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Differential Associations of Rumination and Cognitive Flexibility with Guilt and  
Shame following Potentially Morally Injurious Events

THESIS

submitted in partial satisfaction of the requirements  
for the degree of

MASTER OF ARTS

in Social Ecology

by

David Patrick Cenkner

Thesis Committee:  
Associate Professor Alyson Zalta, Chair  
Professor Peter Ditto  
Associate Professor Elizabeth Martin

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## ABSTRACT OF THE THESIS

Differential Associations of Rumination and Cognitive Flexibility with Guilt and Shame following Potentially Morally Injurious Events

by

David Patrick Cenker

Master of Arts in Social Ecology

University of California, Irvine, 2023

Associate Professor Alyson Zalta, Chair

**Background:** Guilt and shame are common moral emotions following potentially morally injurious events (PMIEs), which involve events that violate one's deeply held moral values.

However, not all individuals will experience guilt and shame following PMIEs and the mechanisms by which PMIEs lead to guilt and shame are not well understood. This study set out to examine the role of event-related intrusive rumination, event-related deliberate rumination, cognitive flexibility, and their interactions, in predicting PMIE-related guilt and shame. **Methods:** A subsample of undergraduate participants exposed to an objective PMIE and endorsing a subjective PMIE ( $N = 323$ ) completed self-report assessments. **Results:**

Higher levels of event-related intrusive rumination and event-related deliberate rumination and lower levels of cognitive flexibility were associated with higher levels of PMIE-related shame. Only higher levels of event-related deliberate rumination were associated with greater PMIE-related guilt. Moreover, the predictors explained much greater variance in PMIE-related shame ( $R^2_{Adj} = 0.44$ ) than PMIE-related guilt ( $R^2_{Adj} = 0.05$ ).

There was no significant interaction between event-related rumination and cognitive flexibility in predicting PMIE-related guilt or shame. **Limitations:** This study was cross-

sectional, the sample was mostly female, and all data was collected via self-report.

Longitudinal studies are needed to explore these potential mechanistic processes.

**Conclusions:** Our findings suggest that differential pathways may affect whether individuals experience guilt or shame following PMIEs. Rumination and cognitive flexibility may be valuable clinical targets for interventions aimed at addressing PMIE-related shame.



## INTRODUCTION

Potentially morally injurious events (PMIE) have been defined as perpetrating or witnessing events that transgress against one's moral code (Litz et al., 2009). Those who develop clinical levels of distress following a PMIE are then considered to have a moral injury (Griffin et al., 2019). The moral emotions of guilt and shame have been theorized and identified as key aspects of moral injury (Jinkerson, 2016) and these moral emotions are also linked to psychopathology including posttraumatic stress disorder (PTSD; Nazarov et al., 2015; Saraiya & Lopez-Castro, 2016). Notably, not all individuals who encounter a PMIE will experience guilt and shame. Therefore, it is important to identify factors associated with guilt and shame following a PMIE to better understand potential mechanisms of moral injury.

Guilt has been defined as a feeling of responsibility or remorse for an action that one has either done wrong or perceived to have done wrong (Tangney & Dearing, 2002). By contrast, shame has been defined as a feeling of inadequacy and a negative evaluation of the self (Tangney & Dearing, 2002). Research has found that guilt and shame often co-occur (Eisenberg, 2000), are strongly correlated (Blum, 2008), and can be characterized as unfavorable self-evaluations following perceived transgressions or failures (Tangney et al., 2007). Yet, while these moral emotions share characteristics, there is evidence that guilt and shame are distinguishable (Tangney et al., 1996). For example, shame has consistently been found to be a maladaptive emotion that increases the risk of psychopathology (Stuewig & McCloskey 2005; Tangney et al., 2011). Conversely, evidence suggests that guilt may be socially adaptive (Arimitsu, 2001; Tangney, 1991) and increase prosocial behavior with the goal to reinforce and remedy interpersonal relationships (Carni et al., 2013). Thus,

understanding what factors are differentially associated with guilt and shame may be particularly important for understanding how individuals recover from PMIEs.

Rumination may be one important factor to consider. Rumination is a pattern of recurrent thinking that may involve attempts to make sense of or problem solve an event (Martin & Tesser, 1996). Following a PMIE, individuals may ruminate over their wrongdoing to promote meaning making of the encountered event. However, excessive rumination has been theorized to potentially lead to thoughts of being unforgivable, and feelings of shame and guilt (Litz et al., 2009; Zalta & Held, 2020). Two studies with veteran samples found rumination to be positively correlated with moral injury and that rumination may play a critical link between moral injury and psychopathology (Bravo et al., 2020; Hamrick et al., 2020). While rumination has typically been measured broadly and has focused on maladaptive or negative thinking (Nolen-Hoeksema et al., 1997), there have been efforts to measure rumination connected to a specific event (Cann et al., 2011; Scott & McIntosh, 1999; Segerstrom et al., 2003). Two factors of rumination that result from a specific event have been identified: deliberate rumination and intrusive rumination (Cann et al., 2011). Deliberate rumination occurs when individuals voluntarily engage in thinking about their wrongdoing in attempts to understand the impact and implications of their actions (Cann et al., 2011). Intrusive rumination occurs after a wrongdoing and consists of unprompted and automatic thoughts about the event (Tedeschi & Calhoun, 2004). Research has found intrusive and deliberate rumination to be significantly correlated with guilt (Kamijo & Yukawa, 2018) and found that rumination more broadly, is associated with shame (Orth et al., 2006). However, research has not examined the role of intrusive and deliberate rumination in predicting guilt and shame in individuals with a PMIE.

A second factor that may be associated with the onset of moral emotions following PMIEs is cognitive flexibility. Cognitive flexibility has been defined as the ability to think about the same situation from different perspectives and adapt to changing environmental stimuli (Dennis & Vander Wal, 2010; Martin & Rubin, 1995). Thus, cognitive flexibility may reduce the likelihood that individuals focus solely on personal responsibility for moral transgressions. In turn, this may reduce the likelihood of guilt and shame following these events. Higher levels of cognitive flexibility have been found to be associated with lower levels of guilt and shame (Bi et al., 2022; Keith et al., 2015), though this has not been explored in the context of PMIEs. Cognitive flexibility has also been theorized to interact with PMIE-related rumination (Zalta & Held, 2020). Specifically, Zalta and Held (2020) propose that individuals with higher levels of cognitive flexibility will be more likely to resolve PMIE-related rumination with external explanations for moral transgressions leading to lower guilt and shame. By contrast, those with lower levels of cognitive flexibility will be more likely to resolve PMIE-related rumination with internal explanations for moral transgression, which is likely to contribute to guilt and shame. However, no study has examined how the interaction of rumination and cognitive flexibility may be associated with the moral emotions of guilt and shame.

The current study aimed to address these gaps in the literature in a sample of undergraduates who experienced a PMIE. First, we aimed to examine event-related deliberate and intrusive rumination as predictors of PMIE-related guilt and shame. We hypothesized that both intrusive and deliberate rumination would be positively associated with guilt and shame; however, intrusive rumination would be more strongly associated with PMIE-related shame when compared to deliberate rumination and deliberate

rumination would be more strongly associated with PMIE-related guilt when compared to intrusive rumination. Second, we aimed to examine the relationship between cognitive flexibility and PMIE-related guilt and shame. We hypothesized that higher levels of cognitive flexibility would be associated with lower levels of PMIE-related guilt and shame. Third, we aimed to examine whether cognitive flexibility moderated the relationship between event-related deliberate and intrusive rumination and PMIE-related guilt and shame. We hypothesized that the relationship between event-related rumination and PMIE-related guilt and shame will be weaker for those with higher levels of cognitive flexibility.

## **Methods**

### ***Participants and Procedures***

This study used a subsample ( $N = 323$ ) of participants from a larger study exploring potentially morally injurious events in an undergraduate sample. All participants in the study were individuals 18 years or older and were recruited from a university research system. Participants had to be fluent in English and enrolled as an undergraduate at the university where the study took place to be eligible. The participants had a mean age of 22.15 ( $SD = 4.54$ ), were majority female (83%), and the racial breakdown was 35% Asian, 28% Hispanic, 18% Caucasian, 12% “Mixed,” and 7% comprised of other races.

Participants completed a 60-minute survey via Qualtrics and received one unit of course credit for their participation. Participants viewed and indicated their agreement to an online consent form prior to being directed to the survey. To ensure that all participants in the sample had experienced a PMIE, we took a conservative approach whereby we

selected participants who endorsed an objective PMIE and a subjective PMIE. Objective PMIEs were established using the Perpetration Event Index (PEI; Steinmetz et al., 2019). Subjective PMIEs were established using an open-ended question allowing participants to describe a PMIE. Only individuals who passed 3 of 4 attention checks, endorsed at least one event on the PEI, and endorsed a subjective PMIE were included in the analyses. Of note, it was not required that the event participants endorsed on the PEI had to be the same as the event endorsed on the subjective open-ended PMIE response.

## **Measures**

### ***Objective Potentially Morally Injurious Events***

The Perpetration Event Index (PEI; Steinmetz et al., 2019) is a 32-item self-report measure that Steinmetz and colleagues (2019) used as a screening measure that asked participants to answer if they have perpetrated harmful events such as “Committed a serious crime that caused harm” or “Responsible for someone’s accidental death or injury.” Participants were asked to respond either yes or no to each of the listed perpetration events. Two questions from the PEI were excluded. The first question excluded was number 30 that asked if the participant, “Killed an animal and later regretted it.” This was excluded because this item measured perpetration against animals whereas all other items in the PEI involve perpetration against humans. The second question excluded was number 32 that asked if the participant, “Caused another harmful situation not already mentioned here.” This was excluded because we were unable to determine the specific event the participant was endorsing.

### ***Subjective Potentially Morally Injurious Events***

Participants were asked to respond to an open-ended question that stated, “Think of the times when you have seen things that were morally wrong or acted in ways that violated your own morals or values. Please describe the event that most deeply violated your morals and values and caused you the most distress.” Only participants who provided an answer to this question were included in the analyses. Participants were also asked to report how old they were when the event occurred. The years since the subjective PMIE was then calculated as a continuous variable by subtracting the participant age during completion of survey and the participant age when the PMIE occurred.

### ***PMIE-Related Rumination***

The Event-Related Rumination Inventory (ERRI; Cann et al., 2011) is a 20 item self-report measure designed to assess recurrent thinking about a highly stressful event. Respondents rated their frequency of intrusive and deliberate ruminative thoughts on a 4-point Likert scale (0 = not at all; 3 = often). The current study asked participants to respond to these items with reference to their subjective PMIE. The ERRI consists of 10 subscale items that focus on intrusive rumination (ERRI-I) and 10 subscale items that focus on deliberate rumination (ERRI-D). Scores are calculated by summing the responses, with higher scores indicating greater levels of intrusive or deliberate rumination. In the current study, both intrusive and deliberate subscales had high internal reliability (ERRI-D  $\alpha = .96$ ; ERRI-I  $\alpha = .97$ ).

### ***Cognitive Flexibility***

The Cognitive Flexibility Inventory (CFI; Dennis & Vander Wal, 2010) is 20 item self-report measure which examines the type of cognitive flexibility needed to confront and

reconstruct maladaptive thinking into adaptive thoughts. Respondents rated their perceived cognitive flexibility on a 7-point Likert scale (1 = strongly disagree; 7 = strongly agree). Higher scores on the CFI indicate greater cognitive flexibility. Although the CFI is not correlated with gold-standard neuropsychological tests of cognitive flexibility, theories of cognitive flexibility suggest that researchers should not anticipate strong correlations between neuropsychological testing and self-report testing because different aspects of cognitive flexibility are being measured (Wennerhold & Friese, 2020). The CFI has also been found to be well validated in undergraduates of varying cultural backgrounds (Kurginyan & Osavolyuk, 2018; Portoghese et al., 2020). In the current study, the CFI demonstrated high internal reliability ( $\alpha = 0.84$ ).

### ***PMIE-Related Shame***

The Trauma Related Shame Inventory (TRSI; Oktedalen et al., 2014) is a 24 item self-report measuring shame resulting from a traumatic experience. The current study asked participants to respond to these items with reference to their subjective PMIE. For the purposes of the current study, the word “trauma” was replaced with the word “event” for each item. The present study only examined the internalizing items of the TRSI to reduce participant burden given that the study hypotheses were more relevant to internalized perceptions of shame following moral transgressions rather than how people believe others might view them. Respondents rated their internalized shame on a 4-point Likert scale (0 = not at all correct about me; 3 = completely correct about me). The total score was calculated by summing the responses with higher scores indicating more shame. In the current study, the TRSI demonstrated high internal reliability ( $\alpha = 0.94$ ).

### ***PMIE-Related Guilt***

The Trauma-Related Guilt Inventory (TRGI; Kubany et al., 1996) is a 32 item self-report scale measuring guilt resulting from a traumatic experience. The current study asked participants to respond to these items with reference to their subjective morally injurious event. The TRGI contains six subscales including global, distress, hindsight bias/responsibility, general guilt cognitions, wrongdoing, and insufficient justification. The current study examined only the total guilt cognitions score which is obtained by adding the four subscales that include hindsight bias/responsibility, general guilt cognitions, wrongdoing, and insufficient justification. Respondents rated their guilt on a 5-point Likert scale (0 = not at all true; 4 = extremely true) with higher scores indicating more guilt. The TRGI demonstrated high internal reliability ( $\alpha = 0.95$ ).

### **Data Analysis**

All analyses were conducted using R (Version 3.6.1). To test the potential covariates, we used Pearson correlations to analyze the independent variables of years since PMIE and age with the outcome variables of PMIE-related guilt and shame. An independent samples t-test was used to analyze the independent variable of gender on the outcome variables of PMIE-related guilt and shame. Finally, a one-way analysis of variance (ANOVA) was used to examine if the independent variable of race was significantly associated with the outcome variables of PMIE-related guilt and shame. Variables that were found to be associated with the dependent variables at  $p < .05$  were then included as covariates in the subsequent regression models.



For our primary analyses, we first conducted correlations between event-related intrusive rumination, event-related deliberate rumination, cognitive flexibility, PMIE-related shame, and PMIE-related guilt. Using the procedure described by Meng et al. (1992), we compared the correlations to see whether event-related intrusive rumination, event-related deliberate rumination, and cognitive flexibility were more strongly associated with PMIE-related shame versus PMIE-related guilt. Additionally, we used the Meng et al. (1992) procedure to compare the correlations between event-related intrusive rumination and event-related deliberate rumination on PMIE-related guilt and event-related intrusive rumination and event-related deliberate rumination on PMIE-related shame to examine if there were significant differences between the two types of rumination on each outcome variable.

Two multiple linear regression analyses were then conducted to examine event-related rumination, cognitive flexibility, and their interaction as predictors of PMIE-related guilt and shame. Each of the two models included event-related deliberate rumination, event-related intrusive rumination, cognitive flexibility, and the interactions between both event-related deliberate rumination and cognitive flexibility, and event-related intrusive rumination and cognitive flexibility, as simultaneous predictors. The rumination and cognitive flexibility variables were mean-centered and standardized before calculating the interaction terms.

## **Results**

The demographic variables of age ( $p = .059$ ), gender ( $p = .102$ ), and race ( $p = .427$ ) were all found to be non-significant with the dependent variables of PMIE-related guilt and

PMIE-related shame. Therefore, no demographic variables were included in the regression analyses. However, the years since PMIE variable was found to be significantly associated with guilt ( $r = -.13, p = .02$ ) and was therefore included in the regression analysis examining guilt as the dependent variable.

Table 1 presents the variable means, standard deviations, and Pearson correlations of the predictor and outcome variables. Comparisons of the correlations revealed that both intrusive and deliberate rumination were more strongly associated with shame ( $r = .55$  to  $.62$ ) than guilt ( $r = .18$  to  $.22$ ):  $Z = 9.11, p < .001$  and  $Z = 6.71, p < .001$ , respectively. Cognitive flexibility was also more strongly associated with shame ( $r = -.22$ ) than guilt ( $r = -.01$ ):  $Z = 3.87, p < .001$ . As predicted, intrusive rumination was more strongly associated with shame than deliberate rumination:  $Z = 2.21, p = 0.03$ . However, there were no significant differences between intrusive rumination and deliberate rumination in their association with guilt:  $Z = -1.02, p = 0.31$ .

Table 2 presents the linear regression examining PMIE-related shame as the dependent variable. The overall model was found to be significant:  $F(5, 314) = 50.61, p < .001; R^2 = 0.45; R^2_{Adj} = 0.44$ . Deliberate rumination, intrusive rumination, and cognitive flexibility all demonstrated significant main effects. However, no interaction effects were found to be significant. Table 3 presents the linear regression examining PMIE-related guilt as the dependent variable. The overall model was found to be significant:  $F(6, 302) = 3.42, p = .003; R^2 = 0.06; R^2_{Adj} = 0.05$ . Only event-related deliberate rumination was found to have a significant main effect on PMIE-related guilt. Intrusive rumination and cognitive flexibility were not significant main effect predictors of PMIE-related guilt and no

interaction effects were found to be significant. All variation inflation factors (VIF) for the predictor variables were less than 2.65. This suggests no concern for multicollinearity since it is recommended that variables have a VIF of no greater than 5 (Stine, 1995).

## **Discussion**

The mechanisms by which PMIEs lead to moral emotions are not well understood (Griffin et al., 2019). Both rumination and cognitive flexibility have been theorized to serve important roles in the meaning making process following moral transgressions (Zalta & Held, 2020). Specifically, Zalta and Held (2020) propose that higher levels of cognitive flexibility may buffer against maladaptive rumination by enabling individuals to consider multiple explanations for their role in morally transgressive events. To our knowledge, this is the first study to explore the role of cognitive flexibility and the interaction between cognitive flexibility and event-related rumination in predicting moral emotions following PMIEs.

We found differential patterns by which event-related deliberate and intrusive rumination were associated with PMIE-related guilt and shame. Both deliberate and intrusive rumination were significantly associated with PMIE-related shame; comparisons of these correlations showed that intrusive rumination was more strongly associated with PMIE-related shame than deliberate rumination. For PMIE-related guilt, only deliberate rumination was significantly associated. Our findings are generally consistent with previous literature exploring the relationships between event-related rumination, guilt, and shame. Specifically, Orth and colleagues (2006) found a strong association between event-related shame and event-related rumination but a weaker association between

event-related guilt and event-related rumination among mothers and fathers following marital separation. Kamijo and Yukawa (2018) found that in Japanese undergraduates, guilt was only weakly associated with intrusive and deliberate rumination following stressful life events and these associations were not maintained in a path analysis model exploring how multiple emotional responses relate to event-related rumination.

There are several potential explanations for why intrusive and deliberate rumination were strongly associated with shame, but only weakly associated with guilt. Rumination is thought to be part of the meaning making process following PMIEs. When individuals are able to identify external explanations and corrective actions for their behavior upon repeated revisiting of the event, then individuals may be able to formulate actions to atone for the event. If this occurs, rumination is likely to resolve and guilt, rather than shame, is likely to emerge because the individual can identify how to correct their mistake. By contrast, when individuals are not able to identify corrective actions for PMIEs with repeated revisiting of the event and instead believe that individual failings are the source of the problem, shame is likely to emerge. Thus, it is possible that persistent unresolved rumination promotes shame. An alternative possibility is that shame and rumination may be common outputs of certain types of PMIEs. For example, there may be certain types of events that are seen as more morally reprehensible and less forgivable and therefore interpreted as indicative of personal traits; these events may be more likely to result in both shame and rumination. Finally, it is also possible that shame contributes to the development of rumination. If people feel shameful following a PMIE, rumination may be seen as a form of punishment or may result from distress related to perceived failings of moral character. These explanations are not necessarily mutually exclusive as the

relationships between rumination and shame could be bi-directional. Longitudinal research is clearly needed to evaluate these causal relationships.

We also found that cognitive flexibility differentially predicted the moral emotions of guilt and shame. Specifically, greater cognitive flexibility was only predictive of less PMIE-related shame but was not predictive of PMIE-related guilt. This finding is not consistent with the limited existing research, which found cognitive flexibility to be a significant predictor of guilt (Keith et al., 2015). This inconsistency may be due to different populations as Keith and colleagues analyzed a veteran treatment-seeking sample for PTSD. Our findings suggest that cognitive flexibility may act as an important protective factor that may prevent individuals from experiencing shame after encountering a PMIE. In particular, cognitive flexibility may allow people to perceive alternative explanations for the event aside from personal moral failings, which reduces the likelihood of shame. Furthermore, cognitive flexibility did not moderate the relationship between event-related deliberate and intrusive rumination and PMIE-related guilt and shame. The non-significant interaction findings may reflect that rumination and cognitive flexibility are independent processes.

Unexpectedly, the predictor variables in the regression models explained a vastly larger variance in PMIE-related shame compared to PMIE-related guilt. Although the overall model for PMIE-related guilt was statistically significant, caution is warranted given that the predictors only explained 4% of the variation. This low explained variation in PMIE-related guilt in this sample of undergraduates suggests that predictors of PMIE-related guilt require further exploration. Given that we analyzed internal factors, such as

rumination and cognitive flexibility, it is possible that external factors, such as the nature of the event itself (what transpired during the event, what role did the individual play in the event, the developmental stage in which the event occurred) and actions that the individual took to process the event or atone for the event, may be more predictive of guilt. For example, future research may want to examine the role of disclosure as a potential predictor of PMIE-related guilt as previous research has found that when individuals confess their wrongdoing, their feelings of guilt diminish (Murray-Swank et al., 2007; Stice, 1992). Additionally, the emergence of moral emotions, such as guilt, is based on one's own moral code as to what constitutes a transgression and what transgressions can be forgiven. Thus, it's possible that individual beliefs regarding morality and religion may be more strongly predictive of guilt following PMIEs.

Of the covariates we explored, years since PMIE was found to have a significant bivariate relationship with PMIE-related guilt. Specifically, the more time that has passed since an individual's PMIE, the less guilt the individual experienced. On average, we assessed individuals 5 years after their most distressing PMIE. It is possible that more time since a PMIE gives an individual more opportunities to atone or engage in corrective action, thereby reducing guilt over time. These time dynamics may also impact our other findings with respect to rumination and cognitive flexibility. For example, it's possible that these two processes are intertwined in the immediate aftermath of a PMIE but become independent in the maintenance of moral emotions that have already emerged. Future studies should account for these time dynamics and explore the role of these processes in the immediate aftermath of a PMIE and how moral emotions emerge over time.

The present study was not without limitations. First, our sample comprised of mostly female undergraduate students so we are unsure if our results would generalize to veterans, older adults, a mostly male sample, or a clinical population. Examining these relationships in populations at high risk of exposure to PMIEs would be valuable for determining whether our findings generalize to other samples. Second, to address the fact that there is no objective definition for what constitutes a PMIE, we limited our sample to individuals who endorsed perpetration of an objective PMIE and endorsed a subjective PMIE. Because we limited our sample to those who perpetrated an objective PMIE, it is possible our results may not generalize to individuals who witnessed a PMIE or experienced betrayal. Additionally, the PEI measure used to assess objective PMIEs has not been validated. This may mean that individuals failed to endorse events that they had in fact experienced and would therefore have been excluded from our sample. It is also possible that individuals endorsed events that they did not experience, which means that individuals without an objective PMIE may have been included in our sample. However, overall, we believe that our relatively conservative approach likely ensured that the vast majority of those in our sample experienced a PMIE and not merely a moral stressor (Litz & Kerig, 2019). Third, the PMIE-related questionnaires asked participants to reference their subjective PMIE; thus, it is possible that when participants were responding to these questionnaires, they were not necessarily thinking of an event would be deemed potentially morally injurious. Fourth, provided that our dataset was cross-sectional, we are unable to conclude the directionality of the results. Longitudinal analyses are necessary to examine causal relationships among the variables examined. Fifth, all data were collected via self-report, including the cognitive flexibility scale, which may capture different aspects

of cognitive flexibility compared to neuropsychological testing. Finally, we do not know if individuals in our sample actually had moral injury given that we did not assess other domains that comprise moral injury aside from PMIE-related guilt and shame (e.g., cognitive, behavioral, spiritual, and social problems). Examining whether rumination and cognitive flexibility predict who goes on to experience moral injury following PMIEs would help to determine whether these factors affect clinical levels of functioning and impairment.

To our knowledge, this is the first study to examine differential patterns of event-related intrusive and deliberate rumination and cognitive flexibility as predictors of moral emotions in a sample of individuals who have experienced a PMIE. Our results suggest that rumination and cognitive flexibility may be valuable clinical targets for interventions aimed at addressing PMIE-related shame. Given that existing cognitive-behavioral interventions have been shown to reduce rumination (Spinhoven et al., 2018) and enhance cognitive flexibility (Fazeli et al., 2015; Nagata et al., 2018) it would also be valuable to explore whether these may be important mechanisms of interventions aimed at reducing moral injury. Given the lack of research on mechanisms of moral injury to date, the current study represents a critical first step and suggests that further exploration of rumination and cognitive flexibility is warranted.



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**Table 1.** *Pearson correlations between independent, moderator, and dependent variables.*

	M	SD	1	2	3	4	5
1. Years Since PMIE	5.06	5.78					
2. ERRI Deliberate Rumination	11.93	9.55	-.14*				
3. ERRI Intrusive Rumination	9.34	8.99	-.08	.75**			
4. Cognitive Flexibility	101.83	13.24	.12*	-.05	-.14*		
5. PMIE-Related Guilt	44.50	22.63	-.13*	.22**	.18**	-.01	
6. PMIE-Related Shame	8.64	9.80	-.09	.55**	.62**	-.22**	.54**

*Note.* ERRI = Event Related Rumination Inventory; PMIE = Potentially Morally Injurious

Event

\* $p < 0.05$

\*\* $p < 0.01$



**Table 2.** *Linear regression of event-related rumination and cognitive flexibility on PMIE-related shame*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Intercept	8.51	0.42	0.00	20.32	<.001
ERRI Deliberate Rumination	0.25	0.07	0.25	3.62	<.001
ERRI Intrusive Rumination	0.44	0.07	0.40	6.03	<.001
CFI	-0.12	0.03	-0.16	-3.71	<.001
ERRI Deliberate Rumination*CFI	-0.01	0.01	-0.07	-1.05	0.29
ERRI Intrusive Rumination*CFI	-0.01	0.01	-0.08	-1.22	0.22

*Note.* CFI = Cognitive Flexibility Inventory; ERRI = Event Related Rumination Inventory; PMIE = Potentially Morally Injurious Event

**Table 3.** *Linear regression of years since PMIE, event-related rumination, and cognitive flexibility on PMIE-related guilt*

Variable	<i>B</i>	<i>SE B</i>	$\beta$	<i>t</i>	<i>p</i>
Intercept	44.39	1.28	0.00	34.71	<.001
Years Since PMIE	-0.40	0.22	-0.10	-1.81	0.07
ERRI Deliberate Rumination	0.52	0.22	0.22	2.40	0.02
ERRI Intrusive Rumination	-0.02	0.22	-0.01	-0.08	0.94
CFI	0.01	0.10	0.01	0.10	0.92
ERRI Deliberate Rumination*CFI	-0.00	0.02	-0.02	-0.26	0.80
ERRI Intrusive Rumination*CFI	-0.01	0.02	-0.04	-0.51	0.61

*Note.* CFI = Cognitive Flexibility Inventory; ERRI = Event Related Rumination Inventory; PMIE = Potentially Morally Injurious Event