

Spring 5-17-2021

## **Predicting First Responder Resilience: Investigating the Indirect Effect of Posttraumatic Cognitions through Coping Processes**

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Predicting First Responder Resilience: Investigating the Indirect Effect of Posttraumatic

Cognitions through Coping Processes

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A dissertation submitted in partial fulfillment

Of the requirements for the degree of

Doctor of Philosophy

In

Clinical Psychology

Seattle Pacific University

School of Psychology, Family, and Community

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### Abstract

Psychological resilience, or one's ability to return to their baseline biopsychosocialspiritual homeostasis following a stressor or potentially traumatic event (PTE), is protective against psychological distress and symptom presentations such as posttraumatic stress disorder (PTSD), yet little is known about what psychosocial factors influence resilience. Building upon theories of resilience, coping, and posttraumatic cognitions, this study investigated the indirect pathway from posttraumatic cognitions to resilience through coping processes among a sample of  $N = 117$  first responders. Path analysis was used to test the parallel indirect effect model. Results from the path analysis suggested that only the hypothesized indirect effect from posttraumatic cognitions to resilience via disengagement coping processes was statistically significant. For the specific pathways, more posttraumatic cognitions were associated with lower resilience even after controlling for coping processes, greater use of disengagement coping processes was associated with lower resilience, and greater use of emotion-focused engagement coping processes was associated with higher resilience. Post-hoc tests identified a strong and negative relationship between negative cognitions about the self and resilience. This study is the first to identify the relationship between posttraumatic cognitions and resilience among first responders, and provides evidence that disengagement coping processes may be especially relevant to this relationship. Interventions that simultaneously target posttraumatic cognitions and disengagement coping may be especially efficacious for first responders, and interventions that provide emotion-focused engagement coping processes may have a positive influence on first responders' resilience. Continued investigation of the underlying theoretical model is needed, and alternate appraisal and coping constructs should be considered.

## Chapter I: Introduction

Psychological resilience is theorized to result from successful adaptation to stressors (Richardson, 2002; Richardson, Neiger, Jensen, & Kumphier, 1990), and consequently is the byproduct of effective coping. In their transactional model of stress and coping, Lazarus and Folkman (1984) theorize that coping is largely influenced by one's appraisal of the stressor that demands coping resources be mobilized. Ehlers and Clark (2000) specifically focus on appraisals following traumatic events and posit that perceiving a potentially traumatic event (PTE) as more negative or severe results in greater reactivity to the event itself, resulting in exaggerated negative beliefs about the event, about the self, and about others, which then influence how the individual responds to the threat of the event. When the theories of Ehlers and Clark, Lazarus and Folkman, and Richardson and colleagues are considered together, they suggest an indirect pathway from posttraumatic cognitions to resilience through coping processes. That is, posttraumatic cognitions will determine which coping processes are employed and to what degree, and the efficacy of these coping processes will result in higher resilience. Some researchers have articulated similar models of recovery and adaptation after trauma (e.g., Sheerin et al., 2018b), yet no studies have explicitly explored this theorized indirect effect. Thus, the purpose of this study is to investigate this indirect effect model of resilience and to do so among a sample of first responders.

First responders, including firefighters, emergency medical technicians (EMTs), and paramedics, are frequently exposed to PTEs, making first responders an ideal group among which to investigate resilience. It is difficult to quantify the precise number of PTEs first responders experience, yet some estimates indicate that first responders experienced an average of approximately 37 PTEs within their first four years of service, most of which included motor

vehicle accidents, fires, and suicides (Bryant & Guthrie, 2007). Theoretical models of resilience (Richardson, 2002; Richardson et al., 1990) propose that each of these events may result in a departure from responders' biopsychosocialspiritual homeostasis. Consequently, this departure presents the opportunity to reintegrate back to homeostasis. Whether being awoken multiple times throughout the night to respond to calls, responding to a high number of calls on a given shift, or responding to a call that is a PTE, first responders are regularly presented with stressors resultant from their duties. Stressors range in intensity from minor inconveniences to repeated exposure to PTEs, but each of these stressors presents responders the opportunity to reintegrate resiliently.

## **Psychological Resilience**

### ***Theory and operationalization***

The definition and operationalization of psychological resilience have been the source of much attention and debate within the field of positive psychology, and this debate is still ongoing (e.g., Fletcher & Sarkar, 2013; Southwick et al 2014). The following sections will review the historical and current definitions of resilience and clarify how resilience is defined and operationalized in the present study.

**Resilience as the absence of distress.** Resilience has only recently become a construct of interest within the field of psychology; early inquiries into resilience focused on resilience among children when developmental researchers began to notice that some children were able to adapt more effectively to stressors and traumatic events than others. Specifically, researchers such as Garmezy and colleagues (1984), as well as Werner and Smith (1992), observed the multifinality of outcomes among children exposed to traumatic experiences, few of which involved psychopathology. This observation led Garmezy and colleagues to conceptualize



resilience as a lack of pathological outcomes following a stressor or trauma. There is a substantial portion of the resilience literature that continues to rely upon this definition of resilience, and there is strong empirical support for the notion that resilience is associated with less psychological distress and psychopathology following a stressor or PTE. There are numerous studies that have found an inverse relationship between distress and resilience such that those reported higher resilience tended to also report fewer psychological symptoms and pathological outcomes (e.g., Sheerin et al., 2018b; Wang et al., 2019; Wolff & Caravaca Sánchez, 2019).

However, as research has sought to understand resilience more thoroughly it has become increasingly apparent that defining resilience as a lack of pathological outcomes following a stressor or trauma is not an inaccurate definition of resilience, but an oversimplified one. Defining resilience by the absence of pathology following a stressor or PTE suggests that there is some type of “immunity” that some individuals possess, and others do not. Conversely, one piece of evidence that contradicts this definition is that, in the days and weeks following a traumatic event, it is common for individuals to experience a notable uptick in posttraumatic stress following a PTE, but for many this posttraumatic stress will gradually resolve over time. This pattern is evident in many longitudinal studies across many different populations, including military personnel (Bonanno et al., 2012), sexual assault survivors (Steencamp et al., 2012), and following the September 11<sup>th</sup>, 2001 attacks (Pietrzak et al., 2014). The fact that posttraumatic stress is common for a period of time following a PTE suggests that the “immunity” or “lack of pathology/distress” definition of resilience does not fully capture how some individuals are able to recover following a PTE. Further, there is compelling evidence that resilience and distress can

coexist, as some studies have found that elevated PTSD and other psychopathology symptoms coexisted with higher resilience (e.g., Hasselle et al., 2019; van der Meulen et al., 2019).

Another criticism of defining resilience as the absence of pathology, as Bonanno and Diminich (2013) note, is that defining resilience as a dichotomy of pathology versus resilience overlooks important heterogeneity in post-stressor and posttraumatic outcomes. In fact, Bonanno and his colleagues have repeatedly identified four primary trajectories of PTSD symptoms following a loss or PTE. These trajectories are defined by (1) elevated and chronic symptoms, (2) gradually worsening symptoms/delayed onset of symptoms, (3) moderate symptoms that gradually improve, and (4) minimal symptoms that remain stable over time/resilient. Moreover, these trajectories have been identified across multiple samples who experienced varying degrees of losses and PTEs, including among college students (Galatzer-Levy et al., 2012), among a community sample who suffered a traumatic injury (deRoon-Cassini et al., 2010), those whose spouse recently died (Mancini et al., 2015), following a mass shooting (Orcutt et al., 2014), and a large sample of military service members (Bonanno et al., 2012).

An irrefutable strength of Bonanno and colleagues' studies is that they have highlighted the heterogeneity of responses to stressors or PTEs, yet these studies are also limited in that they continued to define resilience as the absence of distress or pathology. In each of the aforementioned studies, the resilient trajectory was classified not by scoring high on a measure of resilience, but by scoring low on measures of psychological distress. Investigating resilience through measures of posttraumatic stress limits our ability to draw direct conclusions about resilience from these studies; resilience is only implicated in these findings by an absence of PTSD symptoms rather than an outcome that is explicitly measured.

To my knowledge, only one study has explored trajectories of resilience in which resilience is explicitly measured. Using the Resilience Scale (Wagnild & Young, 1993), which operationalizes resilience in a trait-like manner, and the Mental Toughness Questionnaire (Clough et al., 2007), which assesses hardiness, van der Meulen and colleagues (2019) found evidence for the stability of resilience over time among police officers. This study found five different classes of resilience, distinguished from each other by differences in baseline resilience, but not changes in resilience. Notably, resilience remained stable over time, even though the police officers in the sample experienced PTEs throughout the study. However, van der Meulen and colleagues did find limited support for fluctuations in resilience over time; though only one class in the latent class analysis showed significant change over time, this class was defined by an initial drop in resilience followed by steady growth.

van der Meulen and colleagues' (2019) findings of multiple different resilience classes appears to have replicated Bonanno and colleagues' findings of multiple symptom trajectories following a stressor or PTE (e.g., Bonanno et al., 2012; Galatzer-Levy et al., 2012; Mancini et al., 2015), but did so using an explicit measure of resilience to measure resilience. However, considering Bonanno and colleagues' PTSD symptom trajectories in tandem with van der Meulen and colleagues' findings, this suggests that even though psychological distress may vary significantly in the posttraumatic environment resilience may remain relatively stable. This also suggests that, although distress and resilience may be negatively related to each other, they may not be diametrically opposed to each other. Rather, it may be possible for resilience and distress to coexist.

**Resilience as a trait.** The studies conducted by Bonanno and his colleagues (e.g., Bonanno et al., 2012; Galatzer-Levy et al., 2012; Mancini et al., 2015), as well as van der

Meulen and colleagues (2019), provide two important insights regarding the definition and conceptualization of resilience. First, resilience is more nuanced than simply the absence of psychological distress following a stressor or PTE, and second, resilience appears to be a construct that is generally stable over time, although may be somewhat malleable as well. This latter finding suggests that resilience may be a trait-like construct given its stability over time.

Resilience has garnered much attention as a trait-like construct, especially given that many measures of resilience operationalize it as such. Widely used resilience measures such as the Resilience Scale (RS; Waglind & Young, 1993), Brief Resilience Scale (BRS; Smith et al., 2008), and Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) all define resilience as a conglomerate of different personal resources and characteristics that help an individual overcome adversity. These scales also are built off of resilience theories put forth by Richardson and his colleagues (Richardson, 1990; Richardson et al., 2002) and Rutter (1987), among others.

As with the conceptualization of resilience as the absence of pathology, there is strong empirical support for resilience as a trait. The previously mentioned studies from Bonanno and his colleagues (e.g., Bonanno et al., 2012; Galatzer-Levy et al., 2012; Mancini et al., 2015) and van der Meulen and colleagues (2019) both provide evidence for the temporal stability of resilience, as does the test-retest reliability data for the RS (Waglind & Young, 1993), BRS (Smith et al., 2008), and CD-RISC (Connor & Davidson, 2003). Further, numerous studies have identified temporally stable factors that are associated with higher resilience (e.g., Bonanno et al., 2006, 2007). Importantly, defining resilience as a trait helps explain the inter-individual differences observed by Bonanno and his colleagues, as well as van der Meulen and colleagues, as this definition would presume that those with higher resilience scores (or lower PTSD

symptom scores) were differentiated from others in the adaptive personal characteristics and resources they possessed. Further, this definition provides a more nuanced definition of resilience than that of Garmezy and colleagues (1984) and satisfies Bonanno and Diminich's (2013) critique that the "absence of distress" definition overlooks important heterogeneity in posttraumatic outcomes.

**Resilience as a process.** Although defining resilience as a trait-based construct has many advantages over defining resilience as the absence of distress or psychopathology, this definition is still limited. Namely, the "trait" definition of resilience does not account for the process(es) implicated in resilience. As one review of the resilience literature notes, although there is not yet one agreed upon definition of resilience, most definitions acknowledge that resilience is somehow related to adversity and positive adaptation (Fletcher & Sarkar, 2013), and implicit in the concept of adaptation is the notion of a process.

The debate about whether resilience is a trait, or the result of a process, is longstanding and ongoing (see Windle, 2011 for a review and Southwick et al., 2014 for a discussion). However, in one of the most widely accepted and utilized resilience theories, Richardson and his colleagues (Richardson, 2002; Richardson et al., 1990) posit that, although there are trait-like components to resilience, resilience is defined as

"the process of coping with disruptive, stressful, or challenging life events in a way that provides the individual with additional protective and coping skills... that allows the individual to learn, develop new skills, and effectively deal with the life events" (p. 34, Richardson, 1990).

Importantly, one of the major contributions of Richardson and colleagues' conceptualization of resilience is that it explicitly anchors resilience to a process. Further, embedded in this definition

is the relationship between coping and resilience; resilient *outcomes* are the result of effective coping *processes*.

The meta-theory of resilience (Richardson, 2002) further clarified the theoretical relationship between coping and resilience, as Richardson (2002) posited that humans exist in a state of biopsychosocialspiritual homeostasis, meaning an “adapted state of mind, body, and spirit” (p. 311), and seek to maintain this homeostatic state whenever possible. Life events, especially stressors, result in perturbations in homeostasis that are proportional to the stressors; that is, more severe stressors such as PTEs will result in greater deviation from homeostasis and thus require more efforts, or coping processes, to reintegrate. Richardson and his colleagues also acknowledged the multifinality that results from reintegrative efforts, and as a result they theorized four primary outcomes following the onset of a stressor. They theorized that attempts to reintegrate can result in (1) dysfunction, (2) some reintegration but with altered homeostasis than is less functional than before the PTE, (3) successful reintegration back to the original homeostatic level, or (4) reintegration where homeostasis improves or grows (Richardson, 2002; Richardson et al., 1990). Successful reintegration is therefore a process that is contingent upon how one reintegrates, and coping processes are the processes by which one seeks to reintegrate.

In sum, Richardson and his colleagues posit that resilience is the product of effectively coping with whatever stressor or PTE is at hand. Further, although the CD-RISC (Connor & Davidson, 2003) is often viewed as a measure of trait resilience, the Connor and Davidson used Richardson and his colleagues’ (Richardson, 2002; Richardson et al., 1990) resilience theory as the predominant theoretical influence for the CD-RISC. In their seminal article, Connor and Davidson defined resilience as “a measure of successful stress-coping ability” (p. 77), which again implicates resilience as the result of the stress-coping process.

To my knowledge no study has sought to test or elucidate the theorized causal relationship between coping processes and resilience put forth by Richardson and his colleagues (Richardson, 2002; Richardson et al., 1990). However, there is strong evidence that resilience and coping are distinct constructs (see Fletcher & Sarkar, 2013 for a review of this literature) but related (e.g., Anderson et al., 2020; Hasselle et al., 2019; Hayward et al., 2018). Further, there is some evidence suggesting that resilience is malleable. In fact, in Connor and Davidson's (2003) seminal article the authors found that resilience significantly increased over the course of PTSD treatment, while van der Meulen and colleagues (2019) found that one class, albeit the smallest class, did report growth in resilience over time. It is also worth noting that although the studies conducted by Bonanno and his colleagues (e.g., Bonanno et al., 2012; Galatzer-Levy et al., 2012; Mancini et al., 2015) operationalized resilience as low levels of PTSD symptoms, the trajectories identified in these studies closely mirror the four stressor-related outcomes posited within Richardson's (2002) meta-theory of resilience.

**Defining and operationalizing resilience for the present study.** Given the strong theoretical foundation that Richardson and his colleagues (Richardson, 2002; Richardson et al., 1990) provide, the fact that one of the most widely used resilience measures, the CD-RISC, is built on this theory, and the data that supports Richardson's theory of resilience, the present study conceptualizes resilience as a malleable construct that is the result of successful stress-coping processes. Specifically, the present study relies on the definition of resilience put forth by Richardson and his colleagues and embraced by Connor and Davidson (2003) and defines resilience as one's ability to effectively cope with a stressful event or PTE in such a way that allows him, her, or them to reintegrate back to their prior biopsychosocialspiritual homeostasis or to improve this homeostasis.

*Differentiating resilience from other related constructs*

In developing the CD-RISC, Connor and Davidson (2003) relied on positive psychological constructs of hardiness, self-efficacy, and adaptability, among others, to construct and inform their measure. While investigating the reliability and validity of the CD-RISC, Connor and Davidson found a strong correlation between hardiness and resilience ( $r = .83$ ). Hardiness has traditionally been defined as a personality characteristic by which one is able to remain psychologically healthy following a stressor or PTE (Kobasa, 1979). This definition of hardiness overlaps with that of resilience in that the individual is able to remain generally psychologically stable following a stressor. In contrast, Richardson and colleagues' (Richardson 2002; Richardson et al., 1990) resilience theory suggests that individuals will experience some departure from their homeostatic state in the aftermath of a stressor, and resilience is the process of reintegration back to homeostasis. This is further supported by Windle's (2011) conceptual review of resilience, in which the author notes that hardiness "is a stable personality trait whereas resilience is viewed as something dynamic that will change across the lifespan." (p. 163). Further, although Connor and Davidson report a strong correlation between hardiness and resilience, this relationship was identified using a sample of only 30 participants and thus may not be the most reliable estimate. Recent research provides additional evidence that resilience and hardiness are distinct given weaker correlations between the two (García-León et al., 2019).

Self-efficacy, or one's perception of their ability to respond appropriately to a given situation (Bandura, 1982), is also closely related to resilience. The link between self-efficacy and resilience can be seen in the definition of self-efficacy; the more one believes they are able to respond to and manage a situation the more motivated they will be to strive for resilient reintegration. This is aligned with Richardson's (2002) meta-theory of resilience in which he



articulates that a key component of resilience is one's motivation to reintegrate. As with hardiness, prior research suggests self-efficacy and resilience are related but distinct constructs (García-León et al., 2019). Further, self-efficacy may explain a notable amount of variance in resilience (Bender & Ingram, 2018). Importantly, self-efficacy is also conceptually distinct from resilience in that self-efficacy is relevant to all aspects of one's life, whereas resilience is specifically related to processes that occur following a stressor or PTE (Schwarzer & Warner, 2013).

Lastly, posttraumatic growth is defined as personal growth that occurs resultant from a PTE (Tedeschi & Calhoun, 2004). The concept of posttraumatic growth seems to align with Richardson and colleagues' (2002, 1990) postulation that, through resilient reintegration, one can improve their homeostatic state in the wake of a PTE. Supporting this idea, prior research has found that higher resilience predicted more posttraumatic growth (Li et al., 2018; Wu et al., 2015). However, based on Richardson and colleagues' resilience theory (Richardson, 2002; Richardson et al., 1990), it is arguable that posttraumatic growth is the growth outcome that follows resilience processes. In fact, in their review of the literature Lepore and Revenson (2006) make the argument that posttraumatic growth is one facet of resilience. Moreover, correlational data suggests that these two constructs are related but distinct (Li et al., 2018; Wu et al., 2015).

Hardiness, self-efficacy, and posttraumatic growth are by no means the only positive psychological constructs related to resilience, but they are arguably the constructs most frequently discussed in relation to resilience. These constructs are all undeniably related to each other, but the current body of research indicates that resilience is distinct from each of these constructs.

### ***Resilience and psychological health***

It is important to note at the outset the high prevalence of resilience, even in the face of significant adversity and trauma. For instance, 33% (Mancini et al., 2015) to 83% (Bonanno et al., 2012) of the respective samples fell into the low symptom/resilient trajectory, although resilience was defined as the absence of psychological distress in these studies. One study conducted by Sheerin and colleagues (2018b) provides some challenge to these findings, as Sheerin and colleagues found notable variability in the prevalence of resilience depending on how resilience was operationalized. However, one strength Sheerin and colleagues' study is that they used the CD-RISC to explicitly measure resilience, and in doing so still found that resilience was prevalent and quite high within their sample. Importantly, even though the findings from Sheerin and colleagues provides a more conservative estimate of the prevalence of resilience, these estimates still support the notion that resilient outcomes are far more common than pathological outcomes.

It is also important to note that, contrary to early conceptualizations of resilience, resilience and psychopathology are not diametrically opposed. In Sheerin and colleagues' (2018b) study, approximately 43% of those scoring in the 75<sup>th</sup> percentile or above for resilience as measured using the CD-RISC also meet the criteria for a psychological diagnosis. A similar study found that participants who employed the most coping processes simultaneously reported significantly higher resilience, as measured by the CD-RISC, and posttraumatic growth as well as higher PTSD and depression symptoms (Hasselle et al., 2019), suggesting that resilience and psychological distress are not opposite ends of the same spectrum but rather can coexist. Rather, these studies indicate that resilience may be better conceptualized as the result of effective coping processes than by the absence or minimal presence of psychological distress. This aligns with Richardson and colleagues' (2002, 1990) definition of resilience and is also congruent with

a large body of evidence suggesting that psychological distress and pathology can lead to positive psychological outcomes (e.g., Shakespeare-Finch & Beck, 2014)

Keeping in mind the research suggesting that resilience is more than simply the absence of psychological distress, and in fact can coexist with distress, it is important to highlight that there is strong evidence suggesting that resilience may still serve as a protective factor against psychological distress. For instance, greater resilience was associated with fewer PTSD symptoms among military veterans, and the relationship between trauma exposure and PTSD symptoms was less strong for veterans who reported higher resilience (Blackburn & Owens, 2016; Green et al., 2010). Further, Green and colleagues highlighted the psychosocial and functional advantages of resilience, finding that higher resilience, as measured by the CD-RISC, was associated with decreased alcohol consumption, lower depression symptoms, fewer physical health complaints, and fewer medical issues. Resilience also interacted with emotion-focused coping processes to predict reduced psychological distress, including depression and anxiety symptoms, as well as negative affect (Smith et al., 2016). Higher resilience was associated with less compassion fatigue and burnout among those who provided behavioral health services following natural disasters (Burnett & Wahl, 2015), more social support and number of therapy sessions received among veterans (DeViva et al., 2016), greater affective balance following a traumatic injury (Laird et al., 2019), greater psychological flourishing among those exposed to childhood trauma (Munoz et al., 2019), and better overall health and well-being in older age (Harris et al., 2016).

With the extant literature indicating that resilience protects against undesirable outcomes and promotes healthy functioning, two questions must then be asked. First, what factors are associated with higher or lower resilience? And second, how can resilience be leveraged and

increased? With regard to the first question, inquiry here has identified a handful of factors, most of which are demographic, that have predicted higher likelihood of a resilient response following a PTE. deRoon-Cassini and colleagues (2010) found that those in a low symptom trajectory had more years of education, whereas those whose injury resulted from an intentional act by another person were more likely to fall into the chronic symptom group. In general, higher trauma exposure and closer proximity to the event were both associated with a lower likelihood of falling into the low symptom/resilient trajectory (Bonanno et al., 2012; Orcutt et al., 2014), but proximity to the event has not always related to outcomes (Bonanno et al., 2006, 2007). Longitudinal data from the Scottish mental survey identified that early-life stressors, including childhood illness and stressors as well as early adulthood stressors, were associated with lower resilience later in life (Harris et al., 2016). This body of literature highlights important factors that may predispose someone to report more or less resilience, which are undoubtedly important to account for as resilience inquiry continues.

Demographic factors, although important to account for, ultimately do not answer the second question posed above: how can resilience be leveraged and increased? Fundamental to this question is the understanding of mechanisms; that is, what factors are associated with changes in resilience? Demographic factors may best be conceptualized as predisposing factors for higher or lower resilience. However, by definition demographic factors cannot be mechanistic as they cannot be leveraged or changed as a result of an intervention. Aside from associations between resilience and demographic factors, the extant resilience literature has often investigated resilience as either a predictor of psychological outcomes or as a mechanistic or buffering factor in relation to psychological distress. As previously discussed, this body of research supports the hypothesis that higher resilience leads to better psychosocial functioning

and helps prevent pathology. Understandably, researchers have concluded that resilience is a construct that should be acted upon in order to help promote adaptive posttraumatic outcomes and prevent pathological outcomes and therefore have developed interventions designed to increase resilience, yet because of our limited understanding of the construct these interventions have not been successful. One meta-analysis of 11 such interventions found that only four significantly improved resilience (Joyce et al., 2018). This study highlights the major gap in the resilience literature; although we have strong evidence that supports the protective nature of resilience, we currently lack evidence indicating what psychosocial factors contribute to differences or changes in resilience. The first step toward developing interventions that are successful in promoting positive psychological constructs such as resilience is understanding the salient mechanistic factors.

### ***Resilience among first responders***

First responders are chronically exposed to PTEs (Bryant & Guthrie, 2007; Köhler et al., 2019). Consequently, one hypothesis is that first responders are at increased risk for subsequent psychological distress as a result of regularly experiencing PTEs. This hypothesis is supported by the dose-response relationship between PTEs and posttraumatic stress disorder (PTSD) symptoms that has been identified (e.g., Henriksen et al., 2010; Koenen et al., 2008; Wilson, 2014). Indeed, this dose-response relationship has been identified among first responders, emergency medical personnel, and others who have been vicariously exposed to PTEs (McLean et al., 2013; Warren et al., 2003), who are at increased risk for PTSD resultant from trauma exposure associated with their duties (Berger et al., 2012).

Research among first responders currently lags behind the broader trauma and resilience research, as there is comparatively little research investigating the role resilience plays in the

psychological and psychosocial functioning of first responders. However, the available research highlights the buffering effects and psychosocial benefits of resilience among first responders. Gayton and Lovell (2012) cross-sectionally sampled a cohort of early-career paramedics whose experience ranged from trainee to five or more years of experience. Their findings suggest that resilience tended to increase within the first five years of service as a paramedic, but slightly declined above five years of service. In a large, longitudinal study of combat medics, increased hardiness, which is closely associated with resilience (Connor & Davidson, 2003), was associated with more favorable behavioral health outcomes (Krauss et al., 2019). Regarding first responders' psychological functioning, a cross-sectional study of firefighter-paramedics found that resilience indirectly contributed to PTSD symptoms via fewer depression and anxiety symptoms, as well as improved sleep quality (Straud et al., 2018), and a large study of Korean firefighters found that higher resilience lessened the indirect effect of trauma exposure on PTSD symptoms via lower perceived work-related stress (Lee et al., 2014). Resilience was also associated with better psychosocial functioning among first responders, as greater emotional support from coworkers and supervisors was associated with higher resilience, which was in turn associated with greater work engagement (Bernabé & Botia, 2015).

Resilience inquiry among first responders has generally aligned with the broader body of resilience inquiry, though first responders appear to differ in a handful of notable ways. First, in contrast to the consensus that trauma and PTSD symptoms are associated with decreased resilience, two studies provide evidence that resilience may operate independently from trauma exposure and related sequelae among first responders. In tracking resilience over time among police officers, van der Meulen and colleagues (2019) identified five distinct longitudinal trajectories using latent class analysis, four of which were defined by differences in resilience at

baseline but not by changes in resilience over nine months (van der Meulen et al., 2019). That is, police officers tended to differ in resilience when first surveyed, with Cohen's *d* effect sizes ranging from 0.39 to 6.74, and resilience was generally stable over time. The one class that demonstrated significant change over time was the smallest of the five, was comprised of only 11 of the 305 participants, and this class was defined by an initial drop in resilience followed by a sustained increase in resilience. Additionally, only education level predicted class membership; those with a lower education level were more likely fall into a lower resilience class whereas those with a higher education level were more evenly distributed across classes. Having experienced a PTE leading up to the initial survey did not predict baseline resilience, nor did PTEs predict any changes in resilience. These findings are corroborated by research investigating two competing definitions of resilience among combat medics; Russell and colleagues (2019) found that baseline resilience did not predict fewer PTSD symptoms following redeployment or among those who deployed for the first time. However, baseline resilience did predict fewer PTSD symptoms among those who did not redeploy. Together these findings first suggest that baseline resilience may not provide a buffer against developing PTSD symptoms; instead, resilience may be linked to coping or other processes that are activated resultant from PTSD symptoms and when the individual has space to process the trauma in the absence of additional PTEs. Russell and colleagues' results also provide empirical support for Richardson's (1990, 2002) model of resilience, as their findings highlight how trauma results in an onset or exacerbation of psychological distress following a PTE, but resilience helps return to baseline functioning.

The extant theory and evidence suggest that, as a result of regular exposure to PTEs and other stressors, first responders are frequently presented with the opportunity to reintegrate from

these stressors resiliently. However, there are three important considerations given their PTE exposure that may be relevant to understanding resilience among first responders; first and foremost, because of the number and frequency of PTEs that first responders are exposed to, first responders may be especially adept at reintegrating and therefore would not demonstrate noticeable increases in resilience once exposed to multiple PTEs, thus explaining van der Meulen and colleagues' (2019) findings. Second, first responders may not be afforded the space to reintegrate because of the chronicity of stressors that result from their duties. Third, it may be that the amount of stress first responders experience resultant from a PTE does not provide a substantial enough disruption in their biopsychosocialspiritual homeostasis, thus not requiring notable reintegrative efforts and therefore does not noticeably affect resilience. Research investigating the relationship between trauma type and PTSD symptoms provides some credence to this notion. One study suggested that witnessing violence, which is similar to what first responders may experience on critical incident calls, was not significantly associated with overall PTSD symptoms (Guina et al., 2018). Although this may complicate or limit the ability to detect changes in resilience among first responders, investigating changes in resilience among first responders is nonetheless warranted; their experiences fit well into theoretical models of resilience (Richardson, 2002; Richardson et al., 1990) and therefore allow for these models to be robustly tested. Further, investigating resilience within first responders may also provide insight and clarity as to the coping processes that are most effective at promoting resilient reintegration.

## **Coping Processes**

### ***Theory and operationalization***

Lazarus and Folkman (1984) defined coping as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as



taxing or exceeding the resources of the person” (p. 141). In short, their transactional model of stress and coping defined coping as an effort to manage a departure from homeostasis. Moreover, coping is conceptualized as a process that is divorced from the resultant outcomes. That is, coping processes are not in-and-of-themselves adaptive or maladaptive, but the result of these processes may be either adaptive, such as resilience, or maladaptive, such as posttraumatic stress symptoms. Lazarus and Folkman’s model alludes to a dose-response relationship between stress appraisals and coping processes; the more distressing one appraises a stimulus to be, the more coping processes will be employed. Importantly, *all types* of coping processes are employed in response to the stressor but may be employed to varying degrees. As stated by Alexander and Klein (2009):

“There is no evidence that any single method of coping guarantees immunity... Moreover, it may be anticipated that any particular method of coping, such as denial, may be useful in one setting, or at some particular time... but be contraindicated in other settings...” (p. 91).

One major contribution of Lazarus and Folkman’s (1984) theory is the delineation between problem-focused coping processes and emotion-focused coping processes. Conceptually, problem-focused processes target the problem that is causing distress (Lazarus & Folkman, 1984; Lazarus & Folkman, 1987), such as taking action to remove the presence of the stressor or brainstorming options to increase control over the situation. On the other hand, emotion-focused coping processes focus on managing one’s emotional reactions to the stressor (Lazarus & Folkman, 1984; Lazarus & Folkman, 1987), such as sharing one’s emotions with a trusted friend or using alcohol or other substances to avoid experience the emotions. Importantly, this latter example of emotion-focused coping processes highlights an additional categorization that exists for both emotion-focused processes and problem-focused processes; engagement

processes orient toward the problem or emotions whereas disengagement processes orient away from the problem or emotions (Hasselle et al., 2019; Litman, 2006; Nielsen & Knardahl, 2014).

Factor analytic studies have provided strong evidence for the existence of problem- and emotion-focused coping processes (e.g., Baumstarck et al., 2017; Litman, 2006; McLoughlin, 2019; Wang et al., 2018), though these studies have also identified additional categories of coping processes. Further, both factor analyses and latent class analyses have provided support for the categorization of engagement and disengagement processes (Hasselle et al., 2019; Litman, 2006; Nielsen & Knardahl, 2014). The evidence is most substantial for dividing emotion-focused processes into engagement and disengagement processes, as some studies have identified only one factor related to problem-focused processes (Litman, 2006; McLoughlin, 2019; Wang et al., 2018). Thus, subdividing problem-focused processes into engagement and disengagement processes may not be advisable, but subdividing emotion-focused processes into engagement and disengagement processes may be informative.

### ***Coping and resilience***

Richardson and his colleagues (Richardson, 2002; Richardson et al., 1990) postulated that resilience is the result of effective coping processes. Richardson established this link through his conceptualization of resilience as a product of reintegration; he explicitly stated that resilient outcomes result from the process of successful reintegration, which is dependent upon coping processes. Connor and Davidson (2003) concisely summarized this theory, stating that “[r]esilience may thus also be viewed as a measure of successful stress-coping ability” (p. 77). Accordingly, when asking the question of what processes might result in increased resilience, the transactional model of stress and coping (Lazarus & Folkman, 1984) and meta-theory of resilience (Richardson, 2002) together suggest that coping processes are employed when a

disruption in homeostasis occurs. In turn, these theories posit that resilience is an adaptive outcome that results from effective coping processes. However, the meta-theory of resilience is limited in that it does not provide guidance regarding which coping processes promotes resilience and which processes arrest resilience.

That said, the current literature does provide evidence that engagement coping processes, whether focused on problems or emotions, tend to be associated with more adaptive psychosocial outcomes, whereas disengagement processes tend to be associated with more maladaptive psychosocial outcomes. In a recently published study, those who reported using the most coping processes in general also tended to report the most resilience and posttraumatic growth, as well as the most psychological distress (Hasselle et al., 2019). However, the existing literature suggests that the most favorable outcomes may to be related to the proportion of engagement processes to disengagement processes employed. High levels of engagement coping processes coupled with low levels of disengagement coping processes were associated with higher-than-average levels of resilience and posttraumatic growth as well as lower than average levels of psychological distress (Hamrick & Owens, 2018; Hasselle et al., 2019; Hayward et al., 2018). The inverse was also true; those who reported using the most disengagement processes and least engagement processes tended to report experiencing above-average psychological distress and below-average resilience and posttraumatic growth (Hasselle et al., 2019). These lead to two possible interpretations; it could be that using more engagement coping processes and less disengagement processes contributes to increased resilience and decreased psychological distress. Conversely, it could also be that those who are experiencing higher levels of distress and are less resilient employ more disengagement processes and fewer engagement processes. Further, this study does not delineate between problem- and emotion-focused coping processes.

Research investigating problem- and emotion-focused coping processes helps to provide clarity to these relationships. For instance, those who used more problem- and emotion-focused processes also reported more resilience compared to those who used less problem- and emotion-focused processes (McBride & Ireland, 2006). Similarly, emotion-focused processes were associated with more resilience, while disengagement coping processes were associated with less resilience (Wolfe & Ray, 2015). Multiple other studies found that problem-focused processes were associated with higher resilience (e.g., Alonso-Tapia et al., 2019; Anderson et al., 2020; Guo, 2019; Séoud & Ducharme, 2015), as were emotion-focused processes (Séoud & Ducharme, 2015). Some studies identified a relationship between emotion-focused processes and resilience in which using more emotion-focused processes were associated with less resilience (Alonso-Tapia et al., 2019; Guo, 2019). However, the emotion-focused processes assessed appear to be more closely aligned with disengagement emotion-focused processes (e.g., using food or substances to manage distress and self-blame) than engagement emotion-focused processes.

Longitudinal evidence helps further to clarify the relationship between coping processes and psychological outcomes; problem- and emotion-focused engagement coping processes were associated with decreased hopelessness and anxiety, respectively, while emotion-focused disengagement processes were associated with higher anxiety six months later (Taft et al., 2007). In a study that explicitly investigated the longitudinal relationships between resilience, coping processes, and PTSD, higher resilience was correlated with later use of more problem- and emotion-focused engagement processes, as well as later use of fewer disengagement processes (Thompson et al., 2018). However, others found that emotion-focused processes were negatively associated with resilience, while disengagement processes were not associated with resilience at all (Stratta et al., 2015). These findings underscore the notion that coping is not a one-size-fits-all

process. Rather, it is highly contextual to both the individual and the situation, but despite this, the evidence tends to indicate that using problem- and emotion-focused engagement processes promotes resilience while using disengagement processes hinders resilience.

### ***First responder coping processes***

Coping processes are especially relevant to consider among first responders due to the quantity and frequency of stress and PTEs associated with their job. First responders are exposed to a multitude of stressors, many of which are relatively unique to the first responder profession. Critical incident calls, such as responding to the injury or death of someone they know, motor vehicle accidents involving fatalities, and pediatric traumatic injuries, are perceived by first responders as especially stressful, and responders also experience a multitude of daily stressors resultant from their duties (Beaton et al., 1998). Factor analytic studies suggested that the coping processes employed by first responders were best categorized by problem-focused coping, emotion-focused coping, and disengagement coping processes (Sattler et al., 2014).

When broadly considering the role of engagement and disengagement coping processes, a large study that included first responders found that engagement coping processes were associated with higher well-being and posttraumatic growth. In contrast, disengagement coping processes were associated with decreased well-being, but also with higher posttraumatic growth (Arble & Arnetz, 2017). Further, greater use of problem-focused coping processes was associated with fewer PTSD symptoms among first responders (Lee et al., 2018; Sattler et al., 2014), as well as with higher posttraumatic growth (Sattler et al., 2014), while disengagement processes were associated with more PTSD symptoms (Sattler et al., 2014; Wild et al., 2016; Witt et al., 2018). The evidence is less clear regarding emotion-focused coping processes, as some have found that greater use of emotion-focused processes was associated with more PTSD

symptoms (Kucmin et al., 2018), while others found no relationship between emotion-focused processes and PTSD symptoms but a positive relationship between emotion-focused processes and posttraumatic growth (Sattler et al., 2014).

Coping processes have also been implicated in resilient outcomes among first responders and those in similar professions. For instance, findings from a systematic review of articles investigating resilience among first responders highlighted the importance of both cognitive and coping factors, among other factors, when considering resilience (van den Pol, 2013). Coping again emerged as an important component of resilience among first responders in a qualitative study, as first responders identified coping processes, especially problem-focused coping, to be explicitly associated with resilience (Crowe et al., 2017). However, there is a lack of quantitative studies investigating the link between coping processes and resilience among first responders.

## **Posttraumatic Cognitions**

### ***Theory and operationalization***

Since the “cognitive revolution” in psychology, philosophers and psychological researchers theorized and began investigating the role of cognitive processes as a factor that indirectly effects the relationship between environmental occurrences and behavioral responses. Theories of psychological functioning and psychopathology that followed have emphasized the role of cognitive appraisals in contributing to and maintaining distress. In short, it is now widely believed that it is how we as humans interpret events and what meaning we ascribe to them that informs how we respond to the events more so than the event itself.

Though not the first to do so, Ehlers and Clark (2000) put forth a cognitive model of PTSD that synthesized extant cognitive theories in relation to traumatic stress and provided a concise, descriptive, theoretical model of how cognitive appraisals during and following a

traumatic event inform how an individual responds to the event. Ehlers and Clark theorized that appraisals of the event perpetuate the ongoing sense of danger and fear that is a hallmark of PTSD. Appraisals can pertain to the event itself, to how one reacted to the event emotionally, cognitively, and behaviorally, as well as to the posttraumatic reactions. Specifically, an individual may experience their reactions to the traumatic event as unnatural or abnormal, resulting in a view of the self that reflects someone who is broken or flawed.

Since the publication of Ehlers and Clark's (2000) theory, research has provided empirical support for the role posttraumatic cognitions play in the onset and maintenance of PTSD symptoms. Longitudinal findings suggest that increases in posttraumatic cognitions preceded the onset or exacerbation of PTSD symptoms (Ehring et al., 2008; Horsch et al., 2015; Kleim et al., 2007). Further, the relationship between posttraumatic cognitions and PTSD symptoms appears to be fairly ubiquitous, as this relationship has been identified across numerous populations, including veterans (Horwitz et al., 2018; Litz et al., 2018), sexual assault survivors (Carroll et al., 2018; Woodward et al., 2015), motor vehicle accident survivors (Ehring et al., 2008; Woodward et al., 2015), and undergraduate students (Barton et al., 2013).

### ***Posttraumatic cognitions and resilience***

The available literature is unfortunately limited in that there is little research investigating the relationship between posttraumatic cognitions and resilience. The broader trauma literature indicates that posttraumatic cognitions were associated with higher PTSD symptoms (e.g., Horwitz et al., 2018; Litz et al., 2018), as well as that more PTSD symptoms were associated with lower resilience (e.g., Hasselle et al., 2019). Taken together, these findings lead to the hypothesis that higher posttraumatic cognitions would be associated with lower resilience. However, this relationship has not been thoroughly investigated. A handful of studies have

identified a correlation between posttraumatic cognitions and resilience, as more posttraumatic cognitions were associated with less resilience (Kaufman et al., 2018; Sexton et al., 2018), but to my knowledge only one study has investigated the relationship between posttraumatic cognitions and resilience beyond cross-sectional relationships. Nanney and colleagues (2018) investigated the relationships between negative beliefs about the self, which were derived from the Posttraumatic Cognitions Inventory (Foa et al., 1999), power and control beliefs, which were derived from the Connor-Davidson Resilience Scale (Connor & Davidson, 2003), and PTSD symptoms. Their findings suggested that more power and control beliefs were cross-sectionally associated with fewer negative beliefs about the self but were longitudinally associated with more negative beliefs about the self (Nanney et al., 2018).

### ***Posttraumatic cognitions and coping processes***

The transactional model of stress and coping (Lazarus and Folkman, 1984) suggests that coping processes in response to a stressor are determined, at least in part, by the appraisal of the stressor. It is this appraisal that is theorized to be more determinant of the coping processes employed than the nature of the stressor itself. Moreover, Ehlers and Clark (2000) theorized a clear, directional link from negative posttraumatic cognitions to coping processes, stating that these cognitive appraisals sustain PTSD symptoms by “encouraging individuals to engage in dysfunctional coping strategies that have the paradoxical effect of enhancing PTSD symptoms” (p. 323). That is, the function of coping processes is to alleviate the distress that results from trauma-related appraisals, but some processes may lead to higher distress rather than resolved distress. In sum, both cognitive models of PTSD and models of coping processes highlight how cognitive appraisals determine coping processes.



Supporting this postulate, posttraumatic cognitions were cross-sectionally associated with coping self-efficacy, or how one perceives their ability to cope, such that more posttraumatic cognitions predicted lower coping self-efficacy (Samuelson et al., 2017). When looking at the specific types of posttraumatic cognitions, more cognitions about the self and the world were associated with lower coping self-efficacy both cross-sectionally and longitudinally, which in turn was associated with more PTSD symptoms (Cieslak et al., 2008). Beyond associations between posttraumatic cognitions and coping, factor analytic findings have suggested that the construct of posttraumatic cognitions may include negative beliefs about one's coping abilities (Sexton et al., 2018). In a study of stress, coping, and PTSD symptoms among a sample of Muslims who had experienced trauma, religious coping was found to indirectly affect PTSD symptoms via posttraumatic cognitions (Berzengi et al., 2017). Interestingly, the indirect effect of posttraumatic cognitions on PTSD symptoms via religious coping was not significant. At face value, this appears to challenge the directionality of Lazarus and Folkman's (1984) theory; however, it is worth noting that this study was cross-sectional in design, which limits the directional inferences that can be made even though one model was significant and the other was not. Moreover, it may be that religious coping is a specific coping process in which the model specified by Berzengi and colleagues is accurate, but that the directionality may not hold when more all-encompassing coping processes are considered.

To illustrate the hypothesized indirect effect from posttraumatic cognitions to resilience through coping processes, consider the following example. Following a motor vehicle accident in which his wife and children were killed, a man may endorse the posttraumatic cognition of "my life has been destroyed by the trauma." Distressing emotions of guilt, shame, and grief may accompany this cognition, and his life will have been uprooted by this event. The emotions, as

well as changes to his life, both prompt coping processes. Perhaps the man chooses to use a disengagement coping processes in which he tries to move forward by not thinking about the event and avoiding his distressing emotions (disengagement coping). Both common wisdom and empirical evidence suggest that avoidance will only maintain this distress (e.g., Badour et al., 2012), and this will inhibit his ability return to his biopsychosocialspiritual homeostasis thus reducing his resilience. Conversely, instead of attempting to disengage from the stressors at hand he could take action by planning a memorial service to honor his wife and children (problem-focused engagement coping) or by seeking grief counseling (emotion-focused engagement coping). Though his journey forward will surely not be easy, both of these coping processes afford this man the opportunity to begin to reintegrate back toward his biopsychosocialspiritual homeostasis, thus increasing his resilience.

### ***Posttraumatic cognitions among first responders***

When considering the relevance of posttraumatic cognitions to first responders, one hypothesis could be that first responders come to view the world as more dangerous and others as more untrustworthy as a result of continuous exposure to PTEs. This hypothesis received support among medical examiners, as Brondolo and colleagues (2018) found that more case exposure was associated with more negative beliefs about the world. There is also evidence that witnessing violence, which is similar to what first responders may experience on critical incident calls, was associated with increased scores on the negative alterations in cognitions and mood subscale of the PTSD symptom checklist for DSM-5 (Guina et al., 2019). Due to their high degree of training, responders may perceive themselves to be more reliable and more trustworthy; however, if and when confronted with a response that either overwhelms their

skillset, is outside of their control, or they perceive their actions to result in adverse outcomes for the patient, they may come to conclude that they are flawed, untrustworthy, or a risk to others.

Though there is limited research investigating posttraumatic cognitions among first responders in comparison to the literature pertaining to other trauma-exposed populations, the existing evidence suggests that first responders may experience elevated posttraumatic cognitions (Bryant & Guthrie, 2007; Bryant et al., 2019; Wild et al., 2016). In turn, elevated posttraumatic cognitions were associated with more PTSD symptoms among first responders (e.g., Bryant & Guthrie, 2007; Köhler et al., 2019; Wild et al., 2016), and interventions that targeted posttraumatic cognitions and other posttraumatic processes resulted in greater reduction of maladaptive appraisals and PTSD symptoms compared to waitlist controls (Bryant et al., 2019). Regarding the relationship between posttraumatic cognitions and coping processes, Köhler and colleagues (2019) found that posttraumatic cognitions indirectly affected PTSD symptoms through dysfunctional disclosure, which was reflective of coping processes. The results from Köhler and colleagues' study provide evidence that Lazarus and Folkman's (1984) model of appraisal and coping is relevant to first responders, and that first responders may experience posttraumatic cognitions that contribute to coping processes.

### **Present Study**

The trauma burden among first responders is elevated, and first responders may be especially vulnerable to experiencing exacerbations in posttraumatic cognitions. However, being regularly confronted with PTEs offers first responders the opportunity to develop and hone coping processes to manage trauma-related sequelae, especially posttraumatic cognitions. The transactional model of stress and coping delineates a causal relationship between cognitive appraisals and coping processes such that more negative appraisals result in greater mobilization

of coping processes (Lazarus & Folkman, 1984). Richardson and his colleagues' (Richardson, 2002; Richardson et al., 1990) conceptualization of resilience extends upon this appraisal-coping theory by positing that resilience is the product of effective coping processes. In a trauma-specific context, posttraumatic cognitions offer a representation of cognitive appraisals. In alignment with coping and resilience theories, posttraumatic cognitions then prompt coping processes, which results in increased resilience. However, increased resilience is predicated on the efficacy of the coping processes employed; that is, coping processes lead to increased resilience *only if* the coping processes are effective.

### ***Hypotheses***

Following the theoretical models and the supporting evidence described above and using a cross-sectional research design, I predicted that posttraumatic cognitions would indirectly affect resilience through coping processes among first responders. The specific statistical hypotheses are detailed below, progressing path-by-path through the theorized model that is presented in Figure 1. It is important to note that I specifically hypothesized that statistical suppression would be present in this model. I hypothesized this based on both theory and available literature that indicates problem-focused and emotional engagement coping processes tended to be associated with more resilience, while disengagement processes tended to be associated with less resilience and more psychological distress.

1. Based on the existing literature indicating that posttraumatic cognitions are negatively associated with resilience, I hypothesized that more posttraumatic cognitions would be associated with less resilience.
2. Based on the theories of coping and resilience (Lazarus & Folkman, 1984; Richardson, 2002; Richardson et al., 1990) and the supporting evidence, I hypothesized that

posttraumatic cognitions would indirectly be associated with resilience via coping processes. I expected there to be discrepant patterns in the indirect effects based on either engagement or disengagement coping processes, which are detailed below. Specifically, I hypothesized that:

- a. Posttraumatic cognitions would be positively associated with using more disengagement coping processes, which would subsequently be associated with less resilience. For this pathway, I hypothesized that the indirect effect would be negative.
- b. Posttraumatic cognitions would be positively associated with using more problem-focused coping processes, which would subsequently be associated with more resilience. For this pathway, I hypothesized that the indirect effect of posttraumatic cognitions to resilience via problem-focused coping would be positive.
- c. Posttraumatic cognitions would be positively associated with using more emotional engagement coping processes, which would subsequently be associated with more resilience. For this pathway, I hypothesized that the indirect effect of posttraumatic cognitions to resilience via emotional engagement coping would be positive.

Additionally, exploratory post-hoc analyses were conducted to further probe findings from the primary analyses.

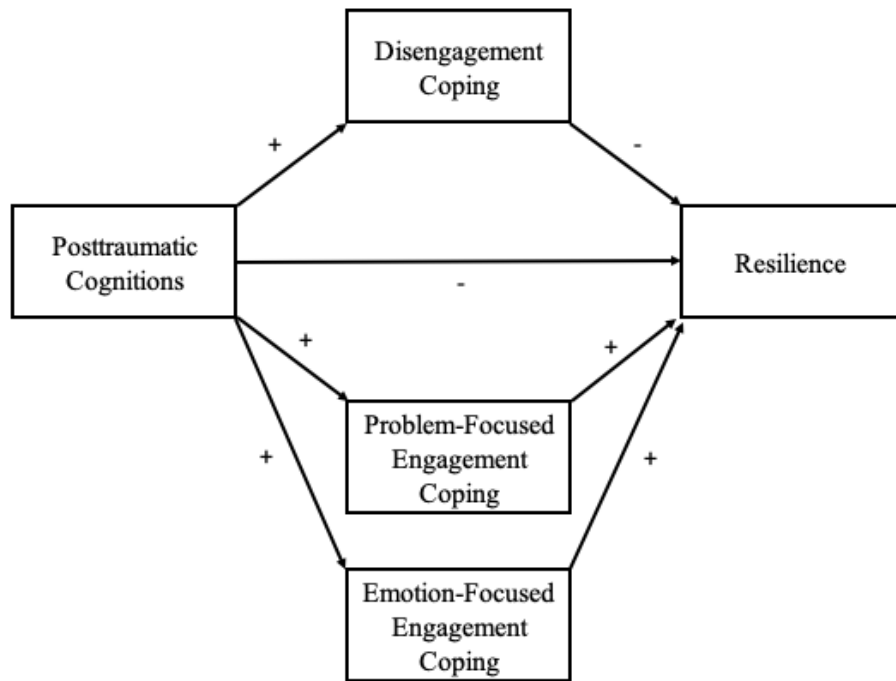


Figure 1. Hypothesized parallel indirect effect model.

Table 1

*Demographic information for N = 117 first responders*

	#	%
<b>Sexual Orientation</b>		
Heterosexual	115	98.3
Bisexual	2	1.7
<b>Marital Status</b>		
Married	94	80.3
In a Relationship	8	6.8
Single	7	6.0
Divorced	5	4.3
Cohabiting	3	2.6
<b>Religion</b>		
No Preference/No Affiliation	54	46.2
Protestant	36	30.8
Catholic	13	11.1
Buddhist	4	3.4
Atheist	4	3.4
Jewish	2	1.7
Other	3	2.6
<b>Rank/Position</b>		
Battalion Chief/EMT	8	6.8
Captain/Paramedic	1	0.6
Captain/EMT	1	0.6
Lieutenant/Paramedic	7	6.0
Lieutenant/EMT	33	28.2
Firefighter/Paramedic	20	17.1
Firefighter/EMT	47	40.2
<b>Prior Military</b>		
No	104	88.9
Yes	13	11.1
Army	5	4.3
Navy	4	3.4
Air Force	2	1.7
Marine Corps	1	0.6

## Chapter II: Method

### Participant Characteristics

The present sample consisted of  $N = 117$  first responders, including firefighters, paramedics, and EMTs, who were recruited from two fire departments located in the Pacific Northwest. Participants were recruited as part of a broader study investigating psychological health and functional outcomes among first responders. The sample was predominantly comprised of men ( $n = 106, 90.6\%$ ), with  $n = 11$  women ( $9.4\%$ ). A majority of the sample identified as Caucasian ( $n = 112, 95.7\%$ ), with  $n = 3$  participants identifying as Hispanic/Hispanic American ( $2.6\%$ ),  $n = 1$  participant identifying as African/African American ( $0.8\%$ ), and  $n = 1$  participant identifying as Asian/Asian American ( $0.8\%$ ). The average age of the sample was 41.20 years ( $SD = 8.52$ ). These demographics are generally consistent with first responder demographics on a national level (Schafer, Sutter, & Gibbons, 2015). First responders in the sample had been with their current department for an average of 13.15 years ( $SD = 9.15$ ) and had served as a first responder for an average of 17.95 years ( $SD = 9.15$ ). The demographic characteristics of the sample are detailed further in Table 1.

### Measures

#### *Psychological resilience*

The Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) is a 25-item, self-report measure that was used to assess one's perceived ability to return to homeostasis when confronted with stressors. Responses on the CD-RISC are provided using a 5-point, Likert-type scale with responses ranging from 0 (*rarely true*) to 4 (*true nearly all of the time*). Connor and Davidson found a five-factor structure to the CD-RISC, but other studies have challenged this factor structure, as one study found that two-factor structure was the best fit, though not an



adequate fit due to high cross-loadings across the two factors (Green et al., 2014). Example items include “I am able to adapt when changes occur” and “I can deal with whatever comes my way.” Responses are summed to create a total score, ranging from 0-100, with higher scores indicating higher resilience. The CD-RISC has demonstrated acceptable internal consistency ( $\alpha = .89$ ), as well as convergent validity with measures of hardiness ( $r = .83, p < .001$ ), social support ( $r = .36, p < .001$ ), perceived stress ( $r = -.76, p < .001$ ), and disability ( $r = -.62, p < .001$ ; Connor & Davidson, 2003). Although a handful of studies have administered the CD-RISC to first responders (e.g., Straud et al., 2018; Wild et al., 2016), none have reported the internal consistency for their specific samples. The internal consistency was  $\alpha = .91$  in the present study.

### ***Coping***

Coping processes were assessed using the Brief Coping Orientation to Problem Experience Inventory (BriefCOPE; Carver, 1997). The BriefCOPE is a 28-item, self-report measure that queries the degree to which respondents employ a multitude of coping methods in response to recent stressors. Responses are provided on a 4-point, Likert-type scale ranging from 1 (*I haven't been doing this at all*) to 4 (*I've been doing this a lot*). There are 14 subscales, each composed of two items, that comprise the BriefCOPE. These subscales include self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. The BriefCOPE is scored by only calculating total subscale scores. The full measure has demonstrated adequate reliability and validity (Litman, 2006), as well as internal consistency ( $\alpha = .50 - .84$ ; Carver, 1997).

Based on a review conducted by Landen and Wang (2010), in which the researchers consulted with first responders to identify the coping styles most relevant to the first responder

profession, six of the 14 BriefCOPE subscales were used for the present study. The six subscales represent three higher-order scales; the problem-focused coping scale is comprised of the *active coping* and *instrumental support* subscales, the adaptive emotion-focused coping scale is comprised of the *positive reinterpretation* and *humor* subscales, and the maladaptive emotion-focused coping subscale is comprised of the *denial* and *venting* subscales (Landen & Wang, 2010). These scales are consistent with prior factor analytic research that identified problem-focused coping, emotion-focused coping, and disengagement coping as predominant coping processes employed by first responders (Sattler et al., 2014). However, based on Lazarus and Folkman's (1984) argument that coping processes should not be conflated with their outcomes (i.e., "adaptive" and "maladaptive"), I choose to use the terminology of "emotional engagement coping" in place of adaptive emotion-focused coping and "emotional disengagement coping" in place of maladaptive emotion-focused coping. Each subscale was scored individually, with higher subscale scores representing greater use of those specific coping processes. The subscales have previously demonstrated adequate internal consistency among first responders ( $\alpha = .81$  for problem-focused coping,  $\alpha = .76$  for emotional engagement coping, and  $\alpha = .80$  for emotional disengagement coping; Landen & Wang, 2010). Internal consistency for the present study was  $\alpha = .85$  for problem-focused engagement coping,  $\alpha = .76$  for emotion-focused engagement coping, and  $\alpha = .66$  for disengagement coping.

### ***Posttraumatic cognitions***

The Posttraumatic Cognitions Inventory (PTCI; Foa et al., 1999) was used to investigate posttraumatic cognitions. The PTCI is a 36-item, self-report measure with item responses provided on a 7-point, Likert-type scale ranging from 1 (*totally disagree*) to 7 (*totally agree*). Foa and colleagues found that a three-factor structure was the best fit for the PTCI, which were

constructed of posttraumatic cognitions about the self (21 items), posttraumatic cognitions about the world (seven items), and self-blame (five items). However, Sexton and colleagues (2018) found that a four-factor structure proved a better fit. Further, three items are considered exploratory and are not included in scoring the PTCI (Foa et al., 1999). Average scores are created for each subscale, and these averages are summed to create a total score ranging from 33-231, with higher scores representing more severe posttraumatic cognitions. The PTCI has demonstrated acceptable reliability, with test-retest correlation coefficients ranging from  $r_s = .74$  to  $r_s = .85$  (Foa et al., 1999). The PTCI has also demonstrated adequate validity, with evidence suggesting strong convergent and divergent validity with other measures of posttraumatic stress, psychosocial functioning, and quality of life (Beck et al., 2004; Foa et al., 1999). The PTCI has also demonstrated adequate overall internal consistency ( $\alpha = .97$ ) as well as subscale internal consistency (Self  $\alpha = .97$ , World  $\alpha = .88$ , Self-Blame  $\alpha = .86$ ; Foa et al., 1999). Further, the PTCI has demonstrated adequate internal consistency within a sample of first responders ( $\alpha = .81 - .90$ ; Bryant et al., 2019). Internal consistency for the present study was  $\alpha = .94$  for the overall PTCI,  $\alpha = .93$  for the Self subscale,  $\alpha = .87$  for the World subscale, and  $\alpha = .69$  for the Self-Blame subscale.

## **Research Design**

This study used a non-experimental, cross-sectional research design using self-report data. These data were collected as part of a greater longitudinal survey in which first responders were queried at four timepoints evenly spaced over one year.

## **Procedure**

### ***Participant Recruitment***

Department chiefs from both departments sent recruitment emails to all members of their respective departments. Data were collected at three-month intervals over the course of one year. Data collection occurred during a window of approximately two-weeks for each time point, during which time the department chiefs sent periodic reminder emails. The emails described the study as “investigating the effects of a change in sleep schedules and resulting health behaviors” that sought to “add to the current understanding of some of the factors that make firefighter health stronger, as well as more vulnerable.” The email contained a survey link that directed interested first responders to an informed consent page. Informed consent delineated that participation in the study was voluntary, no compensation for participation would be provided, and that all responses were confidential and therefore had no influence on their employment status. After providing informed consent, interested first responders were asked to complete a survey comprised of demographic and self-report questions. The survey was estimated to take 45 minutes to complete. All study materials were approved by the Seattle Pacific University Institutional Review Board.

A total of  $n = 165$  participants participated in at least one wave of the study. By each wave,  $n = 129$  first responders participated at Time 1,  $n = 58$  participated at Time 2,  $n = 92$  participated at Time 3, and  $n = 55$  participated at Time 4. By each time point,  $n = 129$  new participants completed the survey at Time 1,  $n = 13$  new participants completed the survey at Time 2,  $n = 15$  new participants completed the survey at Time 3, and  $n = 8$  new participants completed the survey at Time 4. A cross-sectional dataset was then created by compiling each participant’s first survey response, totaling 165 participants.

### *Missing Data*

Missingness in the data was explored prior to any analyses. Based on the findings of Dong and Peng (2013), any participant with 20% missing data or more was deleted. This resulted in the deletion of 47 participants, resulting in a final sample size of  $N = 118$ . Initial investigation of the remaining missingness indicated that no participant had provided complete data with 4.9% of all cells containing missing data. However, upon examination of the data it appeared that a large proportion of this missingness was due to intentional missingness in the demographic variables. When investigating missingness among only the focal variables of the study, 88.13% of participants provided complete data with 0.2% of all cells containing missing data.

Patterns of missingness were explored using the mice (v.3.12.0; van Buuren & Groothuis-Oudshoorn, 2011) and Amelia (v. 1.7.6; Honaker et al., 2011) packages in R. Based on visual inspection, it appeared that a general pattern of missingness was present for the large majority of the data, with planned missingness for the military time variable (Enders, 2010). There is no functional R package to statistically test if the data were missing completely at random (MCAR), so this was not assessed. However, based on qualitative feedback received from members of the two departments who participated in the study, there is reason to suspect that the data may be missing not at random (MNAR), which is a pattern of missingness that suggests missingness on a specific variable is attributable to that variable itself. An example of this would be participants who are lower in resilience opting to discontinue the measure of resilience or study as a whole for reasons that are in some way related to their lower resilience. For the present study, a handful of first responders from one of the departments made comments suggesting that participants discontinued the survey because they did not feel the questions were as specific to the first responder experience as they expected. Based on qualitative experiences

with these first responders, it is possible that the first responders who opted to discontinue the survey were those who experienced higher posttraumatic cognitions and/or lower resilience, and that their elevated posttraumatic cognitions and/or lower resilience played a role in their frustration and choice to discontinue the survey. Alternatively, it could be that those with higher resilience perceived the survey as not relevant to them, as the survey was heavily oriented toward assessing psychological distress, and thus opted to discontinue the survey. Although there is no way to know definitively if either of these scenarios were the case, but if so this would suggest that the data are MNAR.

### **Statistical Suppression**

Statistical suppression may be quite common in psychological research but is often not recognized or is overlooked by researchers (Gutierrez & Cribbie, 2019). Traditional analyses of indirect effects make one assumption that is challenged by statistical suppression and relevant to my hypotheses; a significant indirect effect is traditionally inferred when the strength of the direct effect is weakened by the addition of the intermediary variable into the model (Baron & Kenny, 1986). Statistical suppression, which is often referred to as inconsistent mediation (MacKinnon et al., 2007), is evidenced when the addition of an intermediary variable results in the direct effect becoming stronger, not weaker, or when the estimates of direct and indirect effects have different signs (MacKinnon et al., 2000). In multiple mediation models, one or more intermediary variables may be acting as suppressors, but there can be any combination of suppressors and non-suppressors (MacKinnon et al., 2000). Interpreting the results when statistical suppression is present is no different than for indirect effect analyses in which suppression is not present (Ludlow & Klein, 2014), save for acknowledging that statistical suppression is present.

Importantly, this pattern of results could also result from the third variable being a confounding variable rather than a true intermediary, and this differentiation must be made based on theory as it cannot be distinguished statistically (MacKinnon et al., 2000). Coping and resilience theories identify an indirect pathway from appraisals to resilience through coping processes, and also emphasize that the efficacy of the coping processes employed are partially determinant in the outcome with some processes leading to increased resilience and others leading to decreased resilience. This is well-supported by the available literature, and thus I contend that the theory and literature support the hypothesis that suppression is present and, therefore, rules out the hypothesis that the third variable is acting as a confound.

### **Statistical Analyses**

The present study used a parallel multiple mediation analysis to investigate the indirect effects of posttraumatic cognitions on resilience through problem-focused, emotional engagement, and emotional disengagement coping processes. Parallel multiple mediation assumes that each intermediary variable is not causally related to the other intermediary variable, but that each intermediary variable indirectly affects the relationship between the predictor and outcome variable (Hayes, 2018). Importantly, parallel multiple mediation models test the indirect effect of each specific intermediary variable while controlling for the other intermediary variables. So, as one example from the present study, the parallel multiple mediation model tested the indirect effect of posttraumatic cognitions on resilience through emotional engagement coping while holding constant problem-focused and emotional disengagement coping. This is conceptually advantageous as each coping style does not occur orthogonally (Haselle et al., 2019); each responder uses each coping style to varying degrees along a continuum, so

controlling for the variance explained by the other coping styles allows for the model to test the unique indirect effect of each coping style.

A bootstrapped resampling procedure was employed to test the indirect effects. Bootstrapping uses the sample at hand as a representation of the population; it draws samples from the available data, tests the indirect effect in each sample, then places that sample back in the population before sampling again (Hayes, 2018). Bootstrapping uses a large number of samples to generate 95% confidence intervals for the indirect effect. Indirect effects are considered statistically significant if the 95% confidence interval does not contain a null value (Hayes, 2018). Bootstrapping is also robust to the assumption of a normal sampling distribution (Hayes, 2018), as well as more accurate statistical inferences with a small sample size (Fritz & Mackinnon, 2007). The present study used 5,000 bootstrapped resamples for all analyses.

All preparation and analyses were conducted using R (R Core Team, 2019). The lavaan package (v 0.6-7; Rosseel, 2012) was used to conduct all analyses. The lavaan package uses a maximum likelihood estimation approach, and thus path analysis was used to test the hypothesized model.

### **Sample Size, Power, and Precision**

Similar to OLS-based approaches, SEM-based approaches require that the model is adequately powered in order to accurately detect a specified effect (i.e., a regression coefficient that is significantly different from zero) (Wang & Rhemtulla, 2021). For path analytic approaches, statistical power is influenced by the size of the effect within the population, the sample size, the reliability of the measures used to measure the construct, and the number of variables modelled (Wang & Rhemtulla, 2021). Determining statistical power for SEM-based approaches has historically been imprecise and has often relied on rules of thumb for



determining sample size cutoffs. However, Wang and Rhemtulla recently published *pwrSEM*, a ShinyApp that allows researchers to specify their structural model, enter the estimated parameter values for the model, and conduct Monte Carlo simulation studies using differing sample sizes to determine the sample size needed in order to be adequately powered.

Regarding the *a*-paths, with coping processes regressed on posttraumatic cognitions, meta-analytic results found a large effect between emotional disengagement coping and posttraumatic stress, a small effect between problem-focused coping and posttraumatic stress, and no relationship between emotional engagement coping and posttraumatic stress (Littleton et al., 2007). Posttraumatic stress is known to be strongly related to posttraumatic cognitions, but Littleton and colleagues' study did not explicitly investigate the relationship between posttraumatic cognitions and coping processes. Sheerin and colleagues (2018a) identified small to medium correlations between the PTCI subscales and emotional disengagement coping, while the PTCI subscales were not significantly correlated with other coping processes. In the context of these findings, I conservatively anticipate a medium effect ( $r = .35$ ) for each *a*-path in the model.

For the *b*-paths, with resilience regressed on coping processes, the effects between coping processes and resilience are varied; for instance, one study identified a small effect between problem-focused coping and resilience (Anderson et al., 2020) while another found a large effect (Guo, 2019). Other studies have found small to medium effects among problem-focused and emotional engagement processes and resilience (McBride & Ireland, 2016; Séoud & Ducharme, 2015; Thompson et al., 2018). I elected to use the statistics from Séoud & Ducharme (2015) for the parameter estimates for emotion-focused and problem-focused engagement coping processes, as these processes were more clearly defined in their study, this study had the largest sample size

and was conducted with the most similar population to the population within the present study. Based on their findings, I used a parameter estimate of  $r = .55$  for emotion-focused engagement coping and  $r = .24$  for problem-focused engagement coping. For disengagement coping, Thompson and colleagues (2018) found that disengagement coping strategies were significantly associated with resilience among emergency room personnel, with correlations ranging from  $r = -.16$  to  $r = -.30$ . Based on the average correlation of the three disengagement processes measured in this study, I estimated the parameter to be  $r = -.22$ .

Finally, I relied on the statistics reported by Sexton and colleagues (2018) for the relationship between resilience and posttraumatic cognitions (*c*-path). This study found a correlation of  $r = -.65$  between posttraumatic cognitions and resilience, so a parameter estimate of  $r = -.65$  was used. Parameter estimates for the three specific indirect effects were calculated by multiplying the estimates for the specific *a*- and *b*-paths (i.e.,  $a1*b1$ ), and the parameter estimate for the total indirect effect was calculated by summing the estimates for the three specific indirect effects.

I then conducted the power analysis to determine the sample size needed to detect the specified effect sizes for the specific indirect effects and for the total indirect effect. A Type I Error rate of  $\alpha = .05$  was used for all power analyses. I conducted preliminary power analyses using only 100 simulations in order to find the approximate sample size needed to be adequately powered for all indirect effects. Based on the first power analysis, which estimated the power based on a sample size of  $n = 100$ , only the specific indirect effect for emotion-focused engagement coping was adequately powered (.92), while the other indirect effects were close to being adequately powered, ranging from .66 to .74. Results from the second power analysis, in which I used a sample size of  $n = 150$ , suggested that all indirect effects were adequately

powered, ranging from .93 to .99. Because the power analyses suggested that the study was close to adequately powered with a sample size of  $n = 100$ , I conducted a power analysis using the sample size for the present study,  $n = 117$ . Results from this analysis suggested that all indirect effects were adequately powered, ranging from .80 to .96.

To confirm that the sample for the present study was adequately powered, I then conducted one last analysis using the same sample size but with 1,000 simulations. This analysis suggested that all indirect effects were adequately powered. Specifically, the statistical power for the specific indirect effect with emotion-focused engagement coping was 0.97, the statistical power for the specific indirect effect with problem-focused engagement coping was 0.84, the statistical power for the specific indirect effect with disengagement coping was 0.80, and the statistical power for the total indirect effect was 0.83.

## **Chapter III: Results**

### **Outliers and Assumptions**

Mahalanobis distances were used to identify multivariate outliers. Based on a  $\chi^2$  distribution with a degrees of freedom of 9 (due to 9 columns of data used to determine the Mahalanobis distances), Mahalanobis distances greater than 27.88 were deemed to be outliers. Based on these criteria, one score was determined to be an outlier. When investigating the assumptions with and without the outlier, inclusion of the outlier caused the data to be significantly skewed and kurtotic whereas analyses without the outlier resulted in normal kurtosis but significant skew. Thus, the outlier was excluded from all analyses, resulting in a final sample size of  $N = 117$ .

Table 2

*Means, standard deviations, and correlations for all study variables.*

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10
1. Age	41.20	8.52										
2. Years of Service	17.95	9.16	.85**									
3. Years in Department	13.15	9.15	.80**	.89**								
4. Posttraumatic Cognitions	67.84	22.56	.13	.15	.18							
5. Negative Cognitions - Self	33.32	13.58	.09	.15	.14	.92**						
6. Negative Cognitions - World	20.64	8.31	.13	.12	.19	.80**	.56**					
7. Self-Blame	8.04	3.10	.20*	.09	.12	.64**	.55**	.39**				
8. PFC	9.37	3.15	-.26**	-.29**	-.25**	-.03	-.04	.03	-.09			
9. EFC	9.62	2.98	-.24*	-.29**	-.17	-.05	-.06	-.03	-.15	.57**		
10. DC	6.38	1.86	-.05	-.09	-.02	.16	.26**	.08	.04	.48**	.49**	
11. Resilience	78.42	11.68	-.14	-.19	-.16	-.57**	-.64**	-.36**	-.32**	.05	.15	-.23*

*Note.* *M* and *SD* are used to represent mean and standard deviation, respectively. EFC = Emotion-focused engagement coping; PFC = Problem-focused engagement coping; DC = Disengagement coping.

\* $p < .05$ ; \*\* $p < .01$ .

Maximum likelihood-based approaches assume (1) all observations in the model are independent, (2) there is multivariate normality within the data, (3) all predictors are independent of each other (i.e., no collinearity is present), and (4) the model is correctly specified. Since the data being used in this study is cross-sectional, the assumption that all observations are independent was likely met. The final assumption is theoretical in nature and therefore not able to be tested. Mardia's tests of multivariate skewness and kurtosis was used via the MVN (v. 5.8; Korkmaz et al., 2014) package in R. The null hypotheses of these tests are that of multivariate normality, so the data were deemed to be non-normal if either test was statistically significant. Mardia's kurtosis test indicated that the assumption of multivariate normality was met ( $p = .60$ ), but Mardia's skewness test suggested otherwise, as it indicated that the data were significantly skewed ( $p = .01$ ). The variance inflation factor (VIF) was used to test for collinearity among predictors, and predictors with a VIF greater than 10.00 were determined to be collinear (Kline, 2012). No predictors exceeded the cutoff. Based on the recommendations of Hancock and Liu (2012), a bootstrapped resampling procedure was used to address violating the multivariate normality assumption. Further, in instances where the  $p$ -value and bootstrapped 95% confidence interval contradicted each other, the bootstrapped confidence interval was used as bootstrapped confidence intervals are more robust to non-normality within the data as compared to  $p$ -values (Hayes, 2018).

## **Analyses**

### ***Descriptive Statistics and Preliminary Analyses***

Correlations among continuous descriptive variables, all model variables, and potential covariates are available in Table 2. In looking at the specific model variables, more severe posttraumatic cognitions were significantly associated with lower resilience. However,

posttraumatic cognitions were not significantly associated with any coping processes. All coping processes were positively related to each other with strong relationships between each, suggesting that participants who used one type of coping process tended to also use other types of coping processes. Resilience was significantly associated with disengagement coping such that higher resilience was associated with lower use of disengagement coping processes. Resilience was not significantly associated with either of the engagement coping processes.

### ***Primary Analyses***

The lavaan (v. 0.6-7; Rosseel, 2012) package was used to produce and test standardized path coefficients for the total effect, direct effect, total indirect effect, and specific indirect effects of the parallel indirect effect model. A full information maximum likelihood approach was used to address the remaining missingness within the data, and robust standard errors and 95% confidence intervals were generated using 5,000 bootstrapped resamples.

Standardized path coefficients and bootstrapped 95% confidence intervals from the path analysis are available in Table 3, and the theorized model with standardized coefficients is depicted in Figure 2. The analysis suggested that all the variables in the model explained 41.9% of the variance in resilience. The relationship between posttraumatic cognitions and resilience ( $c$ -path), was statistically significant,  $\beta = -.30$ ,  $p < .001$ , CI95[-0.37, -0.21], suggesting that more posttraumatic cognitions were associated with lower resilience, and this relationship remained statistically significant after controlling for all coping processes in the model ( $c'$ -path),  $\beta = -.26$ ,  $p < .001$ , CI95[-0.34, -0.18].

The total indirect effect was statistically significant, as the bootstrapped 95% confidence interval did not contain zero,  $\beta = -0.03$ ,  $p = .087$ , CI95[-0.08, -0.004]. This was consistent with

my hypothesis and suggested that, in general, coping processes indirectly influenced the relationship between posttraumatic cognitions and resilience.

Regarding the pathway from posttraumatic cognitions to resilience via disengagement coping, the specific indirect effect for disengagement coping was statistically significant as the bootstrapped 95% confidence interval did not contain zero,  $\beta = -0.025$ ,  $p = .170$ ,  $CI95[-0.08, -0.001]$ . The relationship between posttraumatic cognitions and disengagement coping (*a*-path) was not statistically significant, though a statistical trend was present,  $\beta = 0.02$ ,  $p = .063$ ,  $CI95[0.00, 0.34]$ . The relationship between disengagement coping and resilience (*b*-path) was statistically significant,  $\beta = -1.52$ ,  $p = .017$ ,  $CI95[-0.27, -0.21]$ , suggesting that using more disengagement coping processes were associated with lower resilience. In sum, these results provided support for my hypothesis that posttraumatic cognitions would be indirectly related to resilience via disengagement coping processes. However, this support is tentative given that *a*-path was not statistically significant.

Regarding the pathway from posttraumatic cognitions to resilience via problem-focused engagement coping, the specific indirect effect was not statistically significant,  $\beta = 0.00$ ,  $p = .989$ ,  $CI95[-0.01, 0.01]$ . The relationship between posttraumatic cognitions and problem-focused engagement coping (*a*-path) was not statistically significant,  $\beta = -0.001$ ,  $p = .971$ ,  $CI95[-0.03, 0.02]$ . Further, the relationship between problem-focused engagement coping and resilience (*b*-path) was not statistically significant,  $\beta = 0.15$ ,  $p = .693$ ,  $CI95[-0.58, 0.91]$ . These results did not provide support for my hypothesis that posttraumatic cognitions would be indirectly related to resilience via problem-focused coping processes.

Regarding the pathway from posttraumatic cognitions to resilience via emotion-focused engagement coping, the specific indirect effect was not statistically significant,  $\beta = -0.006$ ,  $p =$

.650, CI95[-0.40, 0.01]. The relationship between posttraumatic cognitions and emotion-focused engagement coping (*a*-path) was not statistically significant,  $\beta = -0.007$ ,  $p = .608$ , CI95[-0.03, 0.02]. However, the relationship between emotion-focused engagement coping and resilience (*b*-path) was statistically significant,  $\beta = 0.89$ ,  $p = .023$ , CI95[0.17, 1.74], suggesting that using more emotion-focused engagement coping processes was associated with higher resilience. However, these results did not provide support my hypothesis that posttraumatic cognitions would be indirectly related to resilience via emotion-focused coping processes.

Lastly, the hypothesis that statistical suppression would be present was not supported. The relationship between posttraumatic cognitions and resilience was not strengthened after controlling for coping processes. Moreover, there was no evidence that the direction of the indirect effects differed from the direction of the relationship between posttraumatic cognitions and resilience. Table 3 provides a summary of these pathways.

Table 3

*Direct, indirect, and total effects of posttraumatic cognitions on resilience through emotion-focused engagement coping (EFC), problem-focused engagement coping (PFC), and disengagement coping (DC).*

Effect	Standardized path coefficient ( $\beta$ ) and product			SE	<i>p</i>	95% CI		
						Lower	Upper	
PTC → EFC → RS	-0.007	*	0.885 =	-0.006	0.013	.650	-0.040	0.014
PTC → PFC → RS	-0.001	*	0.150 =	0.000	0.006	.989	-0.014	0.011
PTC → DC → RS	0.016	*	-1.523 =	-0.025	0.018	.170	-0.075	-0.001
Total indirect effect				-0.031	0.018	.082	-0.076	-0.004
Total effect of X on Y (c)				-0.295	0.043	< .001	-0.377	-0.210
Direct effect of X on Y (c')				-0.264	0.042	< .001	-0.341	-0.177

*Note.* PTC = Posttraumatic cognitions; EFC = Emotion-focused engagement coping; PFC = Problem-focused engagement coping; DC = Disengagement coping; RES = Resilience. The significance of the indirect effects was calculated with bias-corrected confidence intervals (.95) bootstrap analysis.



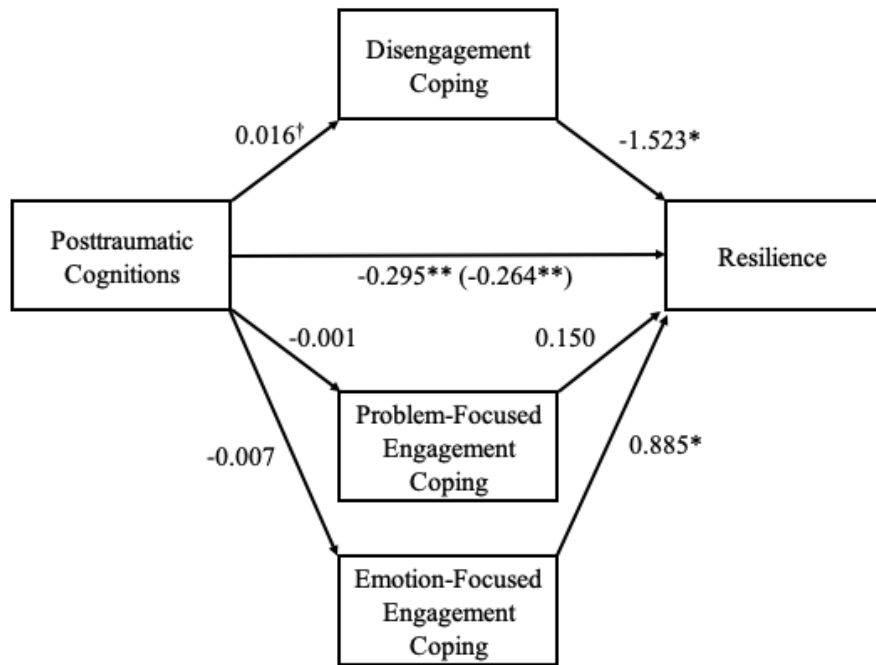


Figure 2. Theorized parallel indirect effect model with path coefficients.

Note. † $p > .05$  but CI95 does not contain zero, \* $p < .05$ , \*\* $p < .01$ .

**Post-Hoc Analyses**

**Simple mediation with disengagement coping.** A simple mediation analysis was conducted to further extricate the indirect relationship from posttraumatic cognitions to resilience via disengagement coping processes. This model explained 34.8% of the variance in resilience. In this model, more posttraumatic cognitions were significantly associated with lower resilience (*c*-path),  $\beta = -0.30, p < .001, CI95[-0.38, -0.21]$ , and were still significantly related to resilience after controlling for disengagement coping processes (*c'*-path),  $\beta = -0.29, p < .001, CI95[-0.37, -0.20]$ . Regarding the *a*-path, posttraumatic cognitions were significantly associated with disengagement coping processes,  $\beta = 0.02, p = .04, CI95[0.001, 0.03]$ . However, disengagement coping processes were not significantly related to resilience (*b*-path),  $\beta = -0.64, p = .225, CI95[-$

1.61, 0.43], and the indirect effect was not statistically significant,  $\beta = -0.01$ ,  $p = .343$ , CI95[-0.04, 0.01].

**Overall coping.** In adherence to the overall theoretical model being tested, in which posttraumatic cognitions contribute to resilience via coping processes, a simple indirect effect analysis was conducted investigating if more posttraumatic cognitions were associated with more overall use of coping processes, and if these overall coping processes consequently contributed to changes in resilience. All of the coping variables were strongly and positively correlated with each other (see Table 2). The total coping variable was created by calculating the sum of emotion-focused engagement coping, problem-focused engagement coping, and disengagement coping.

Results from this simple indirect effect analysis suggested that posttraumatic cognitions and coping explained 33.9% of the variance in resilience. More posttraumatic cognitions were again associated with lower resilience (c-path),  $\beta = -0.30$ ,  $p < .001$ , CI95 [-0.38, -0.21], and were associated with lower resilience after controlling for overall coping processes (c'-path),  $\beta = -.30$ ,  $p < .001$ , CI95[-0.38, -0.21]. Posttraumatic cognitions were not significantly associated with overall coping processes (a-path),  $b = 0.009$ ,  $p = .742$ , CI95[-0.04, 0.07], and overall coping processes were not significantly associated with resilience (b-path),  $\beta = 0.09$ ,  $p = .533$ , CI95[-0.19, 0.38]. Moreover, the indirect effect was not statistically significant,  $\beta = 0.00$ ,  $p = .869$ , CI95[-0.01, 0.02].

**Parallel indirect effects from negative cognitions about the self to resilience via coping processes.** For the last post-hoc test, the original theoretical model was maintained, but the predictor variable was changed from overall posttraumatic cognitions to posttraumatic cognitions about the self. This was conducted based on existing literature suggesting that the

negative cognitions about the self may uniquely discriminate those who meet criteria for a PTSD diagnosis and those who do not (Berzengi et al., 2017; Sheerin et al., 2018b), as well as the inverse relationship between PTSD symptoms and resilience (Hasselle et al., 2019; Wang et al., 2019). Thus, the purpose of this test was to explore if there was a relationship between negative cognitions about the self and resilience, and to test for the theorized indirect effects using this subscale of the PTCI.

This model explained 46.1% of the variance in resilience. The standardized path coefficients and bootstrapped 95% confidence intervals from this path analysis are available in Table 4. As with the hypothesized model, the relationship between negative cognitions about the self and resilience (*c*-path) was statistically significant,  $\beta = -0.55$ ,  $p < .001$ , CI95[-0.68, -0.41], and the strength of this relationship lessened with the inclusion of the different coping processes (*c'*-path) but remained statistically significant,  $\beta = -0.50$ ,  $p < .001$ , CI95[-0.63, -0.37]. Regarding the *a*-paths, more negative cognitions about the self were associated with greater use of disengagement coping processes,  $\beta = 0.04$ ,  $p = .006$ , CI95[0.01, 0.07]. No other *a*-paths were statistically significant. Regarding the *b*-paths, greater use of emotion-focused engagement coping processes was associated with higher resilience,  $\beta = 0.75$ ,  $p = .03$ , CI95[0.09, 1.47], but the relationship between disengagement coping processes and resilience was not statistically significant,  $\beta = -0.98$ ,  $p = .097$ , CI95[-2.03, 0.26]. The overall indirect effect for this model was not statistically significant,  $\beta = -0.05$ ,  $p = .13$ , CI95[-0.11, 0.01], and none of three specific indirect effects were statistically significant. In sum, this model provides no evidence suggesting that negative cognitions about the self indirectly affected resilience via coping processes.

Table 4

*Direct, indirect, and total effects of negative cognitions about the self through emotion-focused engagement coping (EFC), problem-focused engagement coping (PFC), and disengagement coping (DC).*

Effect	Standardized path coefficient ( $\beta$ ) and product			SE	<i>p</i>	95% CI		
						Lower	Upper	
NCS → EFC → RS	-0.010	*	0.747 =	-0.007	0.016	.658	-0.051	0.019
NCS → PFC → RS	-0.002	*	0.052 =	0.000	0.008	.992	-0.018	0.018
NCS → DC → RS	0.038	*	-0.977 =	-0.038	0.028	.176	-0.108	0.004
Total indirect effect				-0.045	0.030	.131	-0.109	0.007
Total effect of X on Y (c)				-0.549	0.069	< .001	-0.682	-0.410
Direct effect of X on Y (c')				-0.504	0.068	< .001	-0.634	-0.368

*Note.* NCS = Negative cognitions about the self; EFC = Emotion-focused engagement coping; PFC = Problem-focused engagement coping; DC = Disengagement coping; RES = Resilience. The significance of the indirect effects was calculated with bias-corrected confidence intervals (.95) bootstrap analysis.

#### Chapter IV: Discussion

The purpose of this study was to evaluate the theoretical model of resilience that was derived from Richardson's (1990, 2002) resilience theory and Lazarus and Folkman's (1984; 1987) transactional model of stress and coping. There were two primary hypotheses tested within the present study; first, it was hypothesized that more posttraumatic cognitions would be associated with lower resilience. And second, it was hypothesized that posttraumatic cognitions would be indirectly related to resilience via coping processes. Within this second hypothesis, it was expected that more posttraumatic cognitions would be associated with greater use of all coping processes (emotion-focused engagement coping, problem-focused engagement coping, and disengagement coping). It was also expected that greater use of the two engagement coping processes would be associated with higher resilience, while greater use of disengagement coping processes would be associated with decreased resilience. Overall, the findings from this study

provided limited statistical support for the theoretical model tested. The following sections will extrapolate on the findings related to each hypothesis, as well as the findings from the post-hoc tests that were conducted.

### **Comparing Resilience, Coping, and Posttraumatic Cognitions Across Studies**

First, it is worth highlighting that first responders reported high resilience within the present study. Based on the means and standard deviations from the present study, first responders reported resilience comparable to (Straud et al., 2018; Wild et al., 2016) or higher than (Lee et al., 2014) other studies of first responders. First responders in the present study also reported similar levels to resilience to other trauma-exposed populations, such as military personnel (Sheerin et al., 2018b) and those with a spinal cord or traumatic brain injury (Simpson et al., 2020). Moreover, first responders in the present study reported higher resilience compared to groups known to be at risk for greater PTSD symptom severity, including sexual assault survivors (Hirai et al., 2020) and military personnel seeking treatment for PTSD (McGuire et al., 2018). Finally, resilience in the present study was comparable to resilience among a large community sample (Connor & Davidson, 2003). The findings from the present study provide further support for the notion that resilience is prevalent among first responders even though they are frequently exposed to stressors and PTEs.

Building off of Richardson and colleagues' (Richardson, 2002; Richardson et al., 1990) resilience theory, the high resilience reported by first responders in the present study also suggests that first responders may be especially skilled at coping with the stressors and PTEs that they experience. The means and standard deviations for the coping variables in the present study indicate that first responders in the present sample used problem- and emotion-focused engagement coping processes to a moderate or large degree and reported using disengagement

coping processes to a notable degree as well, albeit less than the engagement coping processes. Further, all coping processes were significantly and positively correlated with each other. First responders in the present study appear to have relied more on all coping processes than some first responders in other studies (Sattler et al., 2014), but less so than other samples of first responders (Landen & Wang, 2010). The present sample also employed each of the measured coping processes to a similar degree as a sample of active-duty military personnel and veterans (Rice & Liu, 2016). Although it is difficult to cleanly compare coping processes across studies given differences in how the coping subscales are comprised and scored, it is evident that first responders in the present study were employing all coping processes to a relatively high degree. This is again congruent with first responders' frequent exposure to PTEs, as well as Lazarus and Folkman's (1984; 1987) transactional model of stress and coping; the high degree of coping observed in the sample is likely indicative that first responders in the present study were actively coping with some form of stressor.

Unlike resilience and coping processes, first responders in the present study reported notably lower posttraumatic cognitions compared to other samples of first responders. For instance, Bryant and colleagues (2019) found that posttraumatic cognitions were, on average, almost double what the first responders reported in the present sample. It is worth noting that this study was specifically following first responders diagnosed with and receiving treatment for PTSD, which may explain why posttraumatic cognitions were as severe as they were. Conversely, in a study that sampled first responders more broadly, Bryant and Guthrie (2007) found that posttraumatic cognitions in their sample were comparable, if not less severe, on average compared to the present sample, though first responders in this sample had only been working as a first responder for three to four years. Taken together these findings suggest that

posttraumatic cognitions may increase over the course of first responders' careers, but also that posttraumatic cognitions may not be as relevant for first responders not diagnosed with PTSD. In the context of the present study, it may be that, in general, posttraumatic cognitions were not the stressor driving coping processes. This notion is further supported by the fact that none of bivariate relationships between total posttraumatic cognitions and coping processes were statistically significant. Within the present sample it may be that specific work-related factors such as stress responses to specific PTEs or critical incidents contributed first responders' increased coping processes more so than posttraumatic cognitions.

### **Hypothesis 1**

As expected, more posttraumatic cognitions were associated with less resilience in the present study. This hypothesis was supported through both correlational and path analytic findings. To my knowledge this is the first study to investigate the relationship between posttraumatic cognitions and resilience beyond reporting correlations, as well as the first to do so among first responders. Further, this finding is consistent with prior research indicating a strong, inverse relationship between PTSD symptoms and resilience (Hasselle et al., 2019), as well as the strong, negative correlation between posttraumatic cognitions and resilience observed by Sexton and colleagues (2018).

The strength and robust nature of the posttraumatic cognitions-resilience relationship is congruent with both coping and resilience theories. Posttraumatic cognitions, which are by definition negatively valenced global appraisals (as opposed to situation-specific appraisals), provide an indication of how negatively a person views themselves, the world, and those around them. Based on either the social psychology principle of the self-fulfilling prophecy or the core model of cognitive-behavioral therapy, in which thoughts are believed to lead to feelings, which

lead to a behavior, the resulting action of these beliefs is likely to be one of disengagement or withdrawal rather than engagement. For instance, if someone does not trust themselves to do the right thing, they are likely to withdraw or avoid. It is well known that avoidance not only perpetuates posttraumatic distress (e.g., Badour et al., 2012; Lissek & van Meurs, 2015; Thompson & Waltz, 2010), but also does not afford the individual the opportunity to challenge their existing beliefs or facilitate new, more adaptive beliefs (Blakey & Abramowitz, 2016; Lissek & van Meurs, 2015; Lovibond et al., 2009).

Resilience, in contrast to posttraumatic cognitions, is evidenced by positively valenced appraisals, specifically related to one's own ability to cope. The cognitive triad and self-fulfilling prophecy would suggest that the resulting action of these positively valenced beliefs would be to engage with the situation at hand. This engagement would in turn provide further evidence supporting beliefs of efficacy, competence, and resilience. In sum, it may be that posttraumatic cognitions represent beliefs that are antithetical to that of resilience, and that the downstream consequences of these beliefs provide evidence confirming the belief itself.

Results from the present study also suggested that the model including negative cognitions about the self explained more of the variance in resilience than did the model containing overall posttraumatic cognitions. Research among other trauma-exposed populations has indicated that negative cognitions about the self may be especially consequential for PTSD symptoms; negative cognitions about the self differentiated those who meet full criteria for a PTSD diagnosis from those who did not in a study of Muslim trauma survivors (Berzengi et al., 2017), and only negative cognitions about the self predicted a PTSD diagnosis among veterans (Sheerin et al., 2018a). This same relationship has also been identified within first responders, as Bryant and Guthrie (2007) found that negative cognitions about the self during training was the



only significant predictor of PTSD symptomology four years later. In the context of resilience, prior research has found that more positive cognitions about the self, as well as about others and the world, were associated with greater resilience (Mak et al., 2011).

It is also possible that the strength of relationship between posttraumatic cognitions and resilience is due to characteristics that are unique to the first responder profession and experiences. Based on existing literature, it seems that first responders generally tend to report elevated posttraumatic cognitions (Bryant & Guthrie, 2007; Bryant et al., 2019). Moreover, first responders are repeatedly exposed to PTEs that have the potential to reinforce these posttraumatic cognitions, and that these PTEs will occur throughout their career. It would make sense that, in response to repeatedly experiencing PTEs and critical incidents, first responders would slowly begin to change the way in which they view the world, others, and themselves. In fact, the theoretical model of PTSD underlying Cognitive Processing Therapy suggests that “overaccommodation,” or overly changing one’s beliefs in order to reconcile dissonance between the traumatic event and their preexisting beliefs, is one factor that contributes to developing and sustaining PTSD symptoms (Resick et al., 2016). To provide a relevant example for first responders, overaccommodation may manifest as initially believing that the world is generally safe place, but after responding to many unpredictable or entirely random accidents and deaths, the responder alters their belief to the opposite extreme— that the world is generally dangerous and very few safe places exist – in order to make sense of their many experiences with these accidents and deaths. Thus, although emotion-focused, problem-focused, and disengagement coping processes have been found to be especially relevant to first responders (Sattler et al., 2014), it could be that the global and persistent nature of the PTEs make it such that the engagement coping processes are less effective, but disengagement coping is more effective.

## **Hypothesis 2**

The second hypothesis, which theorized that posttraumatic cognitions would indirectly affect resilience through emotion-focused engagement coping, problem-focused engagement coping, and disengagement coping, received partial support. Only the specific indirect effect from posttraumatic cognitions to resilience via disengagement coping processes was statistically significant, and no statistical suppression was observed.

### ***Disengagement coping processes versus engagement coping processes***

One question that arises from the overall pattern of results is why the indirect effect involving disengagement coping processes was statistically significant but the indirect effects involving the engagement coping processes were not statistically significant. One potential explanation for this stems from the functional approach to coping processes. That is, Lazarus and Folkman (1984, 1987) posited that the function of emotion-focused coping processes is to mitigate the emotional response to the stressor at hand, whereas the function of problem-focused coping processes is to mitigate the stressor itself or other external consequences of the stressor. However, given the research that supporting categorizing coping processes into engagement and disengagement processes (Hasselle et al., 2019; Litman, 2006; Nielsen & Knardahl, 2014), the question must then be raised of how engagement and disengagement processes differ in their intended functionality. There is some evidence that, in general, greater use of engagement coping processes were associated with more sense of control while disengagement coping processes were associated with less sense of control (Dijkstra & Homan, 2016). Further, greater perceived stressfulness of situations was associated with greater use of disengagement coping processes among military personnel (Kulenović & Buško, 2006) and Italian police officers (Maran et al., 2015). Among first responders specifically, greater exposure to stress was strongly associated

greater use of disengagement coping processes and was also associated with decreased use of engagement coping processes (Arble & Arnetz, 2017).

These findings provide evidence supporting the notion that engagement coping processes may be employed to a greater degree in relation to stressors that are perceived as more controllable, whereas disengagement strategies may be employed to a greater degree in relation to stressors that are perceived as less controllable. Further, there is compelling evidence suggesting that chronic or more global stressors are more difficult to cope with and have more severe physical and psychological consequences than are short term, identifiable stressors (Hammen et al., 2009; Serido et al., 2004; Yaribeygi et al., 2017), including among emergency medical responders (van der Ploeg & Kleber, 2003). Thus, it may be that disengagement coping processes may become more functional or more heavily relied upon in the face of global, chronic, and/or unmanageable stressors.

The construct of posttraumatic cognitions represents global appraisals such as “I am a weak person”, “the world is a dangerous place,” and “I have no future” (Foa et al., 1999). From a cognitive-behavioral perspective, these global, negative cognitions may lead to feelings of hopelessness and powerlessness, which in turn may lead to behavioral reactions of disengagement. Consequently, disengagement from the stressor may then confirm the extant beliefs and does not allow the individual to grow in their belief that they are able to effectively cope. In the context of resilience theory (Richardson, 2002; Richardson et al., 1990), this would suggest that disengagement coping would then inhibit resilience processes. Thus, returning to the question of why the indirect relationship from posttraumatic cognitions to resilience via disengagement coping was statistically significant but the others were not, it could be that disengagement coping processes are more commonly employed in response to posttraumatic

cognitions, which are by definition global appraisals as opposed to situation-specific appraisals. In contrast, engagement processes may be more heavily employed in relation to situation-specific appraisals.

Disengagement coping processes may also be especially relevant to the first responder profession. Extending from the literature suggesting that global or chronic stressors are more challenging to cope with, one could argue that the PTEs and critical incidents that first responders are exposed to could be considered chronic. The individual events themselves are acute, but critical incidents will continue to happen over the course of one's career, thus adding a degree of chronicity. Further, van den Ploeg and colleagues (2003) found that both acute stressors, defined as critical incidents, and chronic stressors such as poor communication, high emotional demands, and lack of support from peers or supervisors were longitudinally associated with increased PTSD symptom severity, burnout, and fatigue. Moreover, a large sample of Swedish emergency responders found that higher stress exposure was associated with using more disengagement coping process (Arble & Arnetz, 2017). It could be that the frequent exposure to PTEs, as well as additional job-related chronic stressors, may be perceived as uncontrollable, thus resulting in greater reliance on disengagement coping processes compared to other coping processes and consequently lower resilience.

### ***Reconsidering the model specification***

Although it is plausible that disengagement coping processes are especially relevant to consider in relation to both posttraumatic cognitions and resilience, the lack of significant indirect effects involving the problem- and emotion-focused engagement coping processes could have alternate explanations. One simple explanation for this could be that the specific model tested was been misidentified. That is, it could be that the underlying theoretical model is flawed,

or alternatively, it is possible that the underlying theoretical model is true but that the misidentification is the result of using the wrong variables in this study.

When considering the theoretical model underlying the present study, it may be that posttraumatic cognitions represent too global of stressor appraisals. As previously discussed, the global nature of posttraumatic cognitions may be more closely related to disengagement coping processes. In contrast, investigating situation-specific appraisals may provide more clear and accurate insight into the relationship between stressor appraisals, coping processes, and resilience. For first responders specifically, it might be fruitful to investigate the relationship between the perceived stressfulness of different critical incidents and coping processes.

Alternatively, coping self-efficacy, or self-efficacy more broadly, may be a cognitive appraisal that is more relevant to resilience than posttraumatic cognitions. In general, self-efficacy is defined as one's appraisal of their own abilities (Bandura, 1982), and coping self-efficacy is one's appraisal specifically of their own abilities to cope with different stressors (Chesney et al., 2006). In contrast, coping processes are the actual actions taken in response to the stressors (Lazarus & Folkman, 1984). Although self-efficacy is not directly aligned with the theoretical model underlying this study in that it is not a direct stressor-related appraisal, the conceptual link between self-efficacy and resilience is clear, and there is strong empirical evidence for this relationship as well. For instance, Jaeschke (2016) found that the combination of coping self-efficacy and optimism explained nearly 60% of the variance in resilience within a military sample, while others have found strong relationships between general self-efficacy and resilience (Anderson et al., 2020; Bhattarai et al., 2021). There is certainly an argument to be made for coping self-efficacy to replace coping processes, but this is less aligned with the theoretical model given that coping self-efficacy is by definition an appraisal. Additionally, there

is strong evidence that coping self-efficacy may strongly influence coping processes, both directly (Nicholls et al., 2010) and indirectly (Delahaij & Van Dam, 2017), which provides further support for using coping self-efficacy as the appraisal variable in the model and exploring how coping self-efficacy is associated with coping processes.

Similarly, it may be that coping flexibility, defined as one's ability to flexibly employ different coping processes in response to the idiographic needs of a stressor (Bonanno et al., 2011), may be a better fit as the coping variable in the model than coping behaviors. There is evidence that coping flexibility differentiated college students who experienced low and stable PTSD symptom severity following a PTE (defined as resilience in this study) from students who experienced a high degree of distress and students who recovered from high degrees of distress (Galatzer-Levy et al., 2012). Although it appears that no study to date has investigated the relationship between coping flexibility and an explicit measure of resilience, Galatzer-Levy and colleagues' study provides compelling enough evidence to warrant further investigation into this relationship.

### ***Emotion-focused engagement coping and resilience***

Another notable finding from the present study was the strong, positive relationship between emotion-focused engagement coping and resilience. There is currently a dearth of literature investigating the relationship between emotion-focused engagement coping and resilience, and therefore this finding helps support the limited existing research that has identified this relationship (e.g., McBride & Ireland, 2006; Séoud & Ducharme, 2015).

This finding is especially interesting for first responders, given that burnout can be especially high among first responders (Boland et al., 2018; Popa et al., 2010), and one key component of burnout is emotional exhaustion, or feeling emotionally depleted to the point of no

longer being able to emotionally engage (Maslach et al., 1986). Moreover, multiple studies have identified an inverse relationship between burnout and resilience (e.g., Burnett & Wahl, 2015; Lee et al., 2019; West et al., 2020), with one study finding that higher resilience was most strongly associated with lower emotional exhaustion (West et al., 2020). Although these studies are cross-sectional in design and causality cannot be inferred, these studies do provide an indication that there is an important interplay between burnout and resilience that may be especially important to consider when working with first responders.

### **Post-Hoc Tests**

#### ***Indirect effect with disengagement coping and overall coping***

It was surprising that the parallel indirect effect from posttraumatic cognitions to resilience via disengagement coping was not statistically significant when removing the engagement coping processes from the model. However, this may be indicative of the nuance of coping processes. There is a strong theoretical and empirical argument for the notion that *all* coping processes increase in response to increased stress (e.g., Hasselle et al., 2019; Lazarus & Folkman, 1984), and the present study also found that all coping processes were positively correlated with each other. Moreover, the theoretical model underlying this study suggested that the pattern of results would be different for disengagement coping processes compared to the two engagement coping processes. Because all coping processes increase with increased stress, but the subsequent outcomes may differ by the specific coping processes employed, it could be that there is overlapping variance across all of the coping processes that was “muddying” the effect of disengagement coping processes within this specific model. The primary analyses from the study further support this hypothesis, as parallel indirect effect models control for the effects of the other intermediary variables in the model when testing the specific indirect effects. In sum, it

seems likely that the significant indirect effect from posttraumatic cognitions to resilience via disengagement coping processes identified in the parallel indirect effect model more accurately depicts the relationship than does this post-hoc test because the parallel indirect effect model accounts for the shared variance across the different coping processes.

A similar rationale could also explain the lack of significance for the indirect effect model investigating overall coping as the intermediary variable. Because this model looks at the overall use of coping processes rather than the unique contributions of each individual coping process, it could be that the unique contributions of each coping process are getting lost in the shared variance across the coping processes. In other words, although evidence for statistical suppression was not present in the current study, it seems possible that statistical suppression could explain the lack of significant indirect effects for the post-hoc models involving disengagement coping processes and overall coping processes.

### ***Negative cognitions about the self, coping processes, and resilience***

Much like the finding that more posttraumatic cognitions were associated with lower resilience in the primary analyses, to my knowledge this study is the first to explore the relationship between negative cognitions about the self and resilience. Paralleling the results from the primary analysis, more negative cognitions about the self were associated with lower resilience. Much like the results from the primary analysis, this finding builds off of current PTSD literature, as this body of work provides evidence that negative cognitions about the self may be uniquely predictive of PTSD symptom severity and PTSD diagnosis (Berzengi et al., 2017; Sheerin et al., 2018a). Moreover, the pattern of results from this post-hoc parallel indirect effect model was quite similar to the pattern of results from the primary analysis. In general, the same pathways from the primary analysis held in the post-hoc model, although there were



discrepancies in the significance levels of the pathways (i.e., the relationship between disengagement coping and resilience was significant in the theorized model but only approaching statistical significance in the post-hoc model).

The most notable discrepancies between the two models were that the total indirect effect was not statistically significant in the post-hoc model, nor was the specific indirect effect involving disengagement coping processes. Although some of this discrepancy may be attributable to a smaller sample size and potentially underestimating the statistical power of the model, or due to the sub-optimal internal consistency of the disengagement coping scale (see the Limitations section for a further discussion of this), it nonetheless surprising especially given that this model explained more variance in resilience than did the theorized model and that, of the PTCI subscales, only negative cognitions about the self was significantly correlated with disengagement coping. In a study of how posttraumatic cognitions and coping behaviors affecting risk for a PTSD diagnosis, Sheerin and colleagues (2018b) found that, of all the coping processes investigated, greater use of avoidant coping processes was the only coping process associated with increased risk for a PTSD diagnosis. However, avoidant coping was no longer associated with increased risk for PTSD after adding the PTCI subscales into the model, and negative cognitions about the self was the only PTCI subscale that was significantly associated with increased odds of a PTSD diagnosis. Thus, given the strength and robust nature of the relationship between negative cognitions about the self and odds of a PTSD diagnosis, as well as the inverse relationship between PTSD symptoms and resilience (Hasselle et al., 2019; Wang et al., 2019), it is possible that the strength of relationship between negative cognitions about the self and resilience is robust to the effects of coping processes, especially disengagement or avoidant coping.

### **Theoretical and Clinical Considerations**

The present study has numerous implications for both resilience theory, as well as for clinical work with first responders. From a theoretical perspective, it is worth noting that a large portion of the empirical literature investigating to date has investigated resilience among those who have experienced either the loss of a loved one or a traumatic event (e.g., Bonanno et al., 2006, 2007; Bonanno et al., 2011; Coifman et al., 2007; deRoon-Cassini et al., 2010; Mancini et al., 2015). However, in many of these studies the large majority of the sample has endorsed the loss of a loved one as their most traumatic event (e.g., Bonanno et al., 2011; Coifman et al., 2007; Mancini et al., 2015). These studies have provided important contributions to the resilience literature, and in fact many of these studies were used in the justification of the present study, but it is worth considering how the perceived stressfulness of the traumatic event affects the processes that lead to resilience or to psychological distress. In fact, this is directly aligned with the dose-response relationship between stressor appraisal and coping proposed by Lazarus and Folkman (1984) and empirically supported by Hasselle and colleagues (2019). Moreover, in addition to evidence suggesting that the severity of PTSD symptoms may depend on the type of trauma one experiences (Guina et al., 2018), there is evidence suggesting that experiencing the death of a loved one was not associated with increased risk of PTSD diagnosis (Hyland et al., 2017), though other research provides evidence to the contrary (Kessler et al., 2017). Thus, although the evidence here is mixed, it could be that the aforementioned studies conducted by Bonanno and colleagues have only investigated lower-level stressors and their impacts on resilience. Regardless of this potential critique of Bonanno and colleagues' studies, the current evidence provides credence to the notion that the type of stressor or trauma experienced may have some influence on PTSD symptoms. Extending from this, it seems plausible that the trauma

type may also be relevant to resilience, but further research is needed to further understand this relationship.

These studies, as well as Hasselle and colleagues' (2019) study, also suggest the possibility of a curvilinear relationship between the stressfulness of the traumatic event and resilience such that the more stressful a situation is perceived may lead to adaptive outcomes, such as increased resilience, up until a certain threshold, at which point the situation becomes too stressful and psychological distress begins to override the system. Multiple studies have identified a curvilinear relationship between PTSD symptoms and posttraumatic growth (e.g., Kleim & Ehlers, 2009; Kroo & Nagy, 2011), and other studies have identified a strong relationship between posttraumatic growth and resilience (Mahdi et al., 2014). If a curvilinear relationship does indeed exist between PTEs and resilience, then it is possible that first responders in general, and specifically the first responders in this study, fall on the back end of the curve given their frequent exposure to PTEs. Further, a curvilinear relationship between PTEs and resilience would be largely consistent with both Lazarus & Folkman's (1984) transactional model of stress and coping, as well as Richardson's (1990, 2002) meta-theory of resilience.

Clinically, the results of this study provide further support for the prevalence of posttraumatic cognitions within the first responder profession. Consistent with past research (Bryant et al., 2019), this study suggests that first responders may experience elevated posttraumatic cognitions. It is worth noting, however, that the average posttraumatic cognitions in the present study was notably lower than that found by Bryant and colleagues, though their study was explicitly investigating with a diagnosis of PTSD. Although posttraumatic cognitions could be elevated for any number of reasons, it is impossible to divorce the elevated

posttraumatic cognitions among first responders with their frequent exposure to PTEs. Thus, this finding provides further evidence for the importance of providing first responders with adequate supports that help them cope with the psychological consequences of their job. The present study cannot draw causal inferences about the relationship between posttraumatic cognitions and resilience but based on the strong inverse relationship between posttraumatic cognitions and resilience it is reasonable to conclude that providing first responders with evidence-based treatments that have demonstrated efficacy in addressing posttraumatic cognitions will likely have some benefit for first responders' resilience.

The indirect relationship from posttraumatic cognitions to resilience via disengagement coping processes also provides clinical guidance for working with first responders. Although the directionality of this relationship is still in question, interventions that simultaneously address posttraumatic cognitions and disengagement coping processes such as avoidance and substance use may be efficacious for first responders. Further, the positive relationship between emotion-focused engagement coping processes and resilience suggests that interventions that promote emotion-focused engagement coping may also have positive benefit for first responders' resilience. These strategies may be especially relevant for first responders as many of the stressors they encounter are not problems to be solved and therefore problem-focused strategies may not be as effective. Providing first responders with emotion-focused coping processes may provide them with a more diverse coping "tool kit" and therefore increase their coping flexibility, which has previously been associated with higher resilience (Galatzer-Levy et al., 2012).

The findings of the present study also highlight possible impact posttraumatic cognitions may have on resilience outside of the first responder population. The present study identified a

strong, negative relationship between posttraumatic cognitions and resilience even though posttraumatic cognitions for this sample were not as severe as have been observed in samples comprised of those diagnosed with PTSD (e.g., Bryant et al., 2019; Jessup et al., 2020). It is worth considering how the relationship between posttraumatic cognitions and resilience may be relevant to populations of trauma survivors who tend to experience more severe posttraumatic cognitions, such as sexual assault survivors (Jessup et al., 2020), gender and sexual minority individuals (Banerjee et al., 2018; Dworkin et al., 2018), and refugees or displaced persons (Dolezal et al., 2021; van Heemstra et al., 2020). It is especially important to consider how minority and underrepresented groups may be disproportionately exposed to PTEs (e.g., Alegría et al., 2013; Andersen & Blosnich, 2013), thus increasing their risk for posttraumatic cognitions. Given the identified relationship between posttraumatic cognitions and resilience within this study, this would suggest that minority or underrepresented individuals may be disproportionately at risk for lower resilience compared to their non-minority peers. There are now numerous efforts to ensure that minority or underrepresented individuals receive adequate posttraumatic care that is equal to that of their non-minority peers, but it is imperative to ensure that efforts focused on promoting resilience also explicitly investigate and seek to promote health, recovery, and resilience among minority or underrepresented communities.

### **Limitations**

The most notable limitations of the present study are statistical in nature. First, although power analyses suggested the parallel indirect effect model was adequately powered, it is possible that the parameter estimates used overestimated the actual strength of each indirect effect. This possibility is made more probable given the dearth of literature in this area. As a result, it is possible that the lack of statistical significance for many of the theorized relationships

is the result of lacking adequate power to detect effects that are indeed present. Further, if the statistical suppression that was hypothesized is indeed present within the population, there is evidence suggesting that more statistical power is needed to detect suppression effects (Muniz, 2020). Alternatively, the lack of statistically significant indirect effects could be partially attributable to the lower internal consistency values for emotion-focused engagement coping and for disengagement coping. Broadly, it could be that these subscales of the BriefCOPE do not perform as well with first responders, especially given that Landen and Wang (2010) found the same internal consistency for the emotion-focused engagement coping subscale as was found in the present study. However, the internal consistency for the disengagement coping subscale in the present study diverged from Landen and Wang's findings such that the internal consistency was notably lower for the present study. This is especially relevant to consider given that the only significant indirect effect in this study involved disengagement coping processes, which had the lowest internal consistency of all coping process scales. Thus, the significant indirect effect might be more attributable to the poor internal consistency than an actual indirect effect.

Second, based on qualitative feedback that I received from the department membership, some of the missing data may be MNAR. Specifically, there was some indication that responders opted to discontinue or not participate altogether because the survey was not as specific to the first responder experience as they expected, and it may be that this choice was in some way related to these responders being lower or higher in resilience than their peers. If this is indeed the case, there is the possibility that the data collected for this study may not be fully reflective of posttraumatic, coping, or resilience processes within first responders. Because of both of these limitations it is important to interpret the findings of this study with caution, and most

importantly this study needs to be repeated with a larger sample size and data that is not suspected of housing MNAR missingness.

Procedurally, this study is limited by using a cross-sectional, rather than longitudinal, research methodology. Although the cross-sectional approach is advantageous in helping to identify possible longitudinal relationships, the directionality of these relationships cannot be known. Thus, no causal inferences can be drawn from the present study. Moreover, longitudinal research designs are especially advantageous in extricating indirect pathways, and because of this future research should test the theoretical model that underlies the present study but instead employ a longitudinal design.

From a theoretical perspective, the major limitation to this study is that neither the theorized model nor the post-hoc model provided an adequate fit to the data. Importantly, this lack of fit could be due to the statistical limitations discussed above, but it is also possible that the theoretical model does not accurately reflect the pathway(s) to resilience, or that the specific constructs selected for the model were misspecified. Before concrete conclusions are drawn about the accuracy of the theoretical model or specific constructs used here it is important to replicate this study with an adequately powered sample. If the theorized relationships still lack statistical significance in that study, then it is worth considering new constructs, especially for the cognitive appraisal variable.

## **Conclusions**

Resilience is a construct that is garnering growing interest, both empirically and clinically, as the field of psychology is continuing to recognize that resilience promotes recovery and psychological health in the posttraumatic environment. With this recognition in mind, it is imperative to further our understanding of the factors that contribute to and influence resilience.

Resilience is especially important to consider for first responders given their continuous exposure to PTEs and the subsequent potential for adverse psychological reactions. Moreover, this frequent and continuous exposure to PTEs makes first responders an ideal population among which to investigate resilience, as they are regularly presented with the opportunity to cope with these stressors.

The present study tested a theoretical model of resilience based on prominent resilience and coping theories but did not find support for the theorized relationships between posttraumatic cognitions, coping processes, and resilience. Although the theoretical model was not supported statistically, it is possible and indeed quite likely that the model was misspecified. That is, it may be more appropriate to investigate situation-specific cognitive appraisals such as how stressful first responders perceived different critical incidents, in place of posttraumatic cognitions, which represent global cognitive appraisals. It is also important to consider the role of self-efficacy and how one's appraisal of their own abilities may contribute to changes in resilience. Alternatively, given the significant and robust relationship identified between posttraumatic cognitions and resilience, it is worth considering alternate intermediary variables that might mediate this relationship. The results from this study suggest that disengagement coping processes warrant further investigation, but alternate coping-related constructs such as coping flexibility or coping self-efficacy may be especially salient.

With all of this said, this study does help further our understand of first responders' psychological functioning. First, and most importantly, this was the first study to explicitly investigate resilience among first responders and highlighted the prevalence of resilience, at least within this sample. Second, to my knowledge this study was the first to explicitly investigate the



relationship between posttraumatic cognitions and resilience and provided compelling evidence that this relationship is quite strong.

The potential consequences of trauma are immense, especially for those who are likely to experience trauma as a result of their duties. These populations include, but are certainly not limited to, first responders, military personnel, and disaster aid workers. The sacrifice of these groups is immeasurable, and we are in debt to these groups because of the sacrifices they make in service to our society. The field of psychology can do our part in caring for these individuals by continuing our pursuit of how to best treat posttraumatic responses. Resilience is a construct that continues to show promise in this area and furthering our understanding of resilience will only help the field of psychology to better understand how to care for the psychological wounds of trauma and contribute to preventative models of PTSD.

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