and a recent metanalysis revealed an 11% prevalence rate for emergency medical personnel (Petrie et al., 2018). In comparison, the 12-month prevalence rate of PTSD is 3.5% for the average American adult according to the most recent edition of the Diagnostic Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013, p. 276).

Although most research regarding PTSD has focused on generally traumatic events (Marmar et al., 2006; McCanlies et al., 2014; Robbers & Jenkins, 2005), other events which may not be initially conceptualized as traumatic in and of themselves may also be contributing to high PTSD prevalence rates among first responders. Specifically, potentially morally injurious events (PMIEs) may play a role in the development of PTSD (Jordan et al., 2017). PMIEs are events in which an individual perpetrates, learns about, or witnesses an action that contradicts his or her own personal ethics (Litz et al.,

2009). For instance, in a military setting, a PMIE might look like a soldier being required to gather intelligence on a foreign nation despite personal beliefs that the action is wrong. In essence, a PMIE whether perpetrated, witnessed or learned about may promote a deep sense of violation to the point of creating a sort of moral wound. The results of PMIEs are often costly, including increased suicide attempts and ideation (Bryan et al., 2014). Therefore, this phenomenon merits research investigating what factors may mitigate the effect of PMIEs.

Potentially Morally Injurious Events

The hallmark criterion of PTSD is the exposure to a traumatic event (American Psychiatric Association, 2013, p. 272). According to DSM-V criteria, a traumatic event has to consist of, “exposure to actual or threatened death, serious injury, or sexual violence.” Although PMIEs may include violence, such as a soldier being forced to kill an undeserving civilian in a war setting despite personal ethics against murder, according to their definition, PMIEs do not require the presence of violence or threat of violence (Litz et al., 2009). Instead, PMIEs require violation on a moral level (Litz et al., 2009). Though PMIEs have a different definition than “criterion A” for PTSD in the DSM-V, PMIEs have been linked to PTSD symptoms in the past (Jordan et al., 2017). Additionally, PMIEs are usually conceptualized to occur within military populations (Litz et al., 2009) and have a prevalence rate of 10-20.2% (Jordan et al., 2017), but that does not mean they may not occur in other trauma exposed populations, such as first responders (Papazoglou et al., 2020; Papazoglou & Chopko, 2017).

Although PMIEs were originally conceptualized to consist within two main categories (Nash, et al., 2013), research has revealed three categories may exist to fully

capture the phenomenon (Bryan et al., 2016). In particular, Bryan and colleagues (2016) found PMIEs to consist of transgressions by others, transgressions by self, and betrayal. To illustrate these concepts in a first responder population, an example of a transgressions by self could be a law enforcement officer having to remove a child from his/her home when the officer personally believes the situation does not warrant it. An example of a transgression by others within firefighters could be witnessing a fellow firefighter leave a civilian in a burning home in favor of rescuing another. Finally, a betrayal-based PMIE in EMS workers may be a supervisor requiring an EMS worker to administer aid to someone who they believe does not deserve to be saved or whose quality of life would be impaired beyond what the EMS worker would consider to be worth living.

Usually, PMIEs are associated with the syndrome termed “moral injury.” Moral injury is an emerging syndrome as a result of a PMIE(s) in which the primary symptoms consist of guilt, shame, existential conflict, and a loss of trust in self or external entities (Jinkerson, 2016). Although it is starting to become a more recognized and cohesive syndrome, moral injury is still not a DSM-V recognized disorder and clinicians have yet to develop an agreed upon clear set of criteria for its diagnosis and treatment (Jinkerson, 2016). Specifically, moral injury differs from PTSD by lacking nightmares and insomnia and including a unique component of anger (Bryan et al., 2018). However, PMIEs as stated previously, are associated with the DSM-V-recognized disorder of PTSD (Battles et al., 2018), which does have a clear set of criteria (American Psychiatric Association, 2013, p. 271). Specifically, for a diagnosis of PTSD, an individual must have experienced a traumatic event, experience one or more intrusion symptoms, avoidance symptoms, negative alterations in cognition and mood, and the symptoms must persist for more than

a month (American Psychiatric Association, 2013, pp. 271-274). In essence, PMIEs' association with PTSD lends credence to its clinical importance.

Although not much is known about PMIE's relationship to health-related quality of life (HRQoL), PTSD's relationship with HRQoL is well-established. Within a population of domestic abuse victims, participants who had a diagnosis of PTSD reported significantly worse HRQoL compared to domestic abuse victims who lacked the diagnosis (Laffaye et al., 2003). Additionally, HRQoL was significantly impaired for individuals who reported a diagnosis of PTSD compared to individuals who did not have the diagnosis ten years after the traumatic event occurred (Li et al., 2018). Moreover, this effect was amplified when the individuals had a comorbid diagnosis of depression as well (Li et al., 2018). In sum, PTSD is not only a powerful predictor of impaired HRQoL, but its effects are lasting. Given the overlap in experiences and subsequent symptoms between trauma and PMIEs, it stands to reason that PMIEs may also be associated with compromised HRQoL.

The consequences of compromised HRQoL can be severe. HRQoL is a known robust predictor of both future hospitalization and mortality (Desalvo et al., 2006; Dominick et al., 2002). In particular, one meta-analysis found individuals who reported poor HRQoL had double the mortality risk compared to individuals who reported excellent HRQoL (Desalvo et al., 2006). Perception of health is critical to physical well-being, and the association of PTSD with HRQoL suggests trauma, and possibly PMIEs, may have an indirect relationship to morbidity and mortality. In sum, it is important to examine the downstream effects of PMIE on both physical and mental health.

Despite PMIE's potential impact on physical and mental health, it remains unknown if these events occur beyond the few populations known to experience them such as military personnel, teachers exposed to violence, and refugees (Currier et al., 2015; Nash et al., 2013; Nickerson et al., 2015). As stated previously, PMIEs are often associated with soldiers who were exposed to or forced to commit atrocities in battle (Bryan et al., 2014). However, it is posited that PMIEs may occur in first responder populations, such as police officers, who may frequently encounter morally perilous situations, in which they may be called upon to violate their own moral code (Papazoglou et al., 2020; Papazoglou & Chopko, 2017). To the author's knowledge, there has only been one reported study of moral injury examined in a Canadian multi-occupational first responder population which focused on developing a treatment program for the moral injury syndrome rather than providing prevalence rates for PMIEs (Dentry et al., 2017). Scant literature, if any, exists investigating the prevalence of PMIEs in a US first responder population composed of emergency workers, law enforcement, and fire fighters. Additionally, little is known about the protective factors or what may moderate the outcomes of PMIEs. However, research suggests that gratitude is inversely associated with PTSD (Van Dusen et al., 2015), which is associated with PMIEs (Jordan et al., 2017). That is, as levels of gratitude increases, symptoms of PTSD decrease.

Gratitude

Gratitude has many definitions across the literature. For instance, Emmons (2004, p.5) defines gratitude as a feeling of thankfulness for something given even though nothing was done to deserve it. Similarly, Watkins and colleagues (2019, p. 21) define gratitude as, "the emotion people experience 'when they affirm that something good has

happened to them, and they recognize that someone else is largely responsible for this benefit.”” However, Wood and colleagues (2010) offer a broader conceptualization of gratitude, arguing it is more than a simple appreciation for a benefit given, but rather, gratitude is a higher life orientation dedicated to recognizing the positive in life. Evidence exists to support Wood and colleague’s (2010) conceptualization of gratitude via a latent variable analysis which revealed a higher-order benefit appraisal variable when examining state and trait gratitude (Wood et al., 2008). A concise summary of the many definitions of gratitude is that it is a higher-order life orientation with state and trait components which both consist of appreciating what one has, appreciating other people, and/or appreciating the moment (Wood et al., 2010).

Although the definition of gratitude is often contested throughout the literature, in general, gratitude is often measured as both a trait and a state (Lin, 2019; Solom et al., 2016; Wood et al., 2008). Gratitude is often measured as a state in experimental studies where gratitude levels are manipulated via interventions such as writing prompts, keeping gratitude journals, and short behavioral experiments (Emmons & McCullough, 2003; Seligman, 2005; Watkins et al., 2003). The low resource requirements for gratitude interventions make gratitude of particular interest as a moderator because it might have the potential to provide mental healthcare for first responders who live in rural and/or low-income communities. Additionally, gratitude is more often measured as a trait in studies investigating gratitude as a potential protective factor against various psychological damage (Lee et al., 2018; Rey et al., 2019; Vernon et al., 2009). However, trait and state gratitude are related to one another through mechanisms such as a higher order factor uniting the two (Wood et al., 2008), or other factors mediating the

relationship such as perceived value or goodness of the situation or benefit (Lin, 2019). In sum, gratitude may be measured as both a state and/or trait depending on the purpose of the study.

There is a paucity of literature available regarding gratitude's relationship to PMIEs and its sequelae. However, it is posited PMIEs may engender gratitude among some, according to an application of the broaden-and-build theory (Farnsworth et al., 2014; Frederickson, 2001). Within morally perilous situations, it is posited that particular positive emotions also termed moral emotions, such as gratitude, are often repressed in the moment as a survival tactic to allow the individual to focus on the threat at hand (Farnsworth et al., 2014; Frederickson, 2001). However, it is hypothesized that moral emotions arise after the threat has passed to facilitate coping (Farnsworth et al., 2014; Frederickson, 2001). For instance, in the example of the firefighter witnessing a fellow firefighter leaving a person in a burning house, the firefighter who experienced the PMIE may experience gratitude that they survived the fire itself after the event. Therefore, it would not be uncommon for positive emotions such as gratitude to co-occur with moral injury after the PMIE (Farnsworth et al., 2014; Frederickson, 2001). Thus, it is possible that gratitude has the potential to act as a protective factor against the deleterious effects of PMIEs. However, no direct association is known to exist between gratitude and PMIEs as of the current study.

Research does suggest that gratitude is a known protective factor against PTSD, a possible sequela of PMIEs. In particular, gratitude is inversely associated with alterations in mood and cognitions within the context of PTSD (Van Dusen et al., 2015). In other words, possessing high levels of trait gratitude is associated with experiencing fewer

alterations in mood and cognition following a traumatic event. This association is not surprising, as gratitude interventions increase positive affect (Cunha et al., 2019).

Additionally, trait gratitude is inversely associated with PTSD symptoms within samples of first responders such as police officers after a natural disaster (McCanlies et al., 2014). Thus, gratitude may act as a protective factor against PTSD symptoms among first responders who have experienced a PMIE.

As noted previously, it is possible that PMIEs may also be associated with poorer subsequent HRQoL, given that trauma is associated with poorer HRQoL (Laffaye et al., 2003; Li et al., 2018). Given that gratitude is inversely associated with PTSD symptoms (McCanlies et al., 2014) and is hypothesized to facilitate coping after traumatic events (Farnsworth et al., 2014; Frederickson, 2001), it may follow that gratitude may moderate the proposed association between PMIEs and HRQoL. HRQoL is often conceptualized to have a mental well-being component and a physical well-being component (Ware et al., 1995). Gratitude has an established history of boosting positive affect, mental well-being, and overall mental health (Bohlmeijer et al., 2020; Cunha et al., 2019; Wong et al., 2016). Additionally, gratitude has also performed comparably to thought record exercises, which are a key component of cognitive behavioral therapy (CBT), to reduce clinical symptoms such as worry and body dissatisfaction (Geraghty et al., 2010). Gratitude's history shows it has a strong history of improving mental health both inside and outside of a clinical context.

Since gratitude shows a strong association with mental well-being (Bohlmeijer et al., 2020; Cunha et al., 2019; Wong et al., 2016), it stands to reason that gratitude's benefits may extend to physical well-being. Gratitude is associated with better physical

well-being in the realms of improved sleep, lower counts of inflammatory biomarkers, and healthy eating behavior (Fritz et al., 2019; Jackowska et al., 2016; Redwine et al., 2016). Furthermore, gratitude is associated with higher reported levels of QoL in patients with health-related conditions, such as multiple sclerosis (Crouch et al., 2020). In addition to being associated with the individual components of HRQoL, gratitude is also associated with HRQoL as a whole. In particular, a recent study found trait gratitude is associated with state gratitude which in turn was associated with HRQoL within an undergraduate population (McGuire et al., 2020). Gratitude is also indirectly associated with HRQoL, especially in older populations (Hill et al., 2013).

Present Study

Since PMIEs are associated with PTSD symptoms (Jordan et al., 2017) and may be related to HRQoL (Laffaye et al., 2003; Li et al., 2018), research investigating what factors may mitigate the potential sequelae of PMIEs is warranted. Additionally, despite first responders' likely exposure to PMIEs, no research to date has examined the existence and impact of PMIEs among a multi-occupation first responder sample. The current study addresses these gaps in the literature by 1) establishing that PMIEs exist in a first responder population, 2) examining the association of PMIEs with PTSD symptoms and HRQoL, and 3) examining gratitude as a moderator of the PMIE's associations with PTSD symptoms and HRQoL. The specific hypotheses are as follows:

Hypothesis 1) Members of the military experience PMIEs at rates between 10-20.2%; therefore, we expect first responders will report having experienced PMIEs at similar rates.

Hypothesis 2a) There will be a positive association between PMIEs and PTSD symptoms.

Hypothesis 2b) There will be a negative association between PMIEs and HRQoL.

Hypothesis 3a) As overall trait gratitude increases, the relationship between PMIEs and PTSD symptoms will become less positive.

Hypothesis 3b) As overall trait gratitude increases, the relationship between PMIEs and HRQoL will become less negative.

CHAPTER II

Methods

Participants

294 participants were recruited from various law enforcement agencies, emergency services (EMS), and fire departments within Texas and nationwide. Data were collected in-person at 5 agencies in southeast Texas. Data were also collected online from all 50 states. The total sample consisted of primarily young, White/European American males ($M_{age} = 36.46$, $SD = 10.48$, Male 83.90%, and 86.70% White/European American). Participation was solicited for in-person and online data collection by the researchers via email and by phone using scripts. Participants were eligible to participate if they were 18 years or older, English speaking, and had a first responder occupation. A first responder occupation was defined as one of the following occupations: law enforcement, fire fighter, emergency technician, paramedic, and/or search and rescue worker. Preliminary statistical analyses (e.g., t -tests) revealed significant variance between the online and in-person samples; thus, demographics were split by online and in-person participation method, and data collection method (online/in-person) was included as a covariate in the main study analyses. Please see Tables 1 and 2 for detailed demographics split by data collection method.

Insert Tables 1 and 2 about here

Measures

Demographics

A demographics questionnaire assessed participants' age, race/ethnicity, education, marital status, yearly income, religious affiliation, current and past military service, occupation type, years spent in occupation, occurrence and frequency of work-related injury, and substance use.

The Moral Injury Events Scale

The Moral Injury Events Scale (MIES; Nash et al., 2013) is a 9-item measure of PMIEs. Participants rate their level of agreement with statements using a 6-point Likert scale with 1 indicating "strongly agree" and 6 indicating "strongly disagree." The range of scores for the MIES are 9-54. Means were computed for the scale. Specifically, the scale is designed to measure the potential violation of the moral self with statements such as, "I saw things that were morally wrong." Lower scores indicate higher levels of exposure to potentially morally injurious events. However, the scale was reverse scored to ease interpretability in this sample. Bryan and colleagues (2016) found the MIES has a three-factor structure consisting of transgressions by others, transgressions by self, and betrayal. However, for the present study, only the total score was used to reduce the number of analyses. For the purpose of this study, the MIES was minimally altered to tailor it to a civilian/first responder population, with statements such as, "I feel betrayed by fellow service members I once trusted" to "I feel betrayed by fellow employees I once trusted." The MIES demonstrates adequate construct validity within military samples (Bryan et al., 2016). Within two samples of military members, the MIES showed

relatively strong internal consistency ($\alpha = .79$ to $.96$; Bryan et al., 2016). The Cronbach's alpha for the MIES in this study was $\alpha = .85$.

Gratitude, Resentment, and Appreciation Test-Short Form

The Gratitude, Resentment, and Appreciation Test-Short Form (GRAT-S; Watkins et al., 2003) is a 16-item measure frequently used to measure dispositional gratitude. Participants rated how much they agree with statements such as "I couldn't have gotten where I am today without the help of many people" by using a 9-point Likert scale with 1 indicating, "I strongly disagree" and 9 indicating, "I strongly agree." The range of scores for the GRAT-S are 16-144. The GRAT-S has three subscales representative of three different theoretical categorizations of gratitude: Lack of a Sense of Deprivation, Simple Appreciation, and Appreciation for Others. To reduce the number of analyses, the present study only used the total score. Higher scores indicate the individual possesses higher levels of trait gratitude. The GRAT-S has demonstrated excellent internal consistency in previous research ($\alpha = .86$ to $.91$; Solom et al., 2017). The Cronbach's alpha for the GRAT-S in this study was $\alpha = .83$.

Posttraumatic Stress Disorder Checklist-Civilian Version

The Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C; Weathers et al., 1994) is a 17-item measure typically used as a unidimensional measure of PTSD symptoms. However, the PCL-C may be computed into three symptoms categories of intrusion, avoidance, and negative alterations in mood and cognitions. The present study only used the total score to reduce the number of analyses. Participants used a 5-point Likert scale to rate the frequency with which they experienced each symptom with 1 indicating, "Not at all" and 5 indicating "Extremely". PTSD symptoms were assessed

with statements such as, “Avoid thinking about or talking about a stressful experience from the past or avoid feelings related to it?” Higher scores indicate higher symptom severity. The PCL-C’s total score may range from 17- 85. The response categories are symptomatic (i.e., an item is rated 3-5) or non-symptomatic (e.g., an item is rated 1-2). The PCL-C has demonstrated adequate convergent validity (.07-.90; Wilkins et al., 2011) and discriminant validity (-.77 - .78; Wilkins, et al., 2011). Furthermore, the PCL-C has excellent test-retest reliability ($\alpha = .75-.88$; Wilkins et al., 2011) and internal consistency ($\alpha = .65-.96$; Wilkins et al., 2011). The Cronbach’s alpha for the PCL-C in this study was $\alpha = .93$.

The Medical Outcomes Study 12-item Short Form Health Survey Version 2®

The study used a modified version of the Medical Outcomes Study 12-item Short Form Health Survey Version 2® (SF-12 v.2®; Ware et al., 1995) which is a short self-report measure of health-related quality of life used in health psychology and medical research. The SF-12 v.2® consists of 12 items selected from the SF-36 which may be computed to yield mental (MCS) and physical health (PCS) composite summaries. The PCS values and MCS values are transformed using T-score based scoring with a mean of 50 and a standard deviation of 10. Higher scores on each component indicate better health-related quality of life. The rating scales vary by question, but most questions utilize a version of a 5-point rating system. Both components of the SF-12 v.2® show good convergent and divergent validity within a sample of individuals with severe mental illness (Salyers et al., 2000). The SF-12 v.2® also provides satisfactory internal consistency (Mosier’s $\alpha = .69-.70$), split half reliability (.65-.75), and test-retest reliability (.57-.61) for both the PCS and MCS in individuals who have a known mental

illness or co-occurring physical and mental illnesses (Huo et al., 2018). The Cronbach's alpha for the PCS and MCS were unable to be determined in this study due to the nature of the proprietary scoring software.

Validity Check Questions

A variety of validity check questions were implemented within the online data collection throughout the survey to identify careless responding. One validity check question was embedded within every other measure, except for the demographics questionnaire. The questions varied in response format to better blend in within each scale. An example of a validity check question used in measures with Likert scales was, "For this item, please choose 'not at all.'" An example of validity check questions for scales that had a yes/no format was, "I like robbing graves."

Procedure

Prior to COVID-19, about 60% of the total sample size was collected in-person and online according to selection criteria described below, but post-COVID-19, the remaining 40% of the sample was collected solely online. Within the online sample, 39 participants were collected prior to COVID-19 being declared a pandemic, which was approximately 26% of the sample collected online ($n = 151$). The data was counterbalanced via a Latin square key and the Qualtrics randomization function to ensure no order effects were present. After a brief consent procedure, the participants were presented with the demographic questionnaire and the main study measures in random order which took on average 20 minutes to complete. In order to ensure quality data from the online portion of the study, validity check questions were implemented within every other questionnaire. Validity check questions were not implemented for the

in-person version of the study because experimenter presence often naturally results in lower rates of careless responding (Francavilla et al., 2019). The in-person paper surveys were entered into a database and double-coded by two undergraduate students. In order to test for measurement invariance between collection types for each study variable, *t*-tests were conducted.

In-Person

First responder organizations in southeast Texas were solicited for in-person data collection. The in-person portion of the study consisted of a single researcher or a pair of researchers visiting the department or agency upon permission given from the department administration via a letter of support. The administrative contact arranged for first responders to meet the researchers at an appointed time, usually in a conference room. The lead researcher introduced the study by reading from a script explaining the purpose of the study and what participation would include, which on average took five minutes or less. Given that a waiver of informed consent was obtained, the researchers passed out information forms detailing what constituted informed consent for the study, and participants were asked if they had any questions before proceeding. They were then given a paper survey packet. Upon completion of the survey packet, the participants were given a small snack and the option to fill out a paper raffle ticket for a chance to win a \$50 Amazon gift card.

Online

Departments and/or agencies from all 50 states were contacted for participation. Additionally, if a department/agency was originally approached to participate in-person but declined, they were offered the opportunity to participate online. When soliciting

participation from the department or agency, the researcher asked the department or agency's administration to disseminate a promotional flyer explaining the purpose of study and what participation consisted of, along with a QR code to the online version of the study. A URL link to the online survey was provided as well, which was hosted on Qualtrics, an online survey platform. Lastly, participants were thanked for their participation and received a link to a separate survey to fill out an online raffle entry if they desired.

CHAPTER III

Results

An a-priori power analysis was conducted using G*Power 3.1 (Faul et al., 2009), a power analysis software, to determine that a sample size of 263 would allow a small effect size ($f^2 = .05$) to be detected as statistically significant at alpha .05 with .80 power, and five predictors. Thus, a sample size of 263 was anticipated to have the appropriate amount of power to detect small effects for hypotheses 2 and 3 (i.e., the association of PMIEs with PTSD symptoms and HRQoL). However, upon further consideration of the original a-priori power analysis ($N = 263$), data collection was extended by approximately 15% in order to account for careless responding and incomplete data (Oppenheimer et al., 2009). The final collected amount of data was ($N = 295$); 29 participants were deleted due to failing two or more validity check questions, 11 participants were removed due to not having a first responder occupation, and 12 participants were removed for only filling out the demographics portion of the survey which resulted in ($N = 243$). All data was analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.

Preliminary Data Analysis

Heteroscedasticity/homoscedasticity, linearity, normality of errors, kurtosis, skewness, outliers, and multicollinearity were assessed to determine if all assumptions were met to allow planned statistical analyses of the data. After assessing each main variable via a scatterplot, there was no evidence of heteroscedasticity or non-linearity. Normality of errors was assessed using Q-Q plots, which all indicated lack of abnormalities in residual distributions of the MIES, PCL-C, the GRAT-S, MCS, and

PCS. Furthermore, skewness and kurtosis were examined to determine normal distribution of data. A variable was determined to be skewed if it was two and half standard deviations above or below the mean (Abbot, 2016). The skewness for the main study variables of the GRAT-S, PCS, MCS, PCL-C, and MIES in respective order were -.56, -1.01, -.50, .87, and .40. Regarding kurtosis, variables were determined to be normally distributed if they fell between a -3 and 3 range (Abbot, 2016). All of the main study variables fell within the normal distribution range with values as follows for the GRAT-S, PCS, MCS, PCL-C, and MIES in respective order: .21, 1.08, -.42, .15, and -.61. All main study variables were assessed for outliers via boxplots regardless of their skewness or kurtosis values. Outliers were determined based on SPSS's designation of "extreme values" which are calculated via interquartile ranges. No extreme outliers were found in the main study variables. Multicollinearity was assessed via examining the main study variables variable inflation factor (VIF). A common benchmark to assess multicollinearity is if a variable's VIF exceeds 10 (Robinson & Schumacker, 2009). All VIFs were under 3.

Amount and pattern of missing data were also assessed prior to the main analyses. If a participant did not respond to >25% of the items on a measure, their response on that measure was not scored. For the GRAT-S, 20 participants were not scored because they did not contain any responses to the scale, 21 responses on the PCL-C were not scored because they did not contain any responses to the scale, 24 responses were not scored on the MIES with only one response not scored that contained partial data, and 14 participants were not scored on the modified SF-12 v.2[®] because they did not contain any responses to the scale. If a participant did not respond to <25% of items on a measure,

multiple imputation was to be used prior to calculating their score for that measure. Additionally, if a scale as a whole had over 5% missing data (i.e., partial data, not complete blanks), multiple imputation was to be used to account for the missing data to provide the most reasonable estimation of missing responses. The GRAT-S, PCL-C, and MIES had .08%, .05%, and .35% missing data. The modified SF-12 v.2[®] was calculated as a whole scale rather than the PCS and MCS subscales due to the subscales needing to be scored via the proprietary software to determine which items make up the subscales. The modified SF-12 v.2[®]'s percentage of missing data was .14% for the whole scale. Since none of the scales demonstrated more than 5% missing data, multiple imputation was not used. Little's MCAR test was used to investigate systematic patterns for missing data and determined the data to be missing completely at random $\chi^2 = 25.82$; $p = .47$. In sum, the data were examined and were found to meet the assumptions necessary to interpret the findings with confidence.

Additionally, we investigated invariance between the online, in-person, Pre-COVID-19, and Post-COVID-19 samples for the main variables via independent t -tests. Please see Tables 3 and 4 for t -test results.

 Insert Tables 3 and 4 about here

Levene's test for equality of variances was found to be violated for the PCL-C independent t -test of online and in-person samples, $F(1,220) = 6.02$, $p = .015$. Therefore, the PCL-C analysis is reported using equal variances not assumed. People who took the survey online reported significantly higher PCL-C scores ($M = 35.4$, $SD = 13.0$)

compared to people who completed the survey in-person ($M = 29.1$, $SD = 10.4$), $t(215.77) = -4.01$, $p < .001$, 95% CI $[-9.42, -3.21]$, $d = .53$. Given these results, whether a person completed the survey online or in-person as well if the data were collected Pre-COVID-19 or Post-COVID-19 were included as potential covariates in analyses.

Covariates

Covariates were determined based on one-way analysis of variances (ANOVAs) and bivariate correlations with the main study variables. Demographic variables which displayed a value of $p < .20$ in either the ANOVAs or correlations with the main study variables were included in all subsequent analyses as covariates. A one-way ANOVA showed the effect of gender significantly differed for the PCL-C $F(1, 220) = 12.49$, $p < .001$ and the MCS $F(1, 226) = 1.67$, $p = .20$. Additionally, gender's effect on the PCL-C violated Levene's test of homogeneity of variance $F(1, 220) = 3.97$, $p = .05$. Therefore, a Welch's ANOVA was conducted for gender's effect on the PCL-C $Welch's F(1, 39.05) = 8.80$, $p = .005$. Females scored higher on the PCL-C ($M = 39.63$, $SD = 14.8$) compared to males ($M = 31.6$, $SD = 11.5$). Furthermore, females scored higher on the MCS ($M = 48.0$, $SD = 10.1$) compared to males ($M = 45.6$, $SD = 10.7$).

Additionally, race/ethnicity had a main effect on the PCS $F(5, 222) = 1.76$, $p = .12$, MCS $F(5, 222) = 2.04$, $p = .08$, and the MIES $F(5, 212) = 1.87$, $p = .10$. Post hoc analysis using Tukey's HSD test revealed White/European American participants had higher scores on the PCS compared to Latino/Hispanic ($M_{difference} = 1.8$, $SE = 3.5$), Black/African American ($M_{difference} = 9.9$, $SE = 5.6$), Asian American ($M_{difference} = 5.5$, $SE = 8.8$), Pacific Islander ($M_{difference} = 6.5$, $SE = 6.3$), and Other ($M_{difference} = 7.1$, $SE = 5.6$) participants. Additionally, White/European American participants had higher scores on

the MCS compared to Latino/Hispanic ($M_{\text{difference}} = 1.0, SE = 3.0$), Black/African American ($M_{\text{difference}} = 3.0, SE = 4.3$), Asian American ($M_{\text{difference}} = 5.0, SE = 7.4$), and Pacific Islander ($M_{\text{difference}} = 15.9, SE = 6.1$) participants but had lower scores compared to participants who indicated a race/ethnicity of Other ($M_{\text{difference}} = -7.1, SE = 4.7$). Furthermore, White/European American people had higher scores on the MIES compared to Latino/Hispanic ($M_{\text{difference}} = .6, SE = .3$), Black/African American ($M_{\text{difference}} = .2, SE = .5$), Asian American ($M_{\text{difference}} = .9, SE = .8$), Pacific Islander ($M_{\text{difference}} = .7, SE = .5$), and Other ($M_{\text{difference}} = .8, SE = .5$) participants.

Marital status had a main effect on both the MIES $F(4,214) = 3.92, p = .004$ and the PCL-C $F(4, 217) = 2.73, p = .03$. Tukey's HSD was used to interpret the PCL-C's differences in marital status. Participants who were separated from their spouse had higher scores on the PCL-C compared to married ($M_{\text{difference}} = 8.7, SE = 6.2$), divorced ($M_{\text{difference}} = 1.7, SE = 6.8$), never married ($M_{\text{difference}} = 11.6, SE = 6.3$), and widow/widower ($M_{\text{difference}} = 15.0, SE = 10.6$) participants. However, marital status had an effect on the MIES violated Levene's test of homogeneity of variance $F(4,214) = 2.50, p = .04$. Therefore, a Welch's ANOVA was conducted for marital status' effect on the MIES *Welch's* $F(4,5.88) = 3.18, p = .10$, and a Games-Howell post-hoc test indicated participants separated from their spouses had higher scores on the MIES compared to married ($M_{\text{difference}} = 1.1, SE = .5$), divorced ($M_{\text{difference}} = 1.2, SE = .5$), never married ($M_{\text{difference}} = 1.6, SE = .5$), and widow/widower ($M_{\text{difference}} = 1.3, SE = 1.0$) participants.

Income had a main effect on both the MCS $F(6,220) = 1.95, p = .07$, and the MIES $F(6,211) = 1.64, p = .14$. Regarding income's effect on the MCS, a Tukey's HSD post hoc test revealed people who made \$20,000-29,999 a year scored higher on the MCS

compared to people who made \$30,000-39,999 ($M_{\text{difference}} = 6.2, SE = 5.0$), \$40,000-49,999 ($M_{\text{difference}} = 3.2, SE = 4.5$), \$50,000-59,999 ($M_{\text{difference}} = 9.8, SE = 4.3$), and >\$60,000 per year ($M_{\text{difference}} = 6.8, SE = 4.0$). However, income's effect on the MIES violated Levene's test of homogeneity of variance $F(4,211) = 2.98, p = .02$. Therefore, a Welch's ANOVA was conducted for marital status' effect on the MIES $Welch's F(4, 19.41) = 4.55, p = .009$, and a Games-Howell post-hoc test indicated people who made \$20,000-29,999 a year scored lower on the MIES compared to people who made \$30,000-39,999 ($M_{\text{difference}} = -1.1, SE = .4$), \$40,000-49,999 ($M_{\text{difference}} = -.5, SE = .3$), \$50,000-59,999 ($M_{\text{difference}} = -.6, SE = .3$), and >\$60,000 per year ($M_{\text{difference}} = -1.0, SE = .2$).

Religion had a main effect on both the PCS $F(6,221) = 2.47, p = .03$ and the PCL-C $F(6,215) = 1.90, p = .08$. Both of these analyses' violated assumptions of homogeneity, therefore, Welch's ANOVA and Games-Howell post-hoc tests were conducted for religion's effect on both the PCS $Welch's F(4,43.15) = 1.34, p = .27$ and the PCL-C $Welch's F(4,47.28) = 2.37, p = .07$. Since the main effect of religion on the PCS was no longer significant, the Games-Howell test was only conducted for the PCL-C.

Participants who identified as Atheist scored higher on the PCL-C when compared to participants who identified as Non-Catholic Christian ($M_{\text{difference}} = 6.7, SE = 3.9$), Catholic ($M_{\text{difference}} = 10.0, SE = 4.2$), Agnostic ($M_{\text{difference}} = 11.4, SE = 4.6$), and Other ($M_{\text{difference}} = 4.9, SE = 4.7$).

Additionally, occupation type (e.g. whether the participant was a firefighter, law enforcement officer, search and rescue worker, EMT, paramedic and/or a combination of these occupations) had a main effect on the MCS $F(6,221) = 1.56, p = .16$, the MIES

$F(6,212) = 2.06, p = .06$, and the PCL-C $F(6,215) = 1.58, p = .15$. Tukey's HSD revealed Fire fighters had lower scores on the MCS compared to Law enforcement ($M_{\text{difference}} = -3.2, SE = 2.1$), Paramedics ($M_{\text{difference}} = -5.9, SE = 2.7$), EMTs ($M_{\text{difference}} = -7.9, SE = 3.7$), Search and Rescue Workers ($M_{\text{difference}} = -7.4, SE = 5.0$), Other ($M_{\text{difference}} = -11.6, SE = 7.6$), and people who have more than one first responder profession ($M_{\text{difference}} = -3.1, SE = 2.1$). Tukey's HSD also revealed Fire fighters had lower scores on the MIES compared to Law enforcement ($M_{\text{difference}} = -.4, SE = .2$), Paramedics ($M_{\text{difference}} = -.8, SE = .3$), EMTs ($M_{\text{difference}} = -.3, SE = .4$), Other ($M_{\text{difference}} = -.5, SE = .8$), people who have more than one first responder profession ($M_{\text{difference}} = -.2, SE = .2$), but had higher scores on the PCL-C compared to Search and Rescue Workers ($M_{\text{difference}} = .3, SE = .5$). Lastly, Tukey's HSD revealed Fire fighters had lower scores on the PCL-C compared to Law enforcement ($M_{\text{difference}} = -5.0, SE = 2.4$), Paramedics ($M_{\text{difference}} = -8.3, SE = 3.2$), EMTs ($M_{\text{difference}} = -6.0, SE = 4.3$), Search and Rescue Workers ($M_{\text{difference}} = -7.4, SE = 5.8$), Other ($M_{\text{difference}} = -.5, SE = 8.9$), and people who have more than one first responder profession ($M_{\text{difference}} = -5.9, SE = 2.4$).

Whether the surveys were taken before or after March 11, 2020 when the World Health Organization declared that the COVID-19 virus had reached pandemic status (World Health Organization, 2020) was positively correlated with the PCS $r(227) = .14, p = .03$, negatively correlated with the MCS $r(227) = -.17, p = .01$, negatively correlated with the PCL-C $r(221) = -.23, p < .001$, and negatively correlated with the MIES $r(218) = -.22, p = .001$. Age positively correlated with the MIES $r(206) = .24, p = .001$, and negatively with the GRAT-S $r(210) = -.09, p = .19$. Whether or not a participant has served or is currently serving in the military negatively correlated with PTSD symptoms

$r(221) = -.13, p = .05$, negatively correlated with the MIES $r(218) = -.17, p = .01$, and positively correlated with gratitude $r(221) = .13, p = .04$. Lastly, time spent in a first responder occupation positively correlated with the MIES $r(218) = .30, p < .001$, and negatively correlated with trait gratitude $r(222) = -.09, p = .20$.

In light of these analyses, race/ethnicity and whether or not the data was collected before the COVID-19 pandemic were included as covariates in all analyses regarding the PCS. Gender, race/ethnicity, income, occupation type, whether the survey was taken online or in-person, and whether or not the data was collected before the COVID-19 pandemic were included as covariates in all analyses regarding the MCS. Gender, marital status, religion, occupation type, in-person or online survey administration, military service and before or after COVID-19 were included as covariates in all analyses regarding the PCL-C. Race/ethnicity, marital status, income, occupation type, in-person or online administration, before or after COVID-19, age, military service, and time spent in occupation were included as covariates in all analyses regarding the MIES. Lastly, age and military service were included as covariates in all analyses regarding the GRAT-S. However, age ($VIF = 4.19-4.30$) was found to be relatively colinear with time spent in occupation ($VIF = 4.47-4.54$). Therefore, age was not included as a covariate in any analyses that required both age and time spent in occupation as covariates.

Hypothesis 1: PMIE Frequency

In order to test hypothesis 1 (e.g., PMIEs would occur in first responders at rates previously reported to occur in military samples), an exploratory factor analysis (EFA) of the MIES's factor structure was first conducted to determine if Bryan and colleagues' (2016) three-factor structure translated to a first responder sample. Promax rotation was

used to allow the factors to correlate. Additionally, principal axis factor extraction was used due to its robustness in the event data is not normally distributed (Fabrigar et al., 1999). Both the Kaiser-Meyer-Olkin measure of sampling adequacy (.75) and Bartlett's test of sphericity ($p < .001$) indicated the model could be interpreted with confidence. Eigenvalues above the value of one all supported a three-factor solution, as did the scree plot and factor loadings. See figure 1 for scree plot of the MIES. Therefore, given the results, the three-factor structure and factor labels bestowed by Bryan and colleagues (2016) were retained. Please see Table 5 for the EFA factor loadings.

Insert Table 5 about here

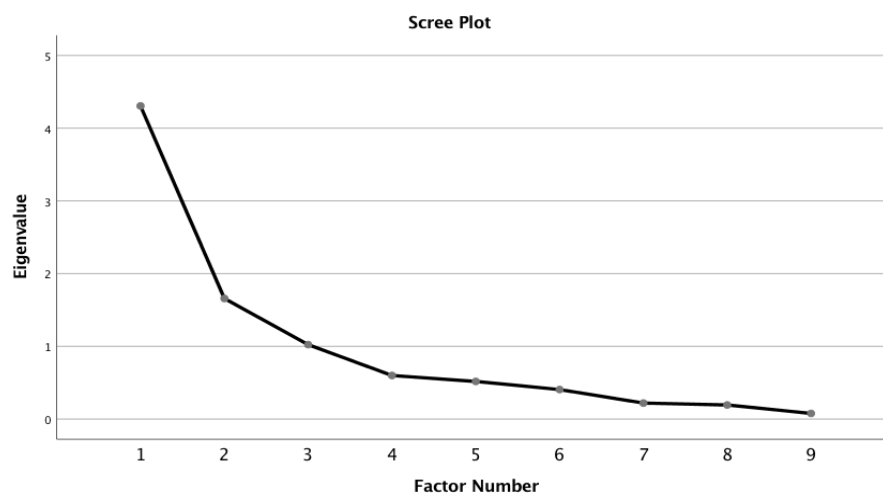


Figure 1. Scree plot of MIES Exploratory Factor Analysis with Promax Rotation

Once the scale's factor structure was analyzed, each subscale was analyzed at the item level to produce a percentage. Similar to the prevalence rate calculation methods for PMIEs described in Jordan and colleague's (2017) paper, if a participant answered

“slightly agree”, “agree”, or “strongly agree” to any item on the MIES scale, the response was considered an occurrence of a PMIE. The responses for each item which fit the criteria described above were totaled into a percentage for each item, and items were averaged into a percentage for each factor. Additionally, an overall PMIE rate percentage was calculated by averaging factor percentages. Please see Table 6 for PMIE prevalence rates.

 Insert Table 6 about here

Hypotheses 2a and 2b: Regression Analyses

Hierarchical multiple regression analyses were conducted to determine if PMIEs, predict PTSD symptoms and HRQoL. For hypothesis 2a, the dependent variable was the PCL-C total score and the relevant covariates which were gender, income, time spent in occupation, race/ethnicity, data collected before or after COVID-19, military service, in-person or online data collection, occupation type, marital status, and religion were entered into step 1. The MIES total score was entered into the model via step 2. Cook’s distance (.00, .10) which detects influential outliers was determined to be within limits. Typically, Cook’s distance maximum values larger than 1 are deemed to be influential outliers (Stevens, 1984). In model 1, the aforementioned covariates significantly accounted for 15% of the variance of the model ($R^2 = .15$, $F(10,196) = 3.35$, $p < .001$). The only variable that was found to be significant in this model was female gender ($\beta = .23$, $p = .003$). In model 2, the MIES was found to significantly account for 12% of the

change in variance ($\Delta R^2 = .12$, $F(1,195) = 32.66$, $p < .001$). The standardized coefficients, R^2 , and ΔR^2 for all regression models are reported in Table 7.

 Insert Table 7 about here

The MIES was positively associated with PCL-C total scores ($\beta = .39$, $p < .001$) as was female gender ($\beta = .22$, $p = .002$) and time spent in occupation ($\beta = -.19$, $p = .01$). A post-hoc power analysis using G*Power 3.1 (Faul et al., 2009) determined the power to be .99 to detect an effect of this size ($f^2 = .20$) as significant.

For hypothesis 2b part one, the dependent variable was the PCS, and the relevant covariates were income, marital status, time spent in occupation, race/ethnicity, pre-COVID-19 or post-COVID-19, military service, in-person or online data collection, and occupation type. Similar to regression described above, the covariates were entered in step 1 and the MIES was entered into step 2. Cook's distance (.0, .18) was within limits. In model 1, the covariates accounted for 5% of the variance but was not significant ($R^2 = .05$, $F(8,193) = 1.26$, $p = .27$). In model 2, the MIES accounted for 1% of the change which was not significant as well ($\Delta R^2 = .01$, $F(1,192) = .02$, $p = .88$). A post-hoc power analysis using G*Power 3.1 (Faul et al., 2009) determined the power to be .90 to detect an effect of this size ($f^2 = .05$) as significant.

For hypothesis 2b part two, the dependent variable was the MCS and the covariates were gender, time spent in occupation, income, race/ethnicity, pre-COVID-19 or post-COVID-19, military service, in-person or online data collection, occupation type, religion, and marital status. Covariates were entered in step 1, and the MIES was entered

in step 2. Cook's distance (.00, 1.39) was out of range, but when the standard residual and P-P plots were examined, there were no significant outliers. In model 1, the covariates accounted for 6% of the variance in the model although it was not significant ($R^2 = .06$, $F(10,191) = 1.14$, $p = .34$). Additionally, the MIES accounted for .04% of the change in variance which was also non-significant ($\Delta R^2 = .004$, $F(1,190) = .75$, $p = .39$). A post-hoc power analysis using G*Power 3.1 (Faul et al., 2009) determined the power to be .93 to detect an effect of this size ($f^2 = .06$) as significant.

Hypotheses 3a and 3b: Moderation Analyses

To investigate hypothesis 3a which stated trait gratitude would moderate the effect of PMIEs on PTSD symptoms, a simple moderation analysis was performed using SPSS PROCESS model 1. The model consisted of the MIES as a predictor, the GRAT-S sum as the moderator, and the PCL-C total score as the dependent variable. Covariates included gender, marital status, religion, occupation type, in-person or online data collection, pre-COVID-19 or post-COVID-19, military service, race/ethnicity, income, and time spent in occupation. The interaction between the MIES and the GRAT-S was non-significant ($\beta = .01$, 95% CI [-.08, .09], $p = .91$). There were no conditional effects found as the relationship between the MIES and the PCL-C was similar to 1 SD below the GRAT-S mean ($\beta = 3.75$, 95% CI [1.69, 5.82], $p < .001$), at the mean ($\beta = 3.84$, 95% CI [2.22, 5.45], $p < .001$), and 1 SD above the mean ($\beta = 3.92$, 95% CI [1.73, 6.11], $p < .001$).

Hypothesis 3b which stated trait gratitude would also moderate the relationship between PMIEs and HRQoL was also investigated using simple moderation models via SPSS PROCESS. In the first moderation model, the MIES was the predictor variable, the

GRAT-S was the moderator, and the PCS was the dependent variable. Covariates were race/ethnicity, marital status, income, occupation type, in-person or online data collection, pre-COVID-19 or post-COVID-19, military status, and time spent in occupation. The interaction between the MIES and the GRAT-S was non-significant ($\beta = .05$, 95% CI [-.01, .10], $p = .08$). There were no conditional effects found as the relationship between the MIES and the PCS was non-significant regardless of whether gratitude remained 1 SD below the mean ($\beta = -.33$, 95% CI [-1.67, 1.01], $p = .63$), at the mean level ($\beta = .52$, 95% CI [-.57, 1.62], $p = .35$), or 1 SD above the mean ($\beta = 1.26$, 95% CI [-.20, 2.73], $p = .09$).

In the second model, MIES was the predictor variable, the GRAT-S was the moderator, and the MCS was the dependent variable. Covariates were race/ethnicity, marital status, income, occupation type, in-person or online data collection, pre-COVID-19 or post-COVID-19, military status, time spent in occupation, and gender. The interaction between the MIES and the GRAT-S was non-significant ($\beta = -.08$, 95% CI [-.16, .01], $p = .07$). There were no conditional effects found as the relationship between the MIES and the MCS was non-significant regardless of whether gratitude remained 1 SD below the mean ($\beta = 1.70$, 95% CI [-.35, 3.76], $p = .10$), at the mean level ($\beta = .44$, 95% CI [-1.19, 2.06], $p = .60$), or 1 SD above the mean ($\beta = -.83$, 95% CI [-3.05, 1.39], $p = .46$) (see figure 2 for a visual representation of this relationship). In sum, the results indicate that trait gratitude does not moderate the relationship between PMIEs and PTSD symptoms nor PMIEs and HRQoL in first responders.

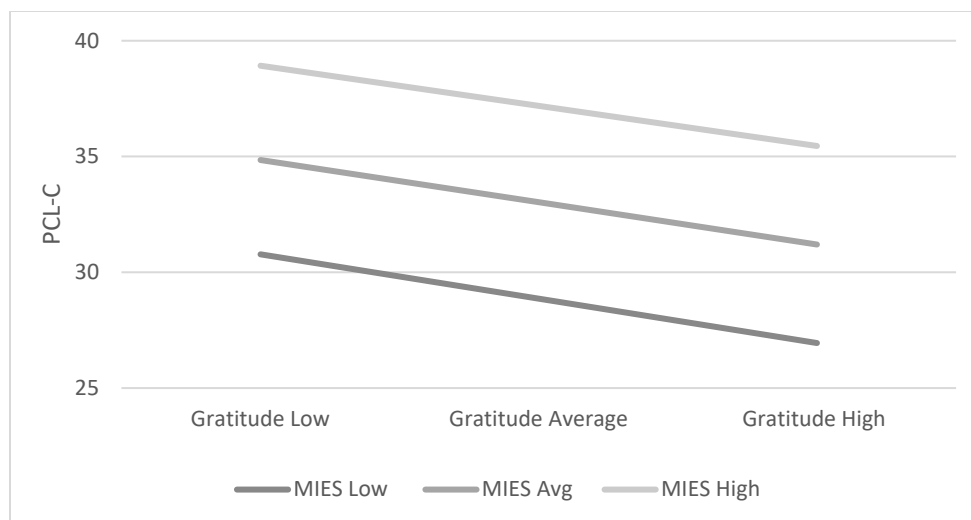


Figure 2. Gratitude as a moderator of PMIEs on PTSD symptoms

CHAPTER IV

Discussion

The three main aims of this study were to 1) investigate if PMIEs occurred in a first responder population and if so, at what rates, 2) investigate the association of PMIEs with PTSD symptoms and HRQoL, and 3) investigate gratitude as a potential moderator of PMIEs association with PTSD symptoms and HRQoL. Results partially supported these hypotheses. We found the prevalence rates of PMIEs in first responders were at the same rates as military personnel or higher. Secondly, we found PMIEs significantly predicted PTSD symptoms but not HRQoL in a first responder sample. Thirdly, we found trait gratitude does not moderate PMIEs' association with PTSD or HRQoL.

Over a third of the respondents reported experiencing betrayal (compared to 14.9-20.2% of military personnel, Jordan et al., 2017) and one in five reported having personally transgressed (compared to 11.6-18.6% of military personnel, Jordan et al., 2017). Additionally, over half of the respondents in this study indicated witnessing a transgression by others, which is a facet of PMIEs for which prevalence rates have not been previously reported. Thus, potentially morally injurious events appear to be very common among first responders. As introduced previously, potentially morally injurious events are events in which a person engages in or observes an act that violates the person's moral beliefs which may result in feelings of guilt and shame (Jinkerson, 2016; Litz et al., 2009). PMIEs are also associated with severe mental health outcomes such as suicide which further demonstrates the need for mental healthcare for this population (Bryan et al., 2014).

According to the *t*-tests investigating Pre-COVID-19 versus Post-COVID-19 PMIE rates, the recent pandemic affected PMIE severity beyond that which would occur under normal circumstances. A recent news article highlighted some accounts of first responders feeling betrayed by their management when proper personal protective equipment could not be obtained, yet they were expected to continually risk exposing themselves and their families to COVID-19 (Hoffman, 2020). First responders who are already putting themselves in harm's way on a daily basis may be bearing the additional burden in a pandemic regarding how their livelihood might ultimately affect their loved ones.

Secondly, the results supported hypothesis 2a which stated PMIEs would be associated with greater PTSD symptoms. This finding is consistent with the literature as PMIEs are known to predict PTSD symptoms in military samples (Battles et al., 2018). However, this finding is novel because the association between PMIEs and PTSD symptoms has not been reported in a US first responder sample to date. PMIEs' presence in first responders and their association with PTSD symptoms may alert clinicians to be on the lookout for first responder staff who have experienced PMIEs and to not only address the trauma symptoms, but their potentially morally injurious underpinnings.

Currently, since PMIEs are an emerging concern and the moral injury syndrome remains an unofficial diagnosis, there is no agreed upon gold-standard treatment to directly address PMIEs or the moral injury syndrome (Griffin et al., 2019). However, due to PMIEs co-occurrence with PTSD and PTSD's similarity to the moral injury syndrome, researchers have investigated evidence-based treatments traditionally used to treat PTSD, such as prolonged exposure and cognitive processing therapy, and state the treatments

may be adapted to treat patients who have experienced PMIEs (Smith et al., 2013; Wachen et al., 2016). Additionally, alternative and adjunctive treatments have been explored such as acceptance and commitment therapy, adaptive disclosure, interventions targeted to address any spiritual or religious distress as a result of the PMIEs, and integrative residential programs (Dentry et al., 2017; Farnsworth et al., 2017; Harris et al., 2011; Litz et al., 2016). Most of these treatments can be readily offered by clinicians trained in treating trauma.

Since treatments do exist to treat people who have experienced PMIEs (Dentry et al., 2017; Farnsworth et al., 2017; Harris et al., 2011; Litz et al., 2016; Smith et al., 2013; Wachen et al., 2016), engaging in outreach to first responders may be a critical component to addressing PMIEs in this population. Potential efforts to increase mental health access to first responders experiencing PMIEs could be offered in a variety of ways, while taking into consideration the sensitive nature of these events. For instance, departments may take the lead in addressing moral injury before it happens via education (Papazoglou et al., 2020). An example could be offering mental health educational workshops to departments to reduce mental health stigma and provide first responders an introduction to mental health and mental health professionals in their area. Furthermore, local universities and mental health agencies could partner with departments/agencies to promote and offer low-cost services to first responders. For example, universities could host mental health summits or mental health services fairs to promote the services available in the community and invite local first responder agencies to participate or ask departments to provide a small incentive (e.g., a small snack) for their members to attend. This platform would allow first responders and the surrounding community to learn about

mental health and available services without being identified as someone who is seeking mental health treatment.

However, the results did not reveal a significant relationship between PMIEs and HRQoL. This finding is not in line with what was expected as a past study reported a significant association between PTSD and HRQoL in a sample of veterans (Li et al., 2018). Since PMIEs was associated with PTSD symptoms, it would logically follow that PMIEs would be associated with HRQoL indirectly through PTSD symptoms. The reason for this discrepancy could lie in differences in study design. The study conducted by Li and colleagues (2018) investigated 10-year PTSD trajectories of 9/11 veterans while the current study employed a cross-sectional design. It could be that PMIEs have the potential for association with HRQoL, but the relationship operates as a function of time. Future research should consider a longitudinal study design investigating potential delayed effects of PMIEs over time.

Contrary to hypotheses, trait gratitude did not moderate the association between PMIEs and PTSD symptoms or HRQoL. Further consideration of the phenomenon of moral injury highlights that gratitude may actually be uniquely poised to be particularly unhelpful in this context. Specifically, a person who has experienced a moral injury may explicitly reject or simply no longer experience feelings or thoughts of gratitude. PMIEs involve the violation of moral fiber and sometimes result in a loss of identity and demoralization (Litz & Kerig, 2019). Additionally, according to the broaden and build theory (Farnsworth et al., 2014; Frederickson, 2001) gratitude is considered a moral emotion which is often suppressed in the midst of a traumatic event, but later arise to facilitate coping. Since gratitude may be considered a virtue (Emmons & Crumpler,

2000), it might remind individuals that their moral fiber has been violated and thus, does not arise after the event, which would result in its failure to facilitate coping. Relatedly, for some, gratitude is connected with spirituality and moral beliefs – beliefs which may be rejected as a result of the person experiencing an event that violated those beliefs.

Alternatively, it could be the association between PMIEs and PTSD symptoms is so robust that it transcends individual factors such as traits. Since PMIEs have the potential to fit within Criterion A required for a PTSD symptom diagnosis (American Psychiatric Association, 2013, p. 272), it is quite possible the association is similar to that of traumatic events and PTSD. Additionally, PTSD and the moral injury syndrome do share a symptom in common (e.g., depression, Bryan et al., 2018) which would explain the strong association which gratitude fails to mitigate.

Furthermore, trait gratitude's failure to moderate the association between PMIEs and PTSD symptoms could be due to the recent finding that repeated measurements of state gratitude may provide a better assessment of gratitude's benefits compared to trait gratitude (McGuire et al., 2020). McGuire and colleagues (2020) posit that calculating an aggregate score of daily state gratitude provides a stronger assessment of gratitude's benefits because the aggregate score overcomes individual differences. Additionally, the measurement of state gratitude might provide more useful data for clinical intervention since state gratitude can be manipulated through writing interventions (Emmons & McCullough, 2003; Seligman, 2005; Watkins et al., 2003). Future studies may wish to measure state gratitude to investigate if state gratitude, considered in aggregate, might moderate the association between PMIEs and PTSD symptoms.

Limitations and Future Directions

One of the current study's limitations was the COVID-19 pandemic which interfered with data collection. Once COVID-19 occurred, the study's in-person data collection was shut down, and the study was opened nationwide in order to collect the needed number of participants. The result of having half the data collected in Texas and the other half opened nationally may have resulted in regional differences. The researchers were unable to control for regional differences in order to protect participants' identity/confidentiality as much as possible due to the prevalent mental health stigma in these professions. Additionally, the pandemic did inflate numbers beyond what may have naturally occurred because of the current high stress environment.

Despite the limitations, the current study's results hold promise for future studies investigating PMIEs and potentially the syndrome of moral injury in a first responder population. In particular, future studies may add a qualitative component to further elucidate what type of situations compose PMIEs in first responders and potentially identify any additional categories of events beyond what military personnel experience. Furthermore, future studies may investigate what other protective factors may help mitigate PMIEs' effects on mental and physical health. For instance, concepts such as optimism and an active coping style are known to moderate both PTSD symptoms (Gil & Weinberg, 2015), and optimism is also associated with better HRQoL (Cherry et al., 2017).

Additionally, since PMIEs and moral injury are still in their early stages of conceptualization, past studies have taken a qualitative approach to parse out what types of PMIEs occur, which might be helpful to explore in a first responder population. Schorr

and colleagues (2018) conducted a qualitative study on PMIEs in a veteran sample using Grounded Theory as a guide which provided insight into the main categories of PMIEs in military veterans. The study utilized focus groups of veterans to determine the different categories of PMIEs and how they could be broadly conceptualized to facilitate informed quantitative study (Schorr et al., 2018). Future studies may consider including a qualitative component to determine what PMIEs first responders are reporting and if additional categories exist outside of the proposed three-factor structure of PMIEs (Bryan et al., 2016).

Conclusion

This study established evidence that PMIEs not only exist in a first responder population, but they exist in higher rates than anticipated. Additionally, PMIEs were associated with PTSD symptoms in first responders which may be an important consideration when treating PTSD symptoms. Trait gratitude did not significantly moderate PMIEs' association with PTSD nor with HRQoL, but investigation into state gratitude's potential as a moderator should be explored.

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Table 1

Summary of Participant Demographics for in-person data collection (n = 91)

Variable	Frequency	Percent
Gender		
Male	89	97.80
Female	2	2.20
Other	0	0
Occupation		
Firefighter	34	37.40
Law enforcement	19	20.90
Paramedic	2	2.20
EMT	4	4.40
Search and Rescue Worker	0	0
Other	0	0
More than one first responder profession	32	35.20
Education		
No High School	0	0
Some High School	0	0
GED	1	1.10
High School Graduate	15	16.50
Some College	58	63.70
College Graduate	17	18.70

(Continued)

Variable	Frequency	Percent
Income		
<\$10,000	0	0
\$10,000-19,999	0	0
\$20,000-29,999	0	0
\$30,000-39,999	2	2.20
\$40,000-49,999	21	23.10
\$50,000-59,999	14	15.40
>\$60,000	54	59.30
Race/Ethnicity		
White/European American	75	83.30
Black/African American	0	0
Latino/Hispanic	8	8.80
Asian American	1	1.10
Pacific Islander	2	2.20
Other	1	1.10
Marital Status		
Married	62	68.10
Separated	0	0
Divorced	6	6.60
Never Married	22	24.20
Widow/Widower	1	1.10
Military service		
Yes, has served or is currently serving	12	13.20
No, has never served/not serving	78	86.70

(Continued)

Variable	Frequency	Percent
Religion		
Non-Catholic Christian	65	71.40
Catholic	13	14.3
Buddhist	0	0
Muslim	0	0
Atheist	1	1.10
Agnostic	4	4.40
Other	7	7.70

Table 2*Summary of Participant Demographics for online data collection (n = 151)*

Variable		Frequency	Percent
Sex			
	Male	114	75.50
	Female	37	24.50
	Other	0	0
Occupation			
	Firefighter	9	6.00
	Law enforcement	58	38.40
	Paramedic	25	16.60
	EMT	8	5.30
	Search and Rescue	5	3.30
	Other	2	1.30
	More than one first responder profession	44	29.10
Education			
	No High School	0	0
	Some High School	0	0
	GED	1	.70
	High School Graduate	6	4.0
	Some College	45	29.80
	College Graduate	99	65.60

(Continued)

Variable	Frequency	Percent
Income		
<\$10,000	1	.70
\$10,000-19,999	1	.70
\$20,000-29,000	7	4.70
\$30,000-39,999	11	7.30
\$40,000-49,999	7	4.70
\$50,000-59,999	22	14.70
>\$60,000	101	67.30
Race/Ethnicity		
White/European American	134	88.70
Black/African American	3	2.0
Latino/Hispanic	7	4.60
Asian American	1	.70
Pacific Islander	2	1.30
Other	4	2.60
Marital Status		
Married	98	64.90
Separated	5	3.30
Divorced	13	8.60
Never Married	34	22.50
Widow/Widower	1	.70
Military service		
Yes, has served or is currently serving	22	14.70
No, has never served/not serving	128	85.30
		(Continued)

Variable	Frequency	Percent
Religion		
Non-Catholic Christian	74	49.00
Catholic	22	14.60
Buddhist	1	.70
Muslim	0	0
Atheist	18	11.90
Agnostic	12	7.90
Other	24	15.90

Table 3*Summary of main study variable means and standard deviations for online and in-person*

Variable	Total ($N = 243$), M (SD)	In-person ($n = 77$), M (SD)	Online ($n = 120$), M (SD)	p
GRAT-S	111.8 (16.7)	113.5 (14.7)	110.7 (17.9)	.21
MIES	2.7 (1.1)	2.4 (1.0)	2.9 (1.1)	.001
PCL-C	32.8 (12.4)	29.1 (10.4)	35.4 (13.0)	.001
MCS	46.0 (10.6)	43.2 (10.9)	47.5 (10.1)	.003
PCS	53.1 (7.3)	54.5 (7.1)	52.2 (7.3)	.02

Table 4

Summary of t-tests for main study variables for Pre-COVID-19 and Post-COVID-19

Variable	Pre-COVID, <i>M</i> (<i>SD</i>)	Post-COVID, <i>M</i> (<i>SD</i>)	<i>p</i>
GRAT-S	112.6 (15.8)	110.6 (17.7)	.38
MIES	2.5 (1.0)	3.0 (1.1)	.001*
PCL-C	30.2 (11.0)	35.9 (13.4)	.001*
MCS	44.2 (10.8)	47.8 (10.2)	.01
PCS	54.1 (7.1)	52.0 (7.4)	.03

Note. *N* = 243, Pre or post-COVID-19 was determined by whether the surveys were collected before or after March 11, 2020. *indicates a test violated Levene's test of equality of variances and the *p* value reported is for equal variances not assumed.

Table 5*MIES exploratory factor analysis factor loadings*

Item	1	2	3	Communality
1. I saw things that were morally wrong			.50	.32
2. I am troubled by having witnessed others' immoral acts			.84	.70
3. I acted in ways that violated my own moral code or values	.81			.67
4. I am troubled by having acted in ways that violated my own morals or values	.86			.75
5. I violated my own morals by failing to do something that I felt I should have done	.90			.79
6. I am troubled because I violated my morals by failing to do something that I felt I should have done	.90			.82
7. I feel betrayed by leaders who I once trusted		.86		.74
8. I feel betrayed by fellow employees who I once trusted		.92		.82
9. I feel betrayed by others outside of my job who I once trusted		.54		.39

Note. Communalities are extracted; Factor 1 = Transgressions by self, Factor 2 = Betrayal, Factor 3 = Transgressions by Others

Table 6*Frequencies and averages for PMIEs across factors in the MIES scale*

Factor Name	Percentage
Transgressions by Others	
1. I saw things that were morally wrong	72.20
2. I am troubled by having witnessed others' immoral acts	49.30
Transgressions by Others Average:	60.75
Transgressions by Self	
3. I acted in ways that violated my own moral code or values	19.70
4. I am troubled by having acted in ways that violated my own morals or values	23.30
5. I violated my own morals by failing to do something that I felt I should have done	21.80
6. I am troubled because I violated my morals by failing to do something that I felt I should have done	20.10
Transgressions by Self Average:	21.23
Betrayal	
7. I feel betrayed by leaders who I once trusted	42.00
8. I feel betrayed by fellow employees who I once trusted	38.70
9. I feel betrayed by others outside of my job who I once trusted	39.20
Betrayal Average:	39.97
PMIE Overall Average:	40.65

Table 7*Summary of hierarchical regression analyses*

	PTSD Symptoms	Physical Health	Mental Health
Step 1:			
Covariates			
Gender	.22**	-	.03
Race/Ethnicity	-.05	.04	.04
Income	.08	-.11	-.02
Time spent in occupation	-.19*	.12	-.08
Pre-COVID-19 or Post-COVID-19	-.03	.16	-.13
Military service	-.08	.01	.05
In-person or online data collection	.10	-.07	.10
Occupation type	.08	.07	.02
Marital status	.04	-.02	.03
Religion	.02	-	-.01
R^2	.15***	.05	.06
Step 2:			
PMIEs			
Potentially morally injurious events	.39***	.01	.07
R^2	.27***	.05	.06
ΔR^2	.12***	.00	.00

Note. All standardized regression coefficients are from the final step of the analyses; $N = 243$, * $p < .05$, ** $p < .01$, *** $p < .001$

APPENDIX A**Demographics Questionnaire**

Age: _____

Gender: ☐1) Male
 ☐2) Female
 ☐3) Other

Race/Ethnicity: ☐1) Caucasian
 ☐2) Hispanic
 ☐3) African American
 ☐4) Asian
 ☐5) Pacific Islander
 ☐6) Other

Education: ☐1) No high school
 ☐2) Some high school
 ☐3) GED
 ☐4) High school graduate
 ☐5) Some college
 ☐6) College graduate

Marital Status: ☐1) Married
 ☐2) Separated
 ☐3) Divorced
 ☐4) Never Married
 ☐5) Widow/Widower

Yearly Income: ☐1) <10,000/year ☐5) 40,000-49,999
 ☐2) 10,000-19,999 ☐6) 50,000-59,999
 ☐3) 20,000-29,999 ☐7) >60,000/year
 ☐4) 30,000-39,999

What is your religious affiliation, if any?

- ☐1) Non-Catholic Christian
- ☐2) Catholic
- ☐3) Buddhist
- ☐4) Muslim
- ☐5) Atheist

- ☐6) Agnostic
- ☐7) Other _____

Are you now or have you ever been a military service member?

- ☐1) Yes
- ☐2) No

What is your occupation? Please check all that apply:

- ☐1) Fire fighter
- ☐2) Police officer
- ☐3) Paramedic
- ☐4) EMT
- ☐5) Search and Rescue worker
- ☐6) Other _____

How many years/months have you spent in this occupation?

_____ years/months

Have you experienced a work-related injury (i.e. concussion, broke bone,etc)?

- ☐ Yes
- ☐ No

If yes, How many?

- ☐ 0
- ☐ 1
- ☐ 2-5
- ☐ 6-9
- ☐ 10+

Demographics Questionnaire

Please check all that apply:

	Yes	No
I have lost functioning due to a work-related injury (i.e. hearing-loss, numbness, etc.)	☐	☐
I experienced a concussion.	☐	☐
I broke a bone.	☐	☐
I hurt my back.	☐	☐
I experienced internal bodily problems (internal bleeding, respiratory issues, etc.)	☐	☐
I required medical attention.	☐	☐
I required a surgical intervention.	☐	☐
I was prescribed pain medication (i.e. Vicodin, oxycodone, etc.).	☐	☐
I required physical or occupational therapy.	☐	☐
I experience chronic pain.	☐	☐

Please check all that apply:

	Never	Once or Twice	Monthly	Weekly	Daily or Almost Daily
Alcohol	☐	☐	☐	☐	☐
Tobacco	☐	☐	☐	☐	☐
Rx Drugs	☐	☐	☐	☐	☐
Illegal Drugs	☐	☐	☐	☐	☐

The Moral Injury Events Scale (MIES)

Indicate how much you agree or disagree with each of the following statements regarding your experiences at any time since starting your current job:

Please circle your response:

	Strongly Agree	Moderately Agree	Slightly Agree	Slightly Disagree	Moderately Disagree	Strongly Disagree
1. I saw things that were morally wrong	1	2	3	4	5	6
2. I am troubled by having witnessed others' immoral acts	1	2	3	4	5	6
3. I acted in ways that violated my own moral code or values	1	2	3	4	5	6
4. I am troubled by having acted in ways that violated my own moral code or values	1	2	3	4	5	6
5. I violated my own morals by failing to do something that I felt I should have done	1	2	3	4	5	6
6. I am troubled because I violated my morals by failing to do something that I felt I should have done	1	2	3	4	5	6
7. I feel betrayed by leaders who I once trusted	1	2	3	4	5	6
8. I feel betrayed by fellow employees who I once trusted	1	2	3	4	5	6
9. I feel betrayed by others outside of my job who I once trusted	1	2	3	4	5	6
10. I trust my leaders and fellow employees to	1	2	3	4	5	6

Gratitude, Resentment, and Appreciation Test-Short Form (GRAT-S)

Please provide your honest feelings and beliefs about the following statements which relate to you. There are no right or wrong answers to these statements. We would like to know how much you feel these statements are true or not true of you. Please try to indicate your true feelings and beliefs, as opposed to what you would like to believe. Respond to the following statements by choosing the number that best represents your real feelings. Please use the scale provided below, and please choose one number for each statement.

Please circle your response:

	I strongl y disagre e		I disagree somewha t		I feel neutral about the statemen t		I mostly agree with the statemen t		I strongly agree with the stateme nt
1. I couldn't have gotten where I am today without the help of many people.	1	2	3	4	5	6	7	8	9
2. Life has been good to me.	1	2	3	4	5	6	7	8	9
3. There never seems to be enough to go around and I never seem to get my share.	1	2	3	4	5	6	7	8	9
4. Oftentimes I have been overwhelmed at the beauty of nature.	1	2	3	4	5	6	7	8	9
5. Although I think it's important to feel good about your accomplishments, I think that it's also important to remember how others have contributed to	1	2	3	4	5	6	7	8	9

my accomplishment s.									
6. I really don't think I've gotten all the good things I deserve in life.	1	2	3	4	5	6	7	8	9
7. Every Fall I really enjoy watching the leaves change colors.	1	2	3	4	5	6	7	8	9
8. Although I'm basically in control of my life, I can't help but think about all those who have supported me and helped me along the way.	1	2	3	4	5	6	7	8	9
9. I think that it's important to "Stop and smell the roses".	1	2	3	4	5	6	7	8	9
10. More bad things have happened to me in my life than I deserve.	1	2	3	4	5	6	7	8	9
11. Because of what I've gone through in my life, I really feel like the world owes me something.	1	2	3	4	5	6	7	8	9
12. I think it's important to pause often to "count my blessings".	1	2	3	4	5	6	7	8	9
13. I think it's important to	1	2	3	4	5	6	7	8	9

Posttraumatic Stress Disorder Checklist-Civilian Version (PCL-C)

Below is a list of problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, pick the answer that indicates how much you have been bothered by that problem *in the last month*.

Please circle your response:

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing <i>memories, thoughts, or images</i> of a stressful experience from the past?	1	2	3	4	5
2. Repeated, disturbing <i>dreams</i> of a stressful experience from the past?	1	2	3	4	5
3. Suddenly <i>acting or feeling</i> as if a stressful experience <i>were happening</i> again (as if you were reliving it)?	1	2	3	4	5
4. Feeling <i>very upset</i> when <i>something reminded</i> you of a stressful experience from the past?	1	2	3	4	5
5. Having <i>physical reactions</i> (e.g. heart pounding, trouble breathing, or sweating) when <i>something reminded</i> you of a stressful experience from the past?	1	2	3	4	5
6. Avoid <i>thinking about</i> or <i>talking about</i> a stressful experience from the past or avoid <i>having feelings</i> related to it?	1	2	3	4	5
7. Avoid <i>activities or situations</i> because they <i>remind you</i> of a stressful experience from the past?	1	2	3	4	5
8. Trouble <i>remembering important parts</i> of a stressful experience from the past?	1	2	3	4	5

9. Loss of <i>interest in things that you used to enjoy?</i>	1	2	3	4	5
10. Feeling <i>distant or cut off</i> from other people?	1	2	3	4	5
11. Feeling <i>emotionally numb</i> or being unable to have loving feelings for those close to you?	1	2	3	4	5
12. Feeling as if your <i>future</i> will somehow be <i>cut short</i> ?	1	2	3	4	5
13. Trouble <i>falling or staying asleep</i> ?	1	2	3	4	5
14. Feeling <i>irritable</i> or having <i>angry outbursts</i> ?	1	2	3	4	5
15. Having <i>difficulty concentrating</i> ?	1	2	3	4	5
16. Being " <i>super alert</i> " or watchful on guard?	1	2	3	4	5
17. Feeling <i>jumpy</i> or easily startled?	1	2	3	4	5

Modified Version of the Medical Outcomes Study 12-item Short Form Health Survey Version 2[®] (SF-12 v.2[®])

This measure is proprietary and thus, was not included in this document.

APPENDIX B

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NON-COMMERCIAL LICENSE AGREEMENT Office of Grants and Scholarly Research (OGSR)

License Number: QM053344

Licensee Name: Amy Rose Senger c/o Sam Houston State University (SHSU)

Licensee Address: Dept. of Psych, SHSU, Campus Box 2447, Huntsville, TX 77341 US

Approved Purpose: Stress and Burnout in First Responders

Study Type: Non-commercial academic research and/or thesis – Unfunded Thesis/Dissertation
Data Collection Method: Tablet

Therapeutic Area: Wellness & Lifestyle

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Purpose

A. Effective Date: This Non-Commercial License Agreement (the "Agreement") from the Office of Grants and Scholarly Research (OGSR) is made by and between OptumInsight Life Sciences, Inc. (f/k/a QualityMetric Incorporated) ("Optum"), 1301 Atwood Ave, Suite 311N, Johnston, RI 02919 and Licensee. This Agreement is entered into as of the date of last signature below and is effective for the Study Term set forth on Appendix B.

B. Appendices: Capitalized terms used in this Agreement shall have the meanings assigned to them in Appendix A, Appendix B and Appendix D. Licensee agrees the study information completed on Appendix D – Project details form (Questionnaire) is for non-commercial use. The appendices attached hereto are incorporated into and made a part of this Agreement for all purposes.

C. Grant of License: Subject to the terms of this Agreement, Optum grants to Licensee a non-exclusive, non-transferable, non-sublicensable worldwide license to use, solely for the Approved Purpose and during the Study Term, the Licensed Surveys, Software, SMS Scoring Solution, and all intellectual property rights related thereto ("Survey Materials"), in the authorized Data Collection Method, Modes of Administration, and Approved Languages indicated on Appendix B; and to administer the Licensed Surveys only up to the total number of Administrations (and to make up to such number of exact reproductions of the Licensed Surveys necessary to support such Administrations) in any combination of the specific Licensed Surveys and Approved Languages, Data Collection Method, and Modes of Administration.

EXECUTED by the duly authorized representatives as set forth below.

OptumInsight Life Sciences, Inc.

Amy Rose Senger c/o Sam Houston State University (SHSU)

DocuSigned by:
Signature: Michelle White
Name: Michelle White
Title: Vice President
Date: 8/3/2020

Signature: Amy Senger
Name: Amy Senger
Title: Graduate Student
Date: 7-31-20

VITA

Amy R. Senger, B.S.
Sam Houston State University

EDUCATION

Sam Houston State University GPA 4.0/4.0

Master of Arts in Clinical Psychology, May 2021

Huntsville, TX

Thesis: *Gratitude as a Moderator of PTSD Symptoms and Health-Related Quality of Life Associated with Potentially Morally Injurious Events in First Responders*

Thesis chair: Dr. Chelsea Ratcliff

Texas A&M University - San Antonio GPA 4.0/4.0

Bachelor of Science, Psychology, August 2019

San Antonio, TX

Graduated *Summa-Cum Laude*

Northwest Vista College GPA 4.0/4.0

Associate of Arts, concentration in Psychology, December 2017

San Antonio, TX

Graduated *Summa-Cum Laude*

RESEARCH EXPERIENCE

1. Integrated Health Lab Research Assistant August 2019-Current

Supervisor: Dr. Chelsea Ratcliff

Lab Duties:

- Project lead for project examining buffers of moral injury on health among first responders (e.g., select study measures, manage study IRB application, contact first responder organizations about participation, coordinate data collection efforts, supervise undergraduate research assistants' data entry, and lead on primary data analyses).
- Lead author on a manuscript examining the relationship among post-traumatic stress, post-traumatic growth, and coping in breast cancer patients.
- Assistant on a pilot study to apply for an NIH grant examining a meditation app's effectiveness on chronic pain in patients with a spinal cord injury along with an accompanying literature review.

- Training: SPSS PROCESS, manuscript preparation, and ad hoc reviewing.
2. Social and Health Achievement Research Exchange December 2018-August 2019
 (S.H.A.R.E.) Lab Research Assistant
 Supervisor: Dr. Ho Phi Huynh
 Lab Duties: Manuscript preparation, grant writing, study set up on Qualtrics, and linking to MTurk.
 Training: Qualtrics, Tables on Word, and Amazon MTurk
 3. Fostering Interdisciplinary Research Experience for June-August 2018
 Undergrad Potential (FIRE-UP) Research Intern
 Supervisors: Drs. Amy Bohmann (Psychology) and Megan Wise de Valdez (Biology),
 Lab Duties: Principal participant recruiter, manuscript preparation, specimen collector, and data analysis.
 Training: SPSS, Excel, Powerpoint, microscope mosquito identification, scale creation, and ovitrap maintenance.

PUBLICATIONS

1. Huynh, H.P. & **Senger, A.R.** (2021). A little shot of humility: Intellectual humility predicts vaccination attitudes and intention to vaccinate against COVID-19. *Journal of Applied Social Psychology*.
2. **Senger, A.R.** & Huynh, H. (2020). Intellectual humility's association with vaccine attitudes and intentions. *Psychology, Health, & Medicine*.

PRESENTATIONS

1. **Senger, A.R.**, Martinez-Berman, L., Wise de Valdez, M., & Bohmann, A. (2019). *Attitudes and personality associated with mosquitoes and mosquito-borne diseases*. Poster presented at the Texas A&M University-San Antonio student research symposium, San Antonio, TX.
2. Martinez-Berman, L., **Senger, A.R.**, Bohmann, A., & Wise de Valdez, M. (2019). *Knowledge, attitudes, and practices survey associated with mosquitoes, mosquito-borne diseases, and the premise condition index*. Poster presented at the Texas A&M University-San Antonio student research symposium, San Antonio, TX.
3. **Senger, A.R.**, Martinez-Berman, L., Wise de Valdez, M., & Bohmann, A. (2019). *Attitudes toward mosquitoes and mosquito-borne diseases: Scale creation and applications*. Paper presented at the Psi Chi International Honors Society