Examining the Relationships between Traumatic Events, Coping Strategies, and Hyperarousal among First Responders

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Police officers experience a significant number of traumatic events, or critical incidents, as a result of their occupation. Exposure to traumatic events can leave police officers susceptible to unfavorable physical, psychological, and behavioral outcomes that can impact their quality of life and ability to effectively complete job-related tasks. One of these outcomes is Post-Traumatic Stress Disorder (PTSD). PTSD is derived of four symptom clusters: re-experiencing, negative mood alterations, avoidance, and hyperarousal. The symptoms of hyperarousal include jumpiness, issues with concentration, aggression and irritability, hypervigilance, sleep issues, and risky behavior. The hyperarousal symptom cluster is particularly important to consider among this population due to the effects that these symptoms can have on the ability to properly and safely assess a crisis situation. This dissertation examines the relationship between the hyperarousal sub-scale of Post-Traumatic Stress Disorder, traumatic events, and coping mechanisms among a sample of law enforcement officers. Multiple regression analyses were used to examine these relationships. Structural Equation Modeling was used to investigate whether coping mechanisms mediated the relationship between traumatic events and hyperarousal. Results indicated that traumatic events were significantly associated with hyperarousal (β=0.14, p= 0.02) and the dysfunctional coping mechanism scale (β=0.58, p= 0.00). Of the critical incidents, use of force had a significant inverse association with hyperarousal (B=-0.09, p=0.00). Being involved in a situation in which one felt that their life was threatened was positively associated with increased hyperarousal (B=0.09, p=0.00). Being involved in a life-threatening situation was positively

associated with increased hyperarousal [$B = 0.09$, $p = .00$]. Coping mechanisms did not mediate the relationship between traumatic events and hyperarousal among this sample. Preventative interventions could benefit this population in managing stress-related outcomes related to their occupation.

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1.0 Problem and Significance

In 2019 there were over 813,000 sworn police officers in the United States, and that number is expected to steadily rise to over 860,000 by 2026 (Bureau of Labor Statistics, 2021). Police work is an inherently stressful occupation, leaving police officers susceptible to long-term physical and psychological distress (Violanti, 2006). The occupational demands of policing have been associated with high rates of burnout, suicide, alcohol and substance use, cardiac disease, lower life expectancy, and excessive use of force related to stress (Cross & Ashley, 2004; Gershon, 2000; Kop, Euwema, & Schaufeli, 1999; Paton, Violanti, Burke, & Gehrke, 2009). In addition to the physical and behavioral effects, stress can have adverse effects on the mental health of police officers and is associated with high rates of depression, somatization, anxiety, and Post Traumatic Stress Disorder (PTSD) (Gershon et al., 2009; Martinussen et al., 2007).

Due to the nature of policing, law enforcement officers are repeatedly exposed to a variety of stressors on a regular basis (Chopko, Palmieri, & Adams, 2015; Violanti et al., 2016; Weiss et al., 2010). One type of stressor experienced by law enforcement is the exposure to critical incidents, or traumatic events, that are unforeseen and disturbing (Clark-Miller & Brady, 2013; Ménard & Arter, 2013). Critical incidents that frequently occur among police include automobile accidents and chases, managing incidents of domestic violence, assault, a direct threat with a weapon, witnessing and handling dead bodies, and facing unknown, threatening individuals (Chopko, Palmieri, & Adams, 2015; Violanti et al., 2016; Weiss et al., 2010). There is evidence that critical incident stress can have longstanding effects on police, as officers report intense, powerful memories of critical incidents over 20 years following event exposure (Karlsson & Christianson, 2003). Coping mechanisms can mediate the relationships between stressors and

adverse outcomes. Past research has found that police officers utilize maladaptive coping mechanisms to manage critical incident stressors, placing them at greater risk of developing adverse mental health outcomes (Haisch & Meyers, 2004; Pasillas, Follette, & Perumean-Chaney, 2006).

Critical incident exposure can leave police officers susceptible to unfavorable physical, psychological, and behavioral outcomes that can impact their quality of life and ability to effectively complete job-related tasks, like PTSD (Gershon, Barocas, Canton, Li, & Vlahov, 2009; Martinussen, Richardsen, & Burke, 2007). The prevalence of PTSD among the general population is 8.3% (Kilpatrick et al., 2013). Police officers experience a lifetime prevalence of PTSD at 15% for male officers and 18.2% for female officers following traumatic event exposure (Hartley et al., 2013).

PTSD consists of four distinct symptom clusters, re-experiencing, avoidance, negative mood alterations, and hyperarousal (American Psychological Association, 2013). Re-experiencing is expressed through intrusive, distressing thoughts or dreams related to a traumatic experience (American Psychological Association, 2013). Avoidance consists of evading stimuli, including people and places, related to the traumatic event (American Psychological Association, 2013). Detachment from others, lack of interest in activities, negative emotional state, and distorted ideas of the traumatic event are symptoms of negative mood alterations (American Psychological Association, 2013).

The symptoms associated with hyperarousal symptoms are irritable or aggressive behavior, self-destructive or reckless behavior, hypervigilance, exaggerated startle response, issues with concentration, and sleep disturbances (American Psychological Association, 2013). The hyperarousal symptom cluster is a predictor of suicidal ideation (Suris, Link-Malcolm, & North,

2011) and aggression among veteran populations (Taft et al., 2007). Hyperarousal can also result in irrational or impulsive decision-making processes. (Paton et al., 1999) Hyperarousal is associated with excessive physiological arousals like increased heart rate and blood pressure (Cohen et al., 1997). These behavioral and physiological symptoms can influence everyday functioning and negatively affect job performance and the ability to complete daily tasks effectively. This is especially important to consider among police officers because they have significant contact with citizens, specifically those from marginalized populations. They are the only civilian occupation that carries a firearm, which emphasizes the importance of their ability to properly assess and respond to crisis situations.

Psychological impairment may compromise an officer's ability to complete occupational requirements as job responsibilities include the evaluation of potentially dangerous situations and the determination of the safest response. Police are faced with the stress of making critical decisions in dangerous situations (Waters & Ussery, 2007). Police officers are frequently called upon for assistance with the de-escalation of conflicts and are expected to remain calm and resolve issues, which assumes the absence of cognitive or mental deficits (Pinals & Price, 2010). Additionally, policing is an occupation of high personal discretion and low visibility (Smith & Visher, 1981) which creates an atmosphere that relies on the absence of functioning impairments as the results of psychological impairments could lead to impulsive, hypervigilant, overly-aggressive, or hesitated responses and could result in citizens or officers being harmed.

Understanding how law enforcement officers are influenced by exposure to critical incidents and the potential adverse outcomes related to these stressors could inform research on hyperarousal and assist in developing interventions to buffer stress-related outcomes. Past research has examined the prevalence of PTSD among law enforcement but rarely investigated the

relationships between hyperarousal symptom-cluster severity, critical incidents, and coping mechanisms. This dissertation will examine these relationships among a sample of police officers from Richmond, Virginia.

1.1 Relevance to Social Work

Police stress is an important issue to consider among social work research due its mental health and societal implications. Social workers play a vital role in assisting with mental health treatment and advocacy (Bureau of Labor Statistics, 2021). It is well-established that police officers face deleterious mental health effects that can impact their well-being, the well-being of their families, and the safety of the community at large.

Police come into contact with 44 million citizens per year (Hyland, Langton, & Davis, 2018), and approximately 2% of interactions result in use of force incidents (Eith & Durose, 2011). Use of force incidents can have substantial impacts on communities that extend past the individuals directly affected. The excessive use of force by police disproportionately affects people of color (Edwards, Lee, & Esposito, 2019). Police misconduct can negatively affect public perception regarding the legitimacy of police, and when misconduct and excessive use of force is directed toward a specific population, such as historically marginalized groups, resulting in negative attitudes about the police (Bayley, 2002; Jackson et al., 2013). The legitimacy of police and other government agencies is questioned when the treatment of minority populations is clearly differential, and it is not being adequately addressed.

Police misconduct can influence public cooperation with police and the law in general (Bayley, 2002). Public cooperation is crucial to policing as cooperation is expressed through

complying with the law, relying on the police for assistance, and assisting and engaging the police in solving crimes (Tyler & Fagan, 2008). Strong evidence associates police legitimacy, rather than the fear of punishment, to compliance with the law (Tyler, 2006). Legitimacy pertains to the presumption that authority figures determine what behaviors are deemed right or wrong in any given situation. Higher levels of police legitimacy are associated with higher levels of citizen cooperation and lower levels of criminality (Tyler, Fagan, & Geller, 2014). Thus, the legitimacy of police has an impact on the safety of the public. Citizen interactions with police determine individuals' overarching views of law and influence their perceptions of policing and compliance. The legitimacy of policing is linked to citizen respect to police authority during interactions, acceptance of police work as efficient means of reducing crime, and compliance and cooperation with police authority (Jackson et al., 2013; Tyler, Lind, & Huo, 2002; Schulhofer, 2011).

Police officers have significant contacts with marginalized populations, and these interactions could be influenced by an officer's well-being or psychological distress. However, there is a lack of social work research focusing on the stress faced by police officers. There is some existing research from psychology and criminal justice perspectives suggesting that stress is correlated with higher rates of violence, anger, depersonalization, and hypervigilance in the absence of threat, which is concerning amongst this population because of the access and authority they have to marginalized groups (Chemtob, Novaco, Hamada, Gross, & Smith, 1997; Orth & Weiland, 2006; Paton & Smith, 1999). Additional research is necessary to make the connection between stressors faced by police and psychological and behavioral outcomes that could negatively affect their personal lives, health, and ability to interact with citizens.

It should be noted that public distrust and negative perceptions of police can have historical roots and are not solely based on police behavior. Past police tactics like broken windows policing and racial profiling affected public opinion and public willingness to utilize the services of police (Steverson, 2008). Police involvement in historical injustices, specifically those in which groups were attempting to attain equal rights, such as the Civil Rights and Labor movements, have contributed to community distrust of police (Brewer, Wilford, Guelke, Hume, & Moxon-Browne, 2016). Police participation in attacks and the perpetuation of repression on striking workers and minority citizens hoping to obtain fundamental rights granted to White citizens have had consequences for policing that have been maintained over time (Brewer et al., 2016). While there are historical and systemic reasons for public perceptions of police, police behavior, particularly misconduct, remains a significant predictor of dissatisfaction with police (Weitzer & Tuch, 2005; Nix & Pickett, 2017). Modern policing is not without its faults, and police misconduct is a barrier to current positive police-citizen interactions.

While there are likely many structural, societal, and bias-related reasons for harmful interactions between police and citizens. There is also the potential that the psychological distress of police officers could have some impact on the likelihood that police engage in misconduct or interactions that can be perceived unfavorably by citizens. For this purpose, stress responses among police should be considered a factor that could affect police behavior. This dissertation could provide insight into the effects of occupational stressors that can influence how police interact with citizens and identify which types of stressors correlate with the severity of hyperarousal.

1.2 Overview of The Study

The purpose of this study was to better understand the relationships between critical incidents and hyperarousal among a sample of police officers. The study also examined whether coping mechanisms mediated the relationships between critical incidents and hyperarousal.

Utilizing a cross sectional survey design, 260 law enforcement officers employed in the Richmond Police Department were recruited to participate in this study. All participants were administered a survey with measures of: 1) symptoms of hyperarousal, including hypervigilance, anger and irritability, problems with concentration, sleep issues, and risky behavior 2) a measure assessing the frequency of exposure to critical incidents 3) coping mechanisms utilized when stressed 4) demographic characteristics.

The findings of this study will provide researchers with a more comprehensive understanding of how exposure to specific events can influence the severity of hyperarousal symptoms and assess the role of coping in the relationship. The implications of this research can be used to improve interventions for populations that experience traumatic events on a regular basis, like first responders and police.

1.2.1 Research Questions and Rationale

To date, several studies have contributed to uncovering the relationships between the exposure of traumatic events and PTSD, but several gaps remain. Previous studies have focused on PTSD as an outcome of trauma exposure but have not focused on hyperarousal as an independent outcome. Though hyperarousal is one cluster of many symptoms, it should be considered an important outcome to research due to the debilitating effects of hyperarousal

symptoms. There is some existing evidence that hyperarousal is the driving symptom in the relationship between PTSD and aggression (Paton et al., 1999). Due to the relationship between hyperarousal and aggression, poor decision making, and impulsive behavior, it should be considered independent of the other PTSD symptom clusters.

Police officers serve as an ideal sample population for this study due to the frequency and variation of exposure to critical incidents. Police officers have significant contact with citizens as part of their work, and it is crucial to consider the effects of critical incidents on their mental health. Further, few studies in the United States have investigated coping skills utilized by police officers. This study also seeks to examine the mediating effects of coping skills on the relationships between critical incidents and hyperarousal which can aid in developing interventions among police officers and, potentially, other traumatized populations. In order to investigate these relationships, the current study was created in collaboration with the Richmond Police Department in Virginia. This study seeks to investigate the following research questions and test the corresponding hypotheses:

Research Question #1: What is the relationship between the severity of hyperarousal, critical incidents, and coping mechanisms among law enforcement officers?

Past research has indicated that worsened PTSD symptoms have been associated with a higher frequency of traumatic event exposure, in this case, critical incident exposure faced by police while on-duty (Green et al., 2000; Schnurr et al., 2002). It is assumed that the more frequently an individual experiences critical incidents, the more severe hyperarousal symptoms. The relationship between coping and hyperarousal will also be explored. Problem-focused coping can serve as a buffer to mental health symptoms, like PTSD, but the relationship between problem-focused coping and hyperarousal has not been explored. Additionally, dysfunctional and emotion-focused coping mechanisms have been associated with an increase in the likelihood of mental

health symptoms (Snyder & Pulvers, 2001). Control variables will be included in the analysis in order to explore their potential role in the relationships.

There is some evidence that minority officers and female officers experience increased PTSD symptomology compared to their White and male counterparts. It is assumed that the longer an officer has been employed, they will experience more exposure to traumatic workplace events. Therefore, years on the force serves as a way to measure cumulative trauma and it is expected that the longer an individual is employed, the more likely they will experience hyperarousal symptoms. Military history also serves as a way to measure cumulative trauma, because it is assumed individuals with military history will have more experiences of traumatic events than individuals without military history. The inclusion of rank and age are exploratory in nature

Past research has indicated a relationship between the cumulative effects of exposure to traumatic events, in this case, critical incidents and PTSD symptomology (Paton et al., 2009). Little research has examined the cumulative effects of workplace trauma among police and the potential behavioral dysfunction associated with hyperarousal. It has also been noted that law enforcement tend to utilize dysfunctional coping mechanisms. This analysis will explore these relationships.

Research Question #2: Does the type of critical incident stressor contribute to hyperarousal symptom severity?

Critical incidents related to personal threats have resulted in more severe symptoms of PTSD (Carlier et al., 1997; Marmar et al., 2006). Incidents in which officers have experienced secondary trauma have also been noted to be considerably distressing (Violanti et al., 2016). No research has examined the role of specific critical incidents related to hyperarousal as an outcome. Due to the frequency of critical incidents that are considered secondary trauma and critical

incidents in which the police officer is put in danger, these relationships should be explored to gain a complete understanding of the mental health risk involved with critical incident exposure.

Research Question #3: Do coping mechanisms mediate the relationship between critical incident exposure and hyperarousal symptom severity*?*

Coping mechanisms have been found to significantly impact mental health outcomes following stressors, with coping mechanisms that are considered to be maladaptive resulting in increased mental health outcomes (Pearlin & Schooler, 1978). Problem-focused coping mechanisms have been found to mediate the relationship between stress and adverse mental health outcomes. Investigating the mediating role of coping mechanisms can provide insight regarding how coping influences hyperarousal among police officers.

1.2.2 Conclusion

To date, several studies have contributed to uncovering the relationships between the exposure of traumatic events and PTSD, but several gaps still remain. Previous studies have focused on PTSD as an outcome of trauma exposure but have not focused on hyperarousal as an independent outcome. Though hyperarousal is one cluster of many symptoms, it should be considered important outcome to research due to the debilitating effects of hyperarousal symptoms. There is some existing evidence that hyperarousal is the driving symptom in the relationship between PTSD and aggression (Paton et al., 1999). Due to the relationship between hyperarousal and aggression, poor decision making, and impulsive behavior, it should be considered independent of the other PTSD symptom clusters.

This chapter provided an introduction to the importance of investigating hyperarousal among police officers. Police officers serve as an ideal sample population for this study due to the

frequency and variation of exposure to critical incidents. Police officers have significant contact with citizens as part of their work, and it is crucial to consider the effects of critical incidents on their mental health. Further, few studies in the United States have investigated coping skills utilized by police officers. This study also seeks to examine the mediating effects of coping skills on the relationships between critical incidents and hyperarousal which can aid in developing interventions among police officers and, potentially, other traumatized populations.

2.0 Review of the Literature

This chapter will present a review of the literature on critical incidents. The review will summarize health-related outcomes of critical incident stress, the mental health effects of different types of critical incidents, and the cumulative effects of stressors on an individual. A brief overview of the current diagnostic measure of PTSD and hyperarousal will be presented, emphasizing the importance of investigating hyperarousal and an outcome independent of other symptoms of PTSD. Stress and coping theory and General Strain Theory will be introduced to provide a better understanding of the relationships between critical incidents, hyperarousal, and coping mechanisms.

2.1 Prevalence of Critical Incidents

Occupational stress that occurs in law enforcement includes critical incidents, or adverse events, in the workplace. Critical incidents occur frequently and are considered an integral aspect of working in law enforcement, as police tend to take the role of first responders in emergency situations (Weinberg & Gil, 2016). In addition to the frequency of traumatic events, police experience an extensive diversity of traumatic events associated with the occupation. Exposure to multiple traumatic events is concerning as research indicates that posttraumatic outcomes increase in severity if an individual experiences cumulative traumas (Green et al., 2000; Schnurr et al., 2002; Turner & Lloyd, 1995).

Research regarding the frequency of traumatic event exposure among police varies depending on the city population, characteristics of the department, and methods utilized to obtain the frequency. However, it is well-established that the frequency of critical incident exposure among police is much greater than the general population. Police officers witness more traumatic events in one month than the average American citizen witnesses in their lifetime (Violanti, 1996). Police officers experience an average of over three traumatic incidents for every six months employed on the force (Patterson, 2001). Critical incidents affect police officers despite the setting of the department, as rural and urban police both face similar stressors. Officers from large, urban departments reported experiencing an average of 168 traumatic events throughout the course of their careers (Weiss et al., 2010), and police from small, rural agencies experienced an average of 188 critical incidents during their careers (Chopko & Schwartz, 2012). The extent of traumatic event exposure in rural settings is particularly concerning as officers in rural settings typically have fewer resources available for mental wellness and stress management (Oliver, 2004).

In addition to the frequency and diversity of critical incidents, traumatic event exposure is experienced in a unique way among police officers (Chopko & Schwartz, 2012). The sporadic nature of experiencing frequent traumatic events followed by long periods of calm has been found to worsen the anticipation of stressors, resulting in increased severity of stress-related outcomes (Kitaeff, 2011). Additionally, the experience of police varies from any most other trauma-affected groups because they are likely to experience threats and violence directed toward themselves and are exposed to secondary trauma (Chopko & Schwartz, 2012). There is some evidence that specific critical incident types are more likely to put an individual at risk for developing PTSD.

2.1.1 Critical Incident Type and the Development of Traumatic Stress

Multiple factors contribute to the development of PTSD, including traumatic incident type, frequency of exposure to traumatic events, and severity of exposure (Norris, 1992). Due to the importance of an individual's perception of a stressor to the development of PTSD, some research has sought to determine the types of traumatic events that are perceived by officers to be the most stressful. Following the same methodology for both urban and rural police, the frequency of exposure and perception of stress severity of 34 traumatic events were examined using the Critical Incident History Questionnaire (Chopko, Palmieri, & Adams, 2015; Weiss et al., 2010). Among both large, urban and small, rural police departments, the most severe critical incidents were related to causing harm or death to another officer and the least severe event was exposure to a dead body (Chopko, Palmieri, & Adams, 2015; Weiss et al., 2010) Some research suggests that exposure to beaten or dead children is the considered the most stressful event for both male and female officers (Violanti et al., 2016). Some stressors occur infrequently, but are considered extremely distressing among police, such as killing someone in the line of duty or the death of a fellow officer in the line of duty (Violanti et al., 2016).

2.1.2 Critical Incidents that Pose a Personal Threat

Traumatic stress reactions are not homogenous, as officers who experience the same critical incident can exhibit variability in psychological responses (Violanti, Paton, & Dunning, 2000). While the individual perception of a traumatic event is highly influential in the development of associated stress symptoms (Weinberg & Gil, 2016), there is some evidence that the type of critical incident could result in varying severity of symptom development (Janoff-Bulman, 2010).

The perception of intense personal threat is associated with increased severity of post-traumatic stress symptoms among the general population (Keinan, Shrira, & Shmotkin, 2012) and law enforcement (Carlier et al., 1997; Marmar et al., 2006). Additionally, the severity of the attack, perception of intent to harm, and perception of animosity toward police has been significantly related to a diagnosis of PTSD (Ellrich & Baier, 2017). The relationship between personal threat or attack and post-traumatic stress symptom development is especially concerning due to the frequency that officers experience this type of stressor. Officers experience personal threat at high rates, as approximately 16% of police officers have reported experiencing a serious assault at work (Weiss et al., 2010), and over 66% of officers have experienced direct life threat during the first 3 years on the police force (Komarovskaya et al., 2011). Despite evidence of increased symptom severity related to the experience of feeling threatened or violently attacked, there is a lack of research examining the effects of violent assault among this population. Little research has focused on the psychological sequelae associated with events characterized by police officers as particularly traumatic.

2.1.3 Critical Incidents Involving Harming Others

Utilizing force that results in the injury or death of a citizen could contribute to traumatic stress symptoms. Nearly 10% of police reported killing or injuring others in the line of duty within their first three years of service (Komarovskaya et al., 2011) and approximately 25% of police officers reported injuring or killing another person at least once in the line of duty (Weiss et al., 2010). Causing fatal harm to another individual was significantly associated with the development of PTSD, even when controlling for age, gender, race, and the perception of direct life threat (Komarovskaya et al., 2011). The reason for this association is not entirely clear and there is a

possibility that multiple pathways exist in the relationship between harming another person and trauma. It has been theorized that feelings of guilt related to causing harm to another person is associated with intensified PTSD symptoms (Lee, Scragg, & Turner, 2001). But it has also possible that, among police officers, the consequences of harming others, including internal investigations and potential attention from the public and the media related to these incidents could intensify the relationship due to moral injury or causing an officer to relive the incident.

2.1.4 Secondary Trauma

Individuals in occupations that require them to help citizens are at risk for secondary trauma. A plethora of research investigating secondary trauma among social workers, nurses, and physicians exists. However, little research has examined the relationship between secondary trauma and mental health outcomes among the law enforcement population. Secondary trauma is defined as the emotions and behaviors that result from interacting with victims or individuals who have experienced a traumatic event (Figley, 1995; Violanti & Gehrke, 2004). The symptoms of secondary trauma are similar to those of PTSD (Baird & Kracen. 2006). Secondary trauma is considered significantly distressing for police, particularly if police are exposed to abused, injured, or murdered law enforcement officers (Violanti et al., 2016). Types of trauma exposure could potentially affect the development of hyperarousal, but research also suggests that the compounding exposure to traumatic events could also result in PTSD symptoms.

2.1.5 Cumulative Critical Incident Exposure

Most police officers remain in the field for 20-25 years, during which exposure to critical incidents can accumulate over time and create increased severity and susceptibility to stress-related outcomes (Paton et al., 2009). Despite the frequency of this exposure, police officers do not become desensitized to traumatic experiences over time (Papazoglou, 2013). The occupational expectation is that the officers are trained to remain calm and stoic in high-stress situations (Goldfarb & Aumiller, 2008). The emotional restraint necessary to maintain the role of the authority figure in crisis situations could take a toll on an individual's ability to process trauma and effectively cope with stress.

The risk of PTSD development increases with the number of traumatic events experienced (Neuner et al., 2004). Research has found that increased risk of the development of PTSD is associated with the cumulative effects of both traumatic events and non-traumatic stressors (Rubin, Berstsen, & Bohni, 2008; Szabo, Warnecke, Newton, & Valentine, 2017). However, the current conceptualization of PTSD in the DSM relies on one specific traumatic event. The DSM has been criticized for its conceptualization of trauma as a diagnosis that is dependent on exposure to a single traumatic event, as it fails to consider the cumulative effects of repeated traumatic event exposure (Goral, Lahad, & Aharanson-Daniel, 2017). The cumulative effects of ongoing exposure to traumatic events are associated with symptoms building over a period of time. While the symptoms of ongoing exposure are similar to those of a single event, they appear to be more pronounced (Goral, Lahad, Aharanson-Daniel, 2017). The nature of traumatic events experienced by police appears to be cumulative, as police officers over the age of 50 had a 40% higher prevalence of PTSD than officers under the age of 40 (Darensburg et al., 2006).

2.2 Overview of PTSD

Per the DSM-5, an individual must meet the required criterion and experience a specified number of symptoms among four symptoms clusters (American Psychiatric Association, 2013). Criterion A is required and states that an individual must have experienced exposure to an event involving or threatening death, injury, or sexual violence either through directly experiencing, witnessing, discovering a family member or friend experienced the event, or through work-related extreme exposure to details of the traumatic event, specifically among police officers and first responders. (American Psychiatric Association, 2013). Per the definition of traumatic event exposure in the DSM, many duty-related critical incidents that law enforcement officers experience meet the criteria of Criterion A.

The presence of a set of symptoms, or symptom clusters, is required for a diagnosis of PTSD. The symptom clusters are intrusion (Cluster B), avoidance (Cluster C), negative cognitive and mood alterations (Cluster D), and alterations in arousal and reactivity (Cluster E). Only symptoms that persist for a duration longer than one month after the traumatic event meet the criteria of PTSD (American Psychological Association, 2013). Symptoms lasting longer than one month, but less than three months are defined as acute; whereas symptoms lasting longer than three months are considered chronic (DSM-5, American Psychiatric Association, 2013). As previously stated, for the purposes of this paper, I will focus on research regarding the hyperarousal symptom cluster due to the potential effects on citizen interactions.

2.2.1 Hyperarousal Symptom Cluster

Criterion E, or arousal and reactivity changes following traumatic event exposure can be expressed through hypervigilance, difficulty concentrating, sleep issues, risky behavior, and aggression (DSM-5, American Psychiatric Association, 2013). Hyperarousal can result in physiological effects including an increased heart rate at rest (Cohen et al., 1997). Hypervigilant and aggressive behavior and can lead individuals to have no discernable baseline of calm despite the absence of threat (Paton et al., 1999). Individuals experiencing hypervigilance have difficulty maintaining a calm presence and lack the ability to participate in rational decision making (Paton et al., 1999). These individuals are prone to an increased tendency to take rapid actions rather than engaging in thoughtful analysis of a situation (Paton et al., 1999). Hypervigilance in a police officer could be beneficial in the presence of an actual threat in the environment. However, in the absence of a threat, a hypervigilant police officer could act in an aggressive manner in an unwarranted, innocuous situation. Additionally, individuals with PTSD are likely to be more impulsive and less inhibited in their aggression due to information processing factors (Chemtob et al., 1997).

There is some evidence that the PTSD symptom cluster hyperarousal is associated with the perpetration of violence and aggression among military samples (Savarese, Suvak, King, & King, 2001; Taft et al., 2007). The hyperarousal symptom cluster is associated with increased physiological responses to stimuli related to past traumas (Cohen et al., 1997) and innocuous stressors such as medical appointments (Gerardi, Keane, Cahoon, & Klauminzer, 1994). In addition to the negative effects of hyperarousal, there is evidence that hyperarousal symptom severity is a predictor of all symptom-cluster severity, indicating individuals with hyperarousal symptom severity likely experience more severe symptoms associated with intrusion, avoidance, and mood alterations (Schell, Marshall, & Jaycox, 2004).

2.2.2 Anticipatory Stage of Trauma

Individuals with a diagnosis of PTSD experience increased impairment related to the anticipatory stage of trauma (Grillon et al., 2009). Traumatic events, for the general population, are typically unpredictable. However, police experience the anticipation of trauma associated with their field of work, as it is widely acknowledged that exposure to a traumatic event exposure is prevalent and frequently remains unreported and unresolved (Paton & Smith, 1999; Van der Kolk, 1996). Simply the knowledge of potential critical incident exposure can result in a stress reaction for police, and for those with an untreated diagnosis of PTSD, the anticipatory response can result in more harmful stress responses during the anticipatory stage. The anticipation of traumatic events is associated with poor decision-making processes (Starcke, Wolf, Markowitsch, & Brand, 2008). Further, the anticipation of a stressor can cause a minor traumatic stress reaction (Kiser et al., 1993).

2.2.3 Comorbidity

PTSD frequently co-occurs with other mental and physical health conditions. Psychiatric morbidity can worsen following exposure to a traumatic event (Tak, Driscoll, Bernard, & West, 2007). Traumatic stress is associated with increased depression among police (Wang et al., 2010). Magruder et al. (2005) found that 87% of veterans with a diagnosis of PTSD were diagnosed with a co-occurring mood, anxiety, or substance abuse disorder. Additionally, there are significant physical symptoms comorbid with PTSD (Kessler, 1995; 2005) which leads to an increase in medical service utilization (Stein et al., 2000). Further, recently traumatized individuals are more likely to present at a medical provider than a mental health specialist (Kimerling & Calhoun, 1994).

The relationship between the presentation of medical symptoms and traumatic stress is important to acknowledge as an individual might present with physical symptoms prior to the personal acknowledgment of PTSD, especially among police who tend to deny mental health deficits.

2.2.4 Attention Bias to Threat

The hyperarousal symptom cluster is associated with symptoms that can affect an individual's ability to properly assess and respond to threatening situations, including attention bias (Ashley, Honzel, Larsen, Justus, & Swick, 2013). Effective response to threat is a necessity of policing, as police officers are frequently exposed to danger. Attention bias is a processing abnormality that occurs in individuals with anxiety disorders, including Post Traumatic Stress Disorder. During the early stages of threat detection, individuals with PTSD process information with a bias towards threat, resulting in an automatic, hypervigilant response that is maladaptive in the absence of actual risk (Williams et al., 1988). In later stages of threat detection, when strategic processing is beneficial, attention bias is focused away from threat, which can result in the minimization of threatening stimuli for the purposes of anxiety reduction. There is currently a lack of research regarding the police population and attention bias. However, due to the prevalence of PTSD and associated symptomology that can affect the assessment of dangerous situations, it should be assumed that police officers are impacted by attention bias.

2.2.5 Delayed Onset PTSD

PTSD responses can have a delayed onset, which can result in the failure of a traumatized individual to seek mental health support due to a lack of symptoms following traumatic event

exposure. This is important to acknowledge among the police population, as officers and administrative staff should attend to the mental health needs of all officers following critical incidents, even if they are not reporting PTSD symptomology. Further, an officer might not relate the symptoms of PTSD to a critical incident that occurred more than 3 months prior. While there is little research regarding the delayed onset of symptoms among police, among Vietnam veterans the onset of psychiatric symptoms related to PTSD occurred an average of 1.34 years following their deployment to Vietnam, with 40% of soldiers having a 2-year onset of symptoms (Schnurr et al., 2003). Rates and severity of PTSD appear to increase over time, which indicates that interventions for police should occur following the traumatic event exposure regardless of the presence of symptoms (Gray, Bolton, & Litz, 2004).

2.2.6 Partial PTSD

Subsyndromal, or partial PTSD, does not meet full diagnostic criteria of PTSD. However, partial PTSD is more prevalent than full PTSD among police and can be equally as debilitating (Carlier et al., 1997). Partial PTSD occurs in approximately 34% of trauma-exposed police officers (Carlier et al., 1997). Partial PTSD is more greatly associated with comorbid disorders than PTSD that meets full diagnostic criteria (Piertzak et al., 2012). Individuals with partial PTSD report functional impairment similar to individuals with full PTSD (Zlotnick et al., 2002), and suffer from the same comorbidity (Fetzner, McMillan, & Asmundson, 2012). Individuals with partial PTSD have 11 times the chance of developing delayed-onset PTSD (Smid, Mooren, van der Mast, Gersons, & Kleber, 2009). For this purpose, research should focus on PTSD symptoms rather than a full diagnosis.

2.2.7 Anger and Hyperarousal

Anger is included in the hyperarousal symptom cluster, though the presence of anger is not necessary for a diagnosis of PTSD. Little research among police officers has examined the relationship between hyperarousal and anger, as most of this research has focused on military veterans. However, both veteran and law enforcement populations share similar experiences with traumatic event exposure as both populations are likely to be exposed to recurrent traumatic events over long durations of time and experience personal violence and threat as a common traumatic event type. There is a significant association between PTSD severity and anger among Vietnam veterans (Novaco & Chemtob, 2002). Anger is considered a central component of combat trauma among Vietnam veterans with PTSD (Novaco & Chemtob, 2002). Anger, aggression, and hostility are elevated in veterans with both full PTSD and subthreshold PTSD (Jakupcak, 2007). In addition to the clinical presence of both anger and hostility, veterans are likely to act upon their anger. Vietnam veterans with PTSD, reported an average of over 13 violent acts the preceding year compared to 3.5 violent acts among veterans without PTSD (Kulka et al., 1990). Veterans with PTSD struggle with displays of violence to the extent that there are issues of criminality among the population. Kulka et al. (1990) found that 50% of Vietnam veterans with PTSD had experienced an arrest for a violent offense, with 34.2% of this population experiencing more than one arrest for a violent crime.

Among veterans, it is theorized that the connections between aggression and traumatic stress are due to the information processing deficits (Chemtob et al., 1997). Chemtob et al. (1997) postulated that the exposure to life-threatening stressors experienced during combat influenced the development of anger dyscontrol, which leads to increased physiological arousal or a tendency to appraise/perceive events as more hostile, and lower thresholds in response to threatening stimuli

even when not in a combat setting. While this theory is mainly utilized as an explanatory construct among veterans, it is not far-fetched to assume this would also apply to law enforcement officers. Thus, anger related to traumatic stress among police could influence the use of violence among police. Longitudinal research among veteran populations has indicated that PTSD symptom severity related to the hyperarousal cluster is associated with the likelihood of violence perpetration over a nine-month period (Barrett, Teeson, & Mills, 2014).

Research has shown that individuals with PTSD have an increased likelihood to utilize aggression when faced with stress (Wilk, Quartana, Clarke-Walper, Kok, & Rivere, 2015). While police-specific research regarding anger is rare, there is some evidence that police officers with PTSD following their first year of service experienced a significant increase in anger compared to their baseline anger measured at the police academy (Meffert et al., 2008). The relationship between PTSD and anger is important as anger could impact a police officer's ability to interact with the public in a fair and just manner (Evans, Giosan, Patt, Spielman, & Difede, 2006). Thus, traumatic event exposure among police could influence the severity of anger and, potentially the use of aggression, in both personal relationships and in the community.

2.2.8 Risk Factors

2.2.8.1 Gender and Race

Research regarding police stress rarely considers the potential race and gender differences among police (Violanti et al., 2016). Policing is a White, male-dominated occupation (United States Census Bureau, 2016). The most recent demographic data indicated that 74% of police officers were White, 13% were Black, and 2.6% reported identification with two or more

unspecified races (United States Census Bureau, 2016). Data indicates that 86.7% of officers were male and 13.3% were female in 2016 (United States Census Bureau, 2016).

Male and female officers experience similar types of traumatic events related to work. However, there are differences in the perception of the severity of these stressors and coping styles (Violanti et al., 2016). Researchers have found that police belonging to an ethnic or racial minority groups report significantly more work stress than their White colleagues (Gershon et al., 2009). Female officers report work-related stressors like the utilization of physical force, an underestimation of abilities (both physical and mental), gender-bias in promotions and work assignments, and harassment at higher rates than male officers (Hartley, Mnatsakanova, Burtchfiel, & Violanti, 2014; Violanti et al., 2016). White officers report more work-related stress than non-White officers (Gershon, 2000). Black officers and female officers experience burnout at a lower rate than White male officers (Johnson & Subramanian, 2000). Among civilian samples, a significant gender effect exists in the prevalence of PTSD, with women at increased risk of developing PTSD (Brewin et al., 2001). However, among police officers, no gender effect has been noted (Meffert et al., 2008). For this purpose, race/ethnicity and gender should be investigated when examining police stress.

2.2.8.2 Police Culture and Help-Seeking

Police work is associated with a specific type of subculture which has been linked to both positive and negative consequences for police officers. Police are enveloped onto police culture immediately following recruitment from the beginning of police trainings. Police officers who feel a sense of solidarity and closeness to their peers tend to adequately cope with both organizational stressors and critical incidents (Chan, 2007; Papazoglou, 2013). Due to the potential of threat in policing, police tend to develop a distrust of civilians when they are on the job, this mistrust

directed toward civilians creates solidarity among officers and results in further isolation from society (Cochran & Bromley, 2003).

Police officers perceive criticism from the general public, the media, and the judiciary system (Blau, 1994). Police culture is characterized by a strong sense of solidarity among officers and isolation from other members of society (Woody, 2006). Police are integrated into this culture which emphasizes that displays of fear and stress are considered unacceptable and results in the stigmatization of seeking help for stress or trauma-related outcomes or sharing emotions, even among colleagues (Rudofossi, 2007). Police culture is associated with the perception that seeking mental health assistance is a sign of weakness (Rees & Smith, 2008). Police officers have difficulty acknowledging negative emotions that result from their occupational experiences (Berking, Meier, & Wupperman, 2010). Due to the importance of police culture to officer support-seeking behaviors, the normalization of discussions regarding mental health and critical incident stress should be helpful in altering police culture. Research regarding the impacts of stress and negative outcomes could assist in the initiation of cultural shifts.

Despite the debilitating symptomology of PTSD, many individuals fail to seek treatment promptly, with research indicating a 12-year median delay in seeking treatment (Wang et al., 2005). Further, only 7% of individuals seek help within the first year of symptom onset (Wang et al., 2005). The organizational culture of policing is considered a contributing factor to the underutilization of mental health services among this population (Amaranto, 2003). Mental health treatment in this population is associated with weakness and the perception that occupational status will be negatively impacted, as some police have experienced the removal of weapons or received desk-duty following a mental health diagnosis (Wester, Arndt, Sedivy, & Arndt, 2010). Police officers are more likely to hold negative stereotypes about individuals with mental illness than the

general population (Soomro & Yanos, 2018). Surprisingly, mental health stigma was more pronounced among officers struggling with mental illness, as officers who met the criteria for PTSD expressed more mental health stigma and increased negative perceptions related to seeking mental health treatment (Soomro & Yanos, 2018).

The treatment of PTSD is challenging as approximately half of individuals retain the diagnosis, and even individuals who are responsive to treatment maintain a substantial amount (approximately 50%) of symptomology post-treatment (Bradley, Greene, Russ, Dutra, & Western, 2005). An additional challenge that might have a negative influence over treatment outcomes is the comorbidity of anger, aggression, and PTSD. Among military samples, anger can negatively impact therapeutic engagement, and in turn, results in termination of services for both combat (Forbes, Creamer, Hawthorne, Allen, & McHugh, 2003) and peacekeeping populations (Forbes et al., 2005).

2.3 Coping Mechanisms

Coping styles can serve as mediators to the development of PTSD from work stress. Problem-focused coping mechanisms are cognitive and behavioral responses to a stressor and are focused on strategies like weighing options to alleviate a stressor, evaluation of the stressor, and actively seeking support to decrease the stress (Lazarus & Folkman, 1984; Paton, 2006). Problem-focused coping mechanisms are adaptive. Emotion-focused coping strategies aims to decrease the negative feelings associated with stress, like using humor, acceptance, positive reframing, or religion to cope (Lazarus &Folkman, 1984). The efficacy of emotion-focused coping is considered dependent on the particular strategy used (Carver, Scheier, & Weintraub, 1989), emotion-focused

coping mechanisms are typically associated with increased stress-related outcomes and considered maladaptive (Roberts, Leonard, Butler, Levenson, & Kanter, 2013). Dysfunctional coping responses to stress, like denial, blaming oneself, the use of substances are also considered maladaptive and are associated with poor mental health outcomes.

Police officers who reported utilizing adaptive coping reported increased job satisfaction, and those who utilized maladaptive coping experienced more psychological distress and alcohol use (Passilas et al., 2006; Violanti et al., 2011). Research indicates that the greater the perception of work stress the more likely police officers are to utilize dysfunctional coping strategies (Gershon et al., 2009). Police officers tend to practice avoidant coping, as reflected in the high rates of substance and alcohol abuse, gambling, and withdrawal from loved ones (Amaranto et al., 2003; Carlan and Nored, 2008). Police who reported utilizing dysfunctional coping were 14 times likely to report anxiety and 9 times more likely to experience burnout (Gershon et al., 2009). These dysfunctional coping strategies can result in the worsening of other aspects of life among police, such as relationship issues and physical health concerns (Berking et al., 2010). Some types of dysfunctional coping mechanisms, like alcohol and substance use, could have effects on job performance for this population. For this reason, a cultural shift in policing with focus on increased trainings and emphasis on adaptive coping could benefit this population greatly.

Social support is considered an important coping mechanism as it can mediate the psychological effects of traumatic events. Social support expressed through non-stigmatizing responses following the disclosure of trauma is especially helpful for individuals after a traumatic experience (Coker, 2002; Lee, Isaac, & Janca, 2002). Police officers tend to seek social support from family, coworkers, and supervisors (Gutshall, 2017). Social support is a protective factor for Post-Traumatic Stress Disorder, and a lack of social support can increase the risk of PTSD (Carlier

et al., 1997). Interpersonal stressors, like intimate relationship distress, has been associated with increased the effects of post-traumatic stress symptomology (Mikkelson & Burke, 2004). Among police, avoidance and hyperarousal symptoms of PTSD among police are associated with diminished efforts to maintain personal relationships (Chopko & Scawartz, 2012). Further, police officers who felt discomfort expressing their emotions to close loved ones reported increased post-traumatic stress symptoms (Craun, Bourke, & Coulson, 2015). Police with little social support, specifically intimate partner support, experienced higher levels of post-traumatic stress symptoms (Davidson, Berah, & Moss, 2006).

Research has acknowledged the importance of social support in relation to police stress, and the positive impacts in regard to their well-being. However, police frequently experience issues related to intimate partner relationships, including high rates of divorce (Paton, Violanti, Burke, & Gehrke, 2009). Further, social support has been shown to be beneficial to PTSD treatment (Ozer et al., 2003). This association could be beneficial when considering potential interventions for police, as interventions could focus on the emphasis of the use of social support as a coping skill or the maintenance of interpersonal relationships through counseling for this population (Perez, Jones, Englert, & Sachau, 2010).

2.4 Physiological Explanations for Stress

Stressful event exposure has acute and chronic effects on an individual (Paton & Violanti, 1996). One long-term effect of chronic stress exposure is allostatic overload which effects both physical and mental health (McEwen, 2004). Stress arousal can negatively impact adaptive

behavior related to managing situations and can result in either increased aggression or freezing (Paton, 2006).

Initial physiological responses following traumatic events include increases in the production of hormones from the adrenal gland like epinephrine, norepinephrine, and dopamine (Arnsten, 1998). The purpose of the release of these hormones serves to increase vigilance and heighten memory consolidation (Arnsten, 1998). The activation of the sympathetic nervous system and the resulting release of epinephrine increases heart rate, redistributes blood to the muscles, and releases glucose to the bloodstream to support an increase in metabolism. The elevation of epinephrine results in skeletal and heart muscles contracting with increased force, which results in an increase in blood pressure. In the short term, these stress reactions assist an individuals' reaction to stressors. However, if these stress reactions occur repeatedly, or for a prolonged period, they may have negative effects on an individual (Sapolsky, 1992). If the reactions are chronic, an individual can experience an overproduction of glucocorticoids which results in deleterious effects on cognitive functioning, memory, sleep cycles, and the immune system (Arnsten, 1998). The overproduction of glucocorticoids also results in the suppression of insulin which causes an individual to feel fatigued and ill, which is why prolonged stress is associated with illness and behavioral consequences (Kirkaldy, Trimpop, & Cooper, 1995).

2.5 General Strain Theory

General strain theory (GST) was developed as an explanatory construct for deviance and criminality (Agnew, 1992). Agnew (1992) posited that individuals exposed to strain would respond negatively and adapt in a variety of manners, including through the adoption of

maladaptive behaviors. Empirical evidence supports that exposure to negative and callous environments, recurrent adverse situations, distressing life events, and perception of unfair treatment have been associated with deviance (Brezina, 1999; Agnew & White, 1992; Agnew, 1992; Hoffman & Cerbone, 1999). Further, maltreatment is associated with an increase in anger and deviant beliefs (Brezina, 1999).

General Strain theory has been utilized among many populations for a variety of outcomes. GST has been utilized to explain the relationship between distressing environments and traumatic events that cause negative affect can predict deviant behavior among juveniles and adults with deviance being defined as alcohol abuse, violence, aggression (Agnew, 1992). GST has been utilized among traumatized populations, like combat veterans with PTSD and found that those veterans were at increased risk for criminal behavior, specifically related to higher levels of irritability. Few studies have examined general strain theory among police, but some have examined the relationship between critical incidents and alcohol for law enforcement (Bishopp, Piquero, Worrall, & Piquero, 2018; Shim, Jo, & Hoover, 2015; Swatt, Gibson, & Piquero, 2007; Ménard & Arter, 2013).

Per GST, an individual can experience three types of strain: *goal blockage*, *the presence of negative stimuli,* and *the loss of positive stimuli* (Agnew, 2001). Among police, examples of *goal blockage* could be organizational stressors that police acknowledge as distressing such as excessive paperwork and court appearances. An officer could see these organizational duties as impeding upon their ability to effectively protect the community and provide a civil service for the common good, which is one of the main motivations that individuals pursue a career in policing (White et al., 2010). The *presence of negative stimuli* among police is represented by critical incident exposure, as police are frequently exposed to aversive or threatening situations. The *loss*

of positive stimuli could be seen through the high divorce rates, lack of interpersonal relationships, the perception of poor social and organizational support, and perceptions that the community hold negative opinions of police. Agnew (1992) posits that an individual's exposure to traumas are likely to result in negative affect, which can be expressed through anger or hostility, as a result of traumas and are increasingly likely to display problematic behaviors (Agnew & White, 1992; Maschi, Bradley, & Morgan, 2008). Strain that targets aspects of an individual's identity is considered particularly distressing and if police believe that society holds a negative opinion of them related to their identity as a police officer, this could cause negative affect and result in problematic behaviors (Agnew, 2001).

Empirical research has noted a relationship between organizational stressors and self-reported misconduct among police. General Strain theory posits that the nature of strain is cumulative, and higher levels of strain are associated with increased levels of deviance. (Agnew & White, 1992). Research has indicated that police officers are faced with a variety of stressors related to their occupation in addition to everyday life stressors. Exposure to these stressors has been associated with negative affective responses. General strain theory can provide a framework for understanding how stress can lead to negative emotions among police and how these emotions can result in maladaptive behaviors or negative interactions at work. Police are likely to experience more than one type of strain at any given time point, as both critical incident and organizational stressors are common for this population. Correlations between high levels of work-related stress and self-reported deviance among police have been noted in research, with police who experienced the highest levels of stress reporting the most significant deviant behaviors (Arter, 2007). Some deviant behaviors were in response to a situation, like threatening or retaliatory behaviors toward

citizens, such as stacking on criminal charges to an individual in response to the perception that a citizen is treating an officer with disrespect (Arter, 2007).

Because of the cumulative nature of traumatic stressors, low perception of respect from the community, the general dissatisfaction with many aspects of their occupation, and the intense emotional responses from negative situations it can be asserted that General Strain Theory applies to this population. Police officers are confronted with stressful situations, aggressive and threatening individuals, and feelings of unappreciative and disrespectful citizens (Violanti et al., 2016). Police also face negative physical outcomes as a result of both operational and organizational stress, such as high rates of suicide, alcohol abuse, divorce rates, and high mortality rates (Ellrich & Baier, 2017). Additionally, police have been shown to utilize maladaptive coping strategies like alcohol use and withdrawal (Menard & Arter, 2013).

The application of GST to explain the effects of cumulative stressors, and the resulting negative affect and maladaptive behavior among police is promising. However, most research regarding police stress and trauma is largely atheoretical, and more empirical research utilizing GST is needed to explore these relationships. One weakness of general strain theory is that not every officer who faces occupational stressors or traumatic event exposure presents with deviant behavior, which can be attributed to the moderating role of coping styles and the role of perception of threat. For instance, strain is related to an individual's perception and if an officer does not perceive occupational stressors as particularly straining, they might not react in adeviant manner.

2.6 Stress and Coping Theory

Early theorist, Henry Selye, introduced General Adaptation Syndrome which viewed stress as a physiological response (Selye, 1956). In his later work, *The Stress Concept: Past Present, and Future,* Selye (1976) posited that stress response could elicit positive or negative outcomes for individuals depending on both cognitive interpretations of the stressor and physiological responses. Lazarus expanded on Selye's conceptualization of stress and introduced the transactional theory of stress and coping (Lazarus, 1966).

The transactional theory of stress and coping posits that stress is a relationship between a person and the environment (Lazarus & Folkman, 1984). Within the transactional model, stress occurs when an individual appraises the relationship between themselves and the environment as exceeding personal resources and posing a threat to one's well-being (Folkman, 1986). The transactional theory identifies two processes that can affect the relationship between stress and outcomes, appraisal and coping. The primary appraisal is an assessment of what is at stake or the amount of perceived threat in a stressful situation. Secondary appraisal is an evaluation of available coping resources (Lazarus & Folkman, 1984). The appraisal of the stressor determines the coping mechanism an individual will utilize (Lazarus, 1966).

The transactional theory posits that coping behaviors are determined situationally by an individuals' appraisal of the stressor or situation (Lazarus & Folkman, 1984). Coping is defined as cognitive and behavioral efforts to manage a stressor based on an appraisal of a stressor as exceeding the individual's resources (Lazarus & Folkman, 1984). Coping is considered a vital factor in the relationship between stressors and psychological outcomes (Pearlin & Schooler, 1978). Lazarus (1966) posited two types of coping strategies in response to stress, emotion-focused coping and problem-focused coping. Emotion-focused coping behaviors focus on modifying

emotional reactions to stressors, while problem-focused coping is associated with a direct action to alleviate the stress or reduce tension related to the stress (Lazarus, 1966).

Situations in which an individual appraises a lack of control are likely to result in emotion-focused coping (Folkman & Lazarus, 1980; 1985). Emotion-focused coping strategies aim to manage and alleviate emotional distress related to the stressor and can include disengagement from emotions, seeking emotional support, or venting emotions (Folkman & Moskowitz, 2004). Emotion-focused coping has been associated with the development of psychological distress (Pearlin & Schooler, 1978).

Past research has suggested that problem-focused coping may be more effective in buffering stress responses than emotion-focused coping. However, if an individual has little to no control over a situation, emotion-focused coping to alleviate the burden of the stressor can be considered an effective strategy (Steptoe, Dockray, & Wardle, 2009). Problem-focused coping strategies directly address the problematic stressor and evaluate ways in which to best resolve or manage the stressor (Folkman & Moskowitz, 2004). Stressful events that are perceived to be manageable are likely to result in problem-focused coping strategies such as, finding information, preparation, and action to alleviate or reduce the stressor (Carver, 1997).

Stress is defined as an individual's biological response to aversive stimuli (Selye, 1976). Behavioral response patterns to stress and trauma are fight, flight, and freeze (Cannon, 1916). The nature of policing ensures the lack of utilization of the fight, flight, or freeze responses that occurs as a stress response. Police officers often must utilize a fourth response of having to manage the stressor by asserting control and maintaining order in the face of stress.

Stress and coping theory posits that cognitive appraisal and coping style can serve as moderators for outcomes of stressful situations. Stress appraisal, or the perception of the severity

of the stressor, has a significant influence on the severity of PTSD symptomology and psychological distress (Ozer, 2003). This is in line with primary stress appraisal (Lazarus, 1966; Lazarus & Folkman, 1984). During primary appraisal, an individual evaluates the significance of an event related to the potential for threat, harm, or challenge. If the event is appraised as posing a significant threat, secondary appraisal identifies available coping responses. During secondary appraisal, an individual evaluates what they can do to overcome or improve the situation for the most personal benefit, and coping options are evaluated.

The ability to manage situations in the face of traumatic events is tied to an individual's perception of both their ability to handle the situation and the magnitude of the situation. If an officer is confronted with a traumatic event and appraises the situation as threatening and evaluates coping strategies for the situation, they are likely to utilize emotion-focused coping (Lazarus & Folkman, 1984). This is supported as research has indicated that police tend to utilize emotion-focused coping strategies when their individual distress levels are higher (Patterson, 2003). This is concerning because, among law enforcement officers, maladaptive coping strategies have been associated with a greater risk of developing PTSD (Haisch & Meyers, 2004).

Conversely, police officers who consider stress and psychological demands to be part of their occupation might appraise a stressor, like a critical incident, and feel equipped to manage the situation, which would result in little stress. However, if an officer is able to withstand the stress associated with a critical incident, yet they are met with a lack of emotional, social, or organizational support, and they do not utilize adaptive coping mechanisms, they are likely to experience stress and the resulting negative physical and psychological effects of stress.

Additionally, if an officer appraises the stressor as non-threatening due to denial, avoidant coping strategies might be used to quell the stress. Avoidance coping strategies focus on avoidance

of the stressor and the emotional reactions tied to the stressor, like withdrawal from others, denial of emotional responses or effects of the stressor (Snyder & Pulvers, 2001). Psychiatric distress is associated with avoidant coping strategies like venting, denial, and withdrawal (Moos & Holahan, 2003). Police utilize avoidant coping mechanisms, and under high levels of stress avoidant coping is ineffective and can increase burnout and anxiety (Violanti, 1992; Gershon et al., 2009).

While there is ample evidence regarding the stress experienced by police, particularly investigating the types of occupational stressors experienced by officers, there are still few studies that examine the severity of stress-related outcomes like hyperarousal, anger, and depersonalization. Further, the existing research focuses on the presence or absence of a full diagnosis of PTSD among police rather than the severity of symptom clusters. Additionally, research regarding traumatic stress typically occurs following a natural disaster, terrorist attack, or non-violent critical incident and fails to capture the multiple stressors related to policing (Weiss et al., 2010).

A majority of these studies failed to gather data regarding potential confounding factors that could influence the impact of critical incident stress, such as previous military experience. Previous military experience can be especially important as a large percentage (19%) of the police force spent time in the military (Bureau of Labor Statistics, 2016). Due to the potential that individuals in the military experienced prior traumas during combat, the inclusion of military experience should be examined as it could influence the impact of traumatic stress on police.

2.7 Proposed Study

Research Question #1) What is the relationship between the severity of hyperarousal, critical incidents, and coping mechanisms among law enforcement officers?

Hypothesis #1: Higher critical incident frequency will predict higher levels of hyperarousal symptom severity among police officers controlling for age, rank, years employed, gender, race/ethnicity, military history, or marital status.

Hypothesis #2: Dysfunctional coping mechanisms will be positively associated hyperarousal symptom severity.

Research Question #2) Does the type of critical incident stressors contribute to hyperarousal symptom severity?

Hypothesis # 3: Critical incidents in which an individual's life is perceived to be in danger will be associated with increased hyperarousal symptom severity.

Research Question #3) Do coping mechanisms mediate the relationship between critical incident exposure and hyperarousal symptom severity?

Hypothesis # 4: Coping mechanisms that are considered problem-focused will mediate the relationship between critical incident exposure and hyperarousal symptom severity.

3.0 Methods

3.1 Project Design and Implementation

This study examines the relationship between critical incidents and the severity of the hyperarousal symptom cluster, and the role of coping mechanisms among police officers utilizing a quantitative, cross-sectional design. A survey measure of critical incident stress serves to assist in the identification of frequency of traumatic event exposure among this population. In addition, this study aimed to identify which coping mechanisms utilized by police mediated the relationship between critical incident exposure and hyperarousal symptom severity.

To address these research questions, this study and survey battery were created in collaboration with the Richmond Police Department in Richmond, Virginia. It should be noted that law enforcement agencies and officers rarely engage in research with academic institutions or community organizations (Alpert, Rojek, & Hansen, 2013). The police department was interested in collaborating with researchers in hopes to assist officers with coping with the effects of occupational stressors. The Richmond Police Department had previously participated in survey research with another university for the purpose of obtaining information about the prevalence of PTSD among their staff and testing interventions in order to reduce stress levels and increase the use of healthy coping skills.

The police department was in the process of testing interventions to buffer the effects of stress. Interventions that the department had utilized were yoga and mindfulness practices. The department had very little engagement with the interventions and collaborated with a researcher who utilized informal measures for a previous survey. The measures consisted of questions related

to exposure to critical incidents, PTSD symptoms, and the utilization of yoga and the mindfulness exercises provided by the department. The results of the survey indicated that hyperarousal was common among the sample. The department wanted to further explore the levels of stress, hyperarousal, and coping mechanisms used by officers in the department in hopes of gaining insight into expanding the types of stress-reducing interventions to offer in order to get more engagement.

The police department wanted a hyperarousal measure included due to the high rate of self-reported hyperarousal in the previous survey, but preferred to use a standardized measure for this survey and we decided to use the hyperarousal subscale of the Post-Traumatic Stress Checklist for the DSM-V. The development of the Critical Incident Checklist was created based on feedback from multiple high-ranking officers. Initially we were planning to use the Critical Incident History Questionnaire (Weiss et al., 2010), but it was determined to be too exhaustive for the purposes of this survey. Items were removed that the officers stated were a rare occurrence for their department and the frequency measure was simplified. The Brief Cope was included to further explore coping mechanisms utilized by the department in order to assist with the creation of interventions for stress reduction that could either be available on-site or sponsored by the department as the department previously sponsored yoga and meditation in the community.

Other measures included in the survey were: The Connor-Davidson Resilience Scale, the State-Trait Anger Expression Inventory-2, Operational Police Stress Questionnaire, Organizational Police Stress Questionnaire, the Depersonalization subscale of the Maslach's Burnout Inventory-Human Services. The Connor Davidson Resilience scale was included because the police department felt it was important to explore positive attributes in addition to the measures of stress included in the survey. The State-Trait Anger Expression Inventory-2 was included to

explore anger as a characteristic in addition to the exploration of anger as a symptom of PTSD. Operational and Organizational Police Stress Questionnaires were important to include because the department wanted insight into specific workplace occurrences that resulted police found the most stressful. The Depersonalization subscale of the Maslach's Burnout Inventory-Human Services was included in order to explore the facet of burnout that reflected feelings about citizens they are helping.

The sample consisted of individuals currently employed as police officers in Richmond. All officers who were employed in the Richmond Police Department at the time of data collection were given the opportunity to participate. Nonprobability, purposive sampling was utilized due to the requirements of participation. A purposive sampling method was utilized in order to obtain a representative sample of the population but may limit the generalizability of the results. Participants were recruited by department staff who informed all staff of the survey during roll call, reminder emails, and a poster campaign.

The surveys were presented to all staff during role call over a period of one week. During this time, officers were reminded that their participation was voluntary and they were given the option to complete the survey over Qualtrics. It should be noted that no participants completed the Qualtrics survey. The potential sample size of the population was 714 sworn officers in four precincts (Richmond Police Department, 2016).

The use of demographic control variables in this study was exploratory in nature, but included due to differences in outcomes found in previous research. Prior research has shown conflicting evidence of the roles of gender and race/ethnicity of individuals who experience traumas in the development of PTSD symptomology. Research has indicated that cumulative and compounded traumas can result in increased severity of PTSD symptoms, and for this purpose

years employed and age will be included as covariates as it is assumed officers who are older or who have more work experience will have accumulated more exposure to traumatic events than their younger and less experienced counterparts. Military experience is included in order to investigate whether there are difference in outcomes for individuals with military experience due to cumulative or compound traumas that might emerge from time in the military. Marital status is examined as there is theoretical research indicating the importance of the role of social support in the development of negative stress-related outcomes. It is assumed that law enforcement officers who are married or co-habitating with a partner experience a higher rate of social support than officers who are widowed, separated, divorced, or never married. The inclusion of rank is exploratory in nature, but it is important to consider the differences that might exist for officers in different roles.

Table 1 shows the descriptive statistics of the sample including as age, years employed with the police department, rank in the department, and race/ethnicity. Ages of participants ranged from 21-61 years old, with a mean age of 37.5. Respondents reported that the time employed as a law enforcement officer ranged from just a few months to 34 years, with the mean among the sample being 11.12 years employed with the department. The majority of the sample (77%) were men, and the rest were female with no participants choosing to self-describe their gender. Most of the respondents were officers (76%) followed by plain clothes detectives (10%) and Sergeants (10%). Few respondents were ranked Lieutenant, Captain, and Major and Above.

The Richmond Police Department consists of approximately 66% White officers, 31% Black officers, and 3% Latino officers (Richmond Police Department, 2016). Most of the sample identified as White (56%) and 31% of the officers identified as Black. Approximately 7% of the sample was Latino, 2% mixed race, and 3% were Asian. The demographics of the city of

Richmond, Virginia are 47% Black, 45% are White, and 2% Asian, with 7% identifying as Latino ethnicity (US Census, 2019). The sample is more diverse than the national average of law enforcement officers, 85% of which are male and 67% are white (US Census, 2019).

Table 1. Demographic Characteristics of the Sample

		N	%
Gender			
	Male	191	77.02%
	Female	57	22.98%
Age (*M*, *SD*; Range)		37.5, *9.96*	21-61
Years employed (*M*, *SD*; Range)		11.12, *8.51*	0.25-34
Race/Ethnicity			
	White	132	56.17%
	Black	72	30.64%
	Latino	17	7.23%
	Asian/Pacific Islander	8	3.40%
	Native American	1	0.43%
	Mixed	5	2.13%
Rank			
	Officer	192	76.49%
	Plain-clothes detective	27	10.76%
	Sergeant	26	10.36%
	Lieutenant	3	1.20%
	Captain	2	0.80%
	Major or above	1	0.40%

Table 2 presents the military history and marital status of the sample. The majority of the sample (69.41%) did not have military history, however 30.59% were veterans. Of the respondents who reported military history, 44.87% reported a deployment in the past. Half of the sample with military history served in the Army, about 27% were Marines, about 15% were in the Air Force, about 5% were in the Navy. Almost half of the sample (48.99%) reported that they were married, 14.57% reported that they were living with a partner, 4.45% were separated from their partner,

almost 7% were divorced, and almost a quarter of the sample (24.70%) stated that they had never been married.

Table 2. Military History and Marital Status

		N	%
Military History			
	Yes	78	30.59%
	No	177	69.41%
Deployed			
	Yes	35	44.87%
	No	30	38.46%
	Did not Answer	13	16.67%
Branch			
	Air Force	12	15.38%
	Army	39	50.00%
	Marines	21	26.92%
	Navy	4	5.13%
	More than one branch	2	2.56%
Marital Status			
	Married	121	48.99%
	Living with Partner	36	14.57%
	Widowed	1	.40%
	Separated	11	4.45%
	Divorced	17	6.88%
	Never Married	61	24.70%

3.2 Measures

All measures are self-reported and completed in a survey questionnaire during one session. The questionnaire was completed individually in a designated room at the police department during roll call. An additional online Qualtrics survey was made available through email for police officers who wished to complete the survey online. However, not one survey was completed through Qualtrics. Survey measures include the hyperarousal subscale of the Post-Traumatic Stress Checklist for DSM V, Brief Cope, a brief demographic sheet, and a critical incident checklist.

Demographic Questionnaire. The battery assessment includes demographic questions consisting of questions regarding their current rank, previous military experience, marital status, age, gender, and race/ethnicity.

Years employed as a police officer. This variable is measured by asking respondents an open-ended question regarding length of time employed as a police officer. Years employed with the police department is coded as continuous variable.

Current Rank. This variable was measured by asking participants "What is your current rank?" Possible responses are 1) Officer, 2) Plain clothes detective, 3) Sergeant, 4) Lieutenant, 5) Captain, 6) Major or above. Rank is coded as dichotomous, 0= plain clothes detective and above, 1=officer), because of the lack of variation of responses of plain clothes detective, Sergeant, Lieutenant, Captain, and Major or above.

Military Experience. This three-part question asks respondents if they have ever served in the military with the option to answer 1) Yes or 2) No. If respondents answer 1) Yes, they are instructed to answer, "What branch of the Military?" Possible answers include 1) Air Force, 2) Army, 3) Marines, 4) Navy, 5) More than one branch. Last, respondents are asked if they were ever deployed to a combat zone and given the options to answer: 1) Yes or 2) No. Military history is coded as a categorical variable with 0= no military history and 1= military history, because how few individuals reported being deployed.

Gender. Participants were asked: What gender do you identify as? And given the options: Male, Female, or Self-Describe. Gender is a categorical variable, coded as 0=female, 1=male, because no respondents used the self-describe option.

Age. Respondents were asked the open-ended question "What is your current age?" The respondent's self-reported age is coded as continuous variable.

Marital Status. This variable was measured by asking "What is your marital status?" Respondents were given the following options to answer: 1) Married, 2) Living with a partner 3) Widowed, 4) Separated, 5) Divorced, and 6) Never married. Marital status was coded as a categorical variable, 0= the respondent is unpartnered 1=married or living with partner, because of the lack of variation in many of the responses.

Race/Ethnicity. Respondents were asked, "What is your race/ethnicity?" and given the following options as responses: 1) American Indian, 2) Asian or Pacific Islander, 3) Black or African-American, 4) White (Caucasian), 5) Latino or Hispanic. . Race is categorical, coded as 0=not White, 1= White, because there were so few responses American Indian, Asian or Pacific Islander, Latino or Hispanic, and participants who indicated they identified as multi-racial/multi-ethnic.

Hyperarousal. Hyperarousal is measured by the hyperarousal subscale of the Post-Traumatic Stress Checklist for the DSM-V (PCL-5) (Weathers et al., 2013). The PCL-5 hyperarousal subscale consists of 6-items representing each symptom of hyperarousal. The hyperarousal subscale consists of symptoms related to irritability and anger, self-destructive behavior, hypervigilance, high startle response, sleeping difficulties, and issues maintaining concentration (Weathers et al., 2013). Questions related to the hyperarousal symptom cluster included: 1) Being "superalert" or watchful or on guard? 2) Irritable behavior, angry outbursts, or acting aggressively? 3) Taking too many risks or doing things that could cause you harm? 4) Feeling jumpy or easily startled? 5) Having difficulty concentrating? 6) Trouble falling or staying asleep? The scale is used to assess the severity of each symptom over the past month. Respondents rate symptom severity through a corresponding Likert-type scale with the options ranging from 0= *Not at all*, 1= *A little bit*, 2= *Moderately*, 3= *Quite a bit*, 4= *Extremely*. The sum of these scores is

considered the severity of a symptom. The PCL-5 has good psychometric qualities including strong internal consistency (α=.94), test-retest reliability (.82), convergent validity (Blevins et al., 2015). Among this sample, using Cronbach's alpha, the PCL-5 had a good internal consistency (α=.84) The measure has not been psychometrically tested for police populations at this time, but among traumatized individuals, it was found to be psychometrically sound. The total of all hyperarousal symptoms was used in analyses. The frequency of hyperarousal symptoms are presented in Table 4. The total hyperarousal score showed a skewed distribution, and a square root transformation was performed. Details of the transformation are included in Table 3.

Critical Incidents. While critical incident stress is considered an operational stressor, due to the unique role that critical incidents might play in the severity of hyperarousal, anger, and depersonalization, a critical incident measure was included. A modified version of the Critical Incident History Questionnaire (Weiss et al., 2010) was included to measure the frequency of exposure to critical incidents which included items related to personal threat, secondary trauma, and events in which an officer caused harm to another individual over the past 4 months. The original measure was shortened to a 14- item measure in collaboration with the Richmond Police Department in order to reduce repetitive and infrequently occurring items. Critical Incident measure items were examined both collectively and individually. Critical incident items include: 1) Been present when a fellow officer was seriously injured? 2) Seen someone dying? 3) Encountered the body of someone recently dead 4) Made a death notification? 5) Encountered a child that had been sexually assaulted or beaten? 6) Encountered an adult who had been sexually assaulted or beaten? 7) Encountered a child who was severely neglected or in dire need of medical care? 8) Been seriously injured on the job? 9) Been involved in a potentially life-threatening situation? 10) Been threatened with a gun, knife, or other weapon? 11) Been involved in a high-

speed chase where lives were in danger? 12) Made a mistake that led to the serious injury or death of a fellow officer? 13) Been in a situation in which you were required to use force? 14) Made a mistake that led to the serious injury or death of a bystander? Several of the critical incidents were skewed and non-linear transformations were necessary for analysis. The transformations are presented in Table 3.

Coping. The Brief COPE (Carver, 1997) is a 28-item self-report scale that measures 14 coping styles representing the following coping styles: 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. It should be noted that the Richmond Police Department requested a small change to the original Brief Cope measure. Two items regarding alcohol and substance use were from "I have been using alcohol or other drugs to get me through it" and "I have been using alcohol to make myself feel better" and "I have been using medication to get me through it."

The instrument utilizes a four-point Likert scale with responses ranging from 1) *very seldom* to 4) *very often*. The Brief COPE can be divided into the subscales problem-focused coping, emotion-focused coping, and dysfunctional coping. Problem-focused coping strategies in the Brief COPE include: active coping, planning, and the use of instrumental support. Emotion-focused coping includes: the use of emotional support, positive reframing, acceptance, religion, and humor. The dysfunctional coping subscale includes items: venting, denial, substance use, behavioral disengagement, self-distraction, and self-blame (Meyer, 2001). The Brief COPE has good internal consistency (α=.72) and adequate test-retest reliability (α=.58) (Cooper, Katona, & Livingston, 2008). Among this sample, the Brief COPE had a good internal consistency (α=.89).

In this study, Cronbach's alpha of the Brief Cope measure was (α =.90). Internal consistency of the 14 coping processes of the Brief COPE were analyzed utilizing Cronbach's alpha and Spearman's Rank Order Correlation Coefficients. Due to the fact that each scale has only two items, the inclusion of Spearman's Rank Order Correlation Coefficients allowed for further assessment of the strength of the intercorrelation among item pairs. Self-blame (α=.65, n=256, r=.59), active coping (α =.60, n=253, r=.61), denial (α =.67, n=256, r=.42), substance use (α =.22, n=256, r=.27), emotional support (α =.71, n=256, r=.68), instrumental support (α =.79, n=256, r=.72), behavioral disengagement (α =.53, n=256, r=.58), venting (α=.31, n= 255, r=.33), positive reframing (α =.64, n=256, r=.65), planning (α =.68, n=256, r=.67, humor (α =.66, n=256, r=.67), acceptance (α =.624, n=253, r=.63), religion (α =.75, n=255, r=.73), self-distraction (α =.40, n=255, r=.40).

Internal Consistency and average inter-item correlations of the scales used in this study were conducted. The scales measuring coping response categories showed good internal consistency and average inter-item correlations: emotion-focused (α =.77, n=259, r=.40), problem-focused (α =.82, n=259, r=.60), and dysfunctional coping (α =.78, n=259, r=.37). The hyperarousal scale showed good internal consistency and average inter-item correlations (α =.84, n=260, r=.46).

3.3 Preliminary Analysis

Preliminary analyses were conducted in order to test assumptions of normality, multicollinearity, and homoscedacity among study variables. Shapiro-Wilk tests of normality were

run for individual variables related to hyperarousal, critical incidents, and coping mechanisms as well as the total scales of hyperarousal, critical incidents, coping mechanism subscales. Hyperarousal total score, critical incident score, some critical incidents, and some coping mechanisms were skewed. Table 3 presents information regarding the non-linear transformation of variables used in the analysis of this study.

Table 3. Transformation of Continuous Variables

Variable	Skew (pre)	Transform	Skew (post)
Critical Incidents			
Total Critical Incident Score	0.49	sqrt	-0.52
Threatened by Weapon	0.61	none	0.61
Use of Force	-0.17	x^2	0.77
Life Threatening Situation	0.17	x^2	0.94
High Speed Chase	0.73	none	0.73
Seen Abused Child	0.82	none	0.82
Seen Abused Adult	-0.05	x^2	0.70
Seen Neglected Child	0.77	none	0.77
Death Notification	0.91	None	0.91
Hyperarousal			
Total Hyperarousal	.84	sqrt	-0.29
Coping Mechanisms			
Self-Blame	1.38	sqrt	0.18
Active Coping	0.09	none	0.09
Denial	2.67	sqrt	0.69
Substance Use	2.20	sqrt	0.94
Emotional Support	0.79	sqrt	.20
Instrumental Support	0.88	sqrt	.10
Behavioral Disengagement	2.26	sqrt	1.22
Venting	0.85	sqrt	0.10
Reframing	0.25	none	0.25
Planning	0.48	none	0.48
Humor	0.54	sqrt	-0.26
Acceptance	0.25	none	0.25
Religion	0.87	sqrt	0.29
Distraction	0.30	none	0.30

3.4 Analysis Plan

Table 4 provides an overview of the research questions, independent and dependent variables, and corresponding analyses in relation to the research questions.

Research Question 1) What is the relationship between the severity of hyperarousal, critical incidents, and coping mechanisms among law enforcement officers?

To investigate these relationships, multiple linear regression was utilized to regress critical incident exposure total frequency and the three coping response scales (emotion-focused, problem-focused, and dysfunctional) on hyperarousal symptom severity while controlling for the following 7 covariates: age, race/ethnicity, marital status, gender, years employed on the police force, rank, and military history.

Research Question 2) Does the type of critical incident stressor contribute to hyperarousal symptom severity?

In order to explore differences among this sample, multiple regression analysis was utilized to explore the relationship between dependent variable, hyperarousal symptom severity and each critical incident type in order to determine the relationship between critical incident type and hyperarousal symptom severity. Among this sample, the critical incidents "Made a mistake that led to the serious injury or death of a bystander?" and "Made a mistake that led to the serious injury or death of a fellow officer?" were excluded from the analysis as they were rarely reported.

Research Question 3) Do coping mechanisms mediate the relationship between critical incident exposure and hyperarousal symptom severity?

In order to investigate the role of coping mechanisms as mediators between critical incidents and hyperarousal, a Structural Equation Modeling (SEM) approach to mediation analysis was utilized. Two methods can be used in mediation analysis, the traditional regression approach (Baron & Kenny, 1986) and the SEM approach. The SEM approach is an appropriate method to use as it have many advantages over the regression approach to mediation. The first advantage is that the SEM approach has more precision than the standard regression approach (Gunzler, Chen,

Wu, & Zhang, 2013; Iacobucci, Saldanha, & Deng, 2007). Secondly, SEM simplifies mediation analysis by testing mediation and allowing for analysis of all variables simultaneously, as opposed to the 3-step regression approach (Gunzler et al., 2013; MacKinnon, Cheong, & Pirlott, 2012; Zhao, Lynch, & Chen, 2010). Third, SEM uses maximum likelihood techniques for handling missing data. This method is more efficient than conventional methods like pair-wise deletion (Gunzler et al., 2013).

Table 4. Research Questions, Independent Variables, Dependent Variables, and Analyses

Research Question	Independent Variable	Dependent Variable	Analysis
1: What is the relationship between the severity of hyperarousal, critical incidents, and coping mechanisms among law enforcement officers?	Total Score of Critical Incidents Problem-focused Coping Scale Emotion--focused Coping Scale Dysfunctional Coping Scale	Total Score of Hyperarousal from the PCL-5	Multiple linear regression, controlling for age, rank, years employed, gender, military history, race/ethnicity, and marital status
2: Does the type of critical incident stressor contribute to hyperarousal symptom severity?	Total of the Critical Incident Variables: Use of Force Life Threatening Situation High Speed Chase Seen Abused Child Seen Abused Adult Seen Neglected Child	Total Score of Hyperarousal from the PCL-5	Multiple linear regression
3: Do coping mechanisms mediate the relationship between critical incident exposure and hyperarousal symptom severity?	Total Score of Critical Incidents	Total Score of Hyperarousal from the PCL-5	Mediation analyses using SEM with each critical incident type as mediating variable

3.4.1 Power Analysis

Research Question # 1 involved multiple linear regression, regressing hyperarousal symptom severity on the total frequency of critical incident exposures in 6 months, coping mechanism scales (problem-focused coping, emotion-focused coping, and dysfunctional coping), while controlling for age, rank, years employed, gender, military history, and marital status. Power analysis for a multiple regression with eleven predictors was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a medium effect size (f^2 = 0.15). Based on the aforementioned assumptions, the desired sample size is 123.

In order to test Research Question #2, multiple linear regression was used, with dependent variable hyperarousal symptom severity regressed on critical incidents involving being threatened with a gun or other weapon, being involved in a life-threatening situation, being in a situation that required the use of force, being involved in a high-speed chase, being exposed to an abused or beaten child, being exposure to an abused or beaten adult, and exposure to a neglected child. Power analysis for a multiple regression with eight predictors was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a medium effect size (f^2 = 0.15). Based on the aforementioned assumptions, the desired sample size is 43.

Research Question #3 utilized a mediation analysis in order to investigate the role of coping in the relationship between critical incidents and hyperarousal symptom severity. Power analysis for a mediation analysis was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, and a medium effect size (f^2 = 0.15). Based on the aforementioned assumptions, the desired sample size is 55.

4.0 Results

This chapter includes the results of the previously outlined statistical analysis in Chapter 3. First, the demographic characteristics of the sample, results of preliminary analysis, internal consistency of measures, and bivariate correlations will be reported. Then the research questions and hypotheses will be reported.

4.1 Descriptive Statistics

4.1.1 Hyperarousal

Table 5 shows the descriptive statistics of hyperarousal, including the frequency, mean, and standard deviation of reported hyperarousal symptoms. Hyperarousal symptom severity scores range from 0-24 as each of the six symptoms of hyperarousal (anger, risky behavior, hypervigilance, jumpiness, poor concentration, and sleep issues) were scored 0-4. Among this sample, total hyperarousal scores ranged from 0-23 with a mean score of 6.23 (*SD*=4.90). A score of 2, or "moderate" experience with a symptom, and above indicates the symptom is present or symptomatic. Officers reported moderate symptoms including: 123 officers (47.31%) reported symptomatic hypervigilance, 116 (44.62%) stated they experienced sleep issues, 68 officers (26.15%) reported symptomatic anger, 65 (25%) participants stated they experienced poor concentration, 49 (19.23%) reported jumpiness, and 48 (18.46%) officers reported risky behavior. The clinical cut-off for a PTSD symptom from the PCL-5 is assessed when a moderate rating is

reported for 2 or more symptoms within the symptom category. Among this sample, 116 participants (44.79%) met the clinical cut-off of the hyperarousal symptom cluster, and 143 (55.21) participants did not meet the criteria.

Table 5. Descriptive Statistics for Hyperarousal

Variable	*N*	*%*	*Range*	*M*	*SD*
Hyperarousal	260		0-23	6.23	4.90
Anger	260		0-4	0.97	1.02
Rating: 0	105	40.38%			
Rating: 1	87	33.46%			
Rating: 2	45	17.31%			
Rating: 3	17	6.54%			
Rating: 4	6	2.31%			
Risky Behavior	260		0-4	0.70	0.91
Rating: 0	141	54.23%			
Rating: 1	71	27.31%			
Rating: 2	35	13.46%			
Rating: 3	11	4.23%			
Rating: 4	2	0.77%			
Hypervigilance	260		0-4	1.50	1.23
Rating: 0	69	26.54%			
Rating: 1	68	26.15%			
Rating: 2	64	24.62%			
Rating: 3	42	16.15%			
Rating: 4	17	6.54%			
Easily Startled	260		0-4	0.69	0.96
Rating: 0	149	57.31%			
Rating: 1	61	23.46%			
Rating: 2	35	13.46%			
Rating: 3	11	4.23%			
Rating: 4	4	1.54%			
Poor Concentration	260		0-4	0.90	1.08
Rating: 0	125	48.08%			
Rating: 1	70	26.92%			
Rating: 2	40	15.38%			
Rating: 3	17	6.54%			
Rating: 4	8	3.08%			
Sleep Issues	260		0-4	1.47	1.40
Rating: 0	92	35.38%			
Rating: 1	52	20%			
Rating: 2	48	18.46			
Rating: 3	37	14.23%			
Rating: 4	31	11.92%			

4.2 Critical Incidents

The descriptive statistics of critical incidents reported by the sample are shown in Table 6 Total critical incident score ranged from 0-32 and the mean score of the sample was 12.03 (*SD*=7.47). Critical incident scores for each incident ranged from 0-3. The most frequently occurring critical incidents among the sample were seeing a dead body (*M*= 1.97), being in a situation that required the use of force (*M*=1.44), seeing someone dying (*M*=1.44), seeing an abused adult (*M*=1.43), and being in a situation in which their life is threatened (*M*=1.28).

Table 6. Descriptive Statistics for Critical Incidents

Variable	*N*	*Range*	*M*	*SD*
Critical Incidents	259	0-32	12.03	7.47
Work Injury	259	0-3	0.18	0.50
Caused Injury of Officer	259	0-1	0.01	0.09
Present during Officer Injury	258	0-2	0.27	0.57
Threatened by Weapon	257	0-3	0.83	0.92
Use of Force	259	0-3	1.44	1.03
Life Threatening Situation	256	0-3	1.28	1.09
High Speed Chase	258	0-3	0.87	1.05
Caused Injury of Citizen	259	0-3	0.01	0.19
Seen Someone Dying	258	0-3	1.44	1.09
Seen Dead body	257	0-3	1.97	0.92
Death Notification	257	0-3	0.70	0.95
Seen Abused Child	259	0-3	0.81	0.96
Seen Abused Adult	259	0-3	1.43	1.11
Seen Neglected Child	259	0-3	0.85	1.00

Table 7 presents the frequency of reported critical incidents among the sample. Some critical incidents occurred infrequently among the sample. In a period of 6 months, 86.49% of respondents answered that they had not been injured on the job, 99.23% reported that they had not

made a mistake that led to the injury or death of another officer, 79.07% reported that they had not been present during an officer injury, 99.61% stated that they had not made a mistake that led to the injury of a citizen, and 60% stated that they had not made a death notification. Due to the infrequency of these critical incidents, they were dropped from the analysis.

Table 7. Frequency Table of Critical Incidents

Abbreviated item	N	0	1	2-5	6+
Seriously injured on the job?	259	224 86.49%	26 10.04%	7 2.70%	2 0.77%
Made a mistake that led to serious injury or death of another officer?	259	257 99.23%	2 0.77%	0	0
Been present when another officer was seriously injured?	258	204 79.07%	38 14.73%	16 6.20%	0
Been threatened with a gun, knife, or weapon?	257	126 49.03%	58 22.57%	64 24.90%	9 3.50%
Been in a situation that required the use of force?	259	68 26.25%	46 17.76%	108 41.70%	37 14.29%
Been trapped in a life-threatening situation?	256	86 33.59%	54 21.09%	75 29.30%	41 16.02%
Been involved in a high-speed chase where lives were at risk?	258	138 53.49%	39 15.12%	58 22.48%	23 8.91%
Made a mistake that led to injury or death of bystander?	259	258 99.61%	0	0	1 0.39%
Seen someone dying?	258	77 29.84%	34 13.18%	103 39.92%	44 17.05%
Encountered dead body?	257	28 10.89%	27 10.51%	126 49.03%	76 29.57%
Made a death notification?	257	154 59.92%	36 14.01%	56 21.79%	11 4.28%
Encountered a child that had been sexually assaulted or beaten?	259	132 50.97%	61 23.55%	50 19.31%	16 6.18%
Encountered an adult that was sexually assaulted or beaten?	259	77 29.73%	44 16.99%	88 33.98%	50 19.31%
Encountered a child who was neglected?	259	132 50.97%	55 21.24%	52 20.08%	20 7.72%

A principal component analysis was conducted on critical incidents in order to determine if all critical incident variables will be included in the analyses. Two factors were found. The first factor included variables: threatened by a weapon, use of force, been in a life-threatening situation, been in a high-speed chase. The first factor includes variables that seem to be related to a personal threat to an individual. It can be assumed that the use of force variable is included because an officer would not use force unless they felt threatened in some way. The second factor included the variables: made a death notification, seen a beaten or abused child, seen a beaten or abused adult, and seen a child neglected or in need of medical attention. The second factor includes variables related to secondary trauma.

The critical incidents: encountered the body of someone recently dead and seen someone dying loaded into both factor components. The inclusion of been present while someone was dying and seeing a dead body do not seem to fit with the rest of the items conceptually. The two variables are also moderately correlated with each other (r=0.65). For this purpose, the two variables were dropped from the analysis investigating the unique contribution of critical incidents to hyperarousal in Research Question #2.

Table 8. Principal Component Analysis Pattern Matrix of Critical Incidents

Variable	Factor 1	Factor 2	Uniqueness
High Speed Chase	0.78	0.23	0.34
Life Threatening	0.76	0.24	0.36
Use of Force	0.76	0.17	0.39
Threat with Weapon	0.74	0.25	0.39
Seen Dying	0.63	0.51	0.35
Injured Child	0.25	0.78	0.32
Neglected Child	0.28	0.78	0.30
Injured Adult	0.32	0.69	0.42
Death Notification	-0.01	0.57	0.68
Dead Body	0.49	0.54	0.47

4.3 Coping Mechanisms

Table 9 shows the descriptive statistics for each coping mechanisms and the coping mechanism subscales of problem-focused coping, emotion-focused coping and dysfunctional coping. The possible score for each coping mechanism type ranged from 2-8, with a higher score indicating more frequent use of the coping mechanism. The most frequently utilized coping mechanisms among the sample included active coping (*M*=4.48), acceptance (*M*=4.41), and distraction(*M*=4.35). Substance use (*M*=2.45), denial (*M*=2.43), behavioral disengagement (*M*=2.50), and self-blame (*M*=3.07) were used the least. All of the least utilized coping mechanisms were dysfunctional coping mechanisms. However, distraction, also considered dysfunctional is highly utilized among the law enforcement officers.

Table 9. Descriptive Statistics of Coping Mechanisms

Variable	*N*	*Range*	*M*	*SD*
Coping Mechanisms				
Problem-focused	256	6-24	11.99	4.61
Active Coping	256	2-8	4.48	1.46
Instrumental Support	256	2-8	3.55	1.70
Planning	255	2-8	3.97	1.88
Emotion-focused	256	3-39	20.12	6.75
Acceptance	255	2-8	4.41	1.92
Emotional Support	256	2-8	3.75	1.74
Instrumental Support	256	2-8	3.55	1.70
Humor	255	2-8	4.02	1.90
Reframing	255	2-8	4.23	1.82
Religion	255	2-8	3.78	2.06
Dysfunctional	256	11-39	17.96	5.00
Behavioral Disengagement	256	2-8	2.50	1.05
Denial	255	2-8	2.43	0.98
Distraction	255	2-8	4.35	1.72
Self-Blame	255	2-8	3.07	1.45
Substance use	256	2-7	2.45	0.91
Venting	256	2-7	3.19	1.25

4.4 Correlations

Bivariate correlations were conducted between demographic characteristics and variables of interest: hypervigilance, coping responses, and critical incident score. Pearson correlations were conducted among demographic variables, total hyperarousal score, total critical incident variables, and coping mechanism subscales (See Table 10).

Table 10. Bivariate Correlations Among Demographics, Hyperarousal, and Coping Responses

	Hyperarousal	Critical Incident	Emotion-focused	Problem-focused	Dysfunctional
Years Emp	0.01	0.00	-0.20**	-0.27**	-0.15*
Rank	-0.03	-0.02	-0.07	-0.04	-0.05
Military Exp	-0.01	0.00	-0.11	-0.05	0.02
Marital Stat	0.02	0.07	0.00	-0.03	-0.03
Race	0.10	0.15*	-0.04	-0.11	0.07
Gender	0.03	0.13	-0.13*	-0.18**	-0.06

*p<.05, **p<.01

Table 10 shows that hyperarousal is not significantly corrected with control variables rank, military history, marital status, race, or gender. Critical incidents were significantly associated with race (r= 0.15, p<.05) showing that White law enforcement officers were significantly more likely to experience critical incidents than officers who are not White. Emotion-focused (r= -0.20, p<.01), problem-focused (r= -0.27, p<.01), and dysfunctional coping mechanisms (r= -0.15, p<.05) were significantly negatively correlated with years employed as a law enforcement officer. The longer an officer is employed in the department, the less likely they are to utilize any type of coping mechanism. Both emotion-focused and problem-focused coping were significantly inversely correlated with and the dichotomous variable of gender, indicating that female officers are more likely than male officers to utilize these types of coping mechanisms.

Table 11 shows a correlation matrix of hyperarousal and critical incident type. Hyperarousal is significantly positively associated being threatened by a weapon (r= 0.15, p<.01), being in a situation in which your life is threatened (r= 0.23, p<.01), seeing an abused child (r= 0.17, p<.01), seeing a neglected child (r= 0.17, p<.01), and making a death notification (r= 0.03, p<.05).

Table 11. Correlation Matrix of Hyperarousal and Critical Incidents

Scale	1	2	3	4	5	6	7	8	9
Hyperarousal	1.00								
Threatened weapon	0.15*	1.00							
Use of Force	-0.01	0.55**	1.00						
Life Threatening	0.23**	0.54**	0.51**	1.00					
High speed chase	0.07	0.54**	0.58**	0.58**	1.00				
Seen Abused Child	0.17**	0.41**	0.41**	0.36**	0.38**	1.00			
Seen Abused adult	0.11	0.39**	0.35*	0.42**	0.40**	0.55**	1.00		
Seen Neglected Child	0.17**	0.44**	0.39*	0.41**	0.41**	0.67**	0.58**	1.00	
Death Notification	0.03**	0.17**	0.20*	0.15*	0.18**	0.26**	0.20**	0.26**	1.00

**p<.05, **p<.01*

Table 12 shows hyperarousal correlated with coping mechanisms. Hyperarousal is significantly positively correlated with every coping mechanism that is grouped in the dysfunctional coping mechanism scale that is derived of behavioral disengagement (r= 0.38, *p*<.01), denial (r= 0.28, *p*<.01), distraction (r= 0.36, *p*<.01), self-blame (r= 0.44, *p*<.01), substance use (r= 0.36, *p*<.01), and venting (r= 0.38, *p*<.01). Hyperarousal is also significantly correlated with items from the problem-focused scale including active coping (r= 0.19, *p*<.01), instrumental support (r= 0.19, *p*<.01), and planning (r= 0.30, *p*<.01). Additionally, hyperarousal is correlated with acceptance (r= 0.21, *p*<.01), humor (r= 0.26, *p*<.01), and positive reframing from the emotion-focused scale (r= 0.22, *p*<.01). Hyperarousal was not significantly correlated with using religion and seeking emotional support as coping mechanisms. Hyperarousal was significantly correlated with all three coping mechanism subscales, but had the strongest correlation with dysfunctional coping (r= 0.55, *p*<.01).

Table 12. Correlation Matrix of Hyperarousal and Coping Mechanisms

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Hyperarousal	1.00																	
Problem-focused	0.26**	1.00																
Active cope	0.19*	0.86**	1.00															
Instrument sup	0.19*	0.83**	0.56**	1.00														
Planning	0.30**	0.86**	0.64**	0.60	1.00													
Emotion-focused	0.25**	0.78**	0.65**	0.68**	0.71**	1.00												
Acceptance	0.21**	0.57**	0.44**	0.47**	0.55**	0.75**	1.00											
Emotion supp	0.14	0.72**	0.58**	0.74**	0.56**	0.74**	0.39**	1.00										
Humor	0.26**	0.33**	0.31**	0.27**	0.34**	0.65**	0.43**	0.36**	1.00**									
Reframing	0.22**	0.75**	0.65**	0.59**	0.71**	0.80**	0.53**	0.59**	0.36**	1.00								
Religion	0.08	0.44**	0.37**	0.39**	0.41**	0.63**	0.28**	0.32**	0.18**	0.40**	1.00							
Dysfunctional	0.55**	0.56**	0.45**	0.48**	0.55**	0.54**	0.46**	0.43**	0.39**	0.52**	0.15**	1.00						
Disengage	0.38**	0.20*	0.11**	0.16**	0.23**	0.18**	0.17**	0.13**	0.13**	0.20**	0.03	0.69**	1.00					
Denial	0.28**	0.19**	0.15**	0.15**	0.17**	0.11**	0.03	0.14**	0.03	0.17**	0.07	0.58**	0.49**	1.00				
Distraction	0.36**	0.58**	0.51**	0.49**	0.49**	0.61**	0.52**	0.46**	0.43**	0.55**	0.22**	0.70**	0.27**	0.18**	1.00			
Self-blame	0.44**	0.46**	0.31**	0.41**	0.52**	0.40**	0.30**	0.33**	0.29	0.42**	0.13	0.75**	0.51**	0.34**	0.39**	1.00		
Substance use	0.36**	0.17**	0.13*	0.13**	0.18**	0.14*	0.17**	0.11*	0.20	0.09	-0.06	0.57**	0.34**	0.36**	0.19**	0.31**	1.00	
Venting	0.38**	0.54**	0.43**	0.45**	0.53**	0.56**	0.45**	0.43**	0.41**	0.51**	0.22**	0.69**	0.29**	0.19**	0.48**	0.41**	0.33**	1.00

*$p<.05$, **$p<.01$

4.5 Multivariate Analysis

Research Question #1) What is the relationship between the severity of hyperarousal, critical incidents, and coping mechanisms among law enforcement officers controlling for race, gender, years employed, military history, rank, and age?

Hypothesis #1: Higher critical incident frequency will predict higher levels of hyperarousal symptom severity among police officers controlling for age, rank, race/ethnicity, years employed, gender, military history, and marital status.

Hypothesis #2: Dysfunctional coping responses will be positively associated with hyperarousal symptom severity.

4.5.1 Model Interpretation

The overall model is significant at $F(11, 208)$, $=8.72$, $p = .00$, Adjusted $R^2 = 0.28$. The demographic variables age, gender, rank, years employed on the police force, age, marital status, and military experience were not statistically significant. A higher frequency of critical incident exposure was significantly positively associated with hyperarousal symptom severity [$B = 0.14$, $t = 2.34$, $p = .02$], which supports the first hypothesis. Of the three coping response types, dysfunctional coping was significantly associated with hyperarousal symptom severity, [$B = 0.13$, $t = 8.10$, $p = .00$] supporting the second hypothesis that the use of dysfunctional coping mechanisms would be associated with increased hyperarousal symptoms. Emotion-focused and

problem-focused coping scales were not significantly associated with hyperarousal symptom severity. In sum, the analysis revealed that the number of total critical incidents experienced and the use of dysfunctional coping mechanisms is related to an increase in hyperarousal symptoms.

Table 13. Multiple Regression Analysis showing Associations Between Hyperarousal Score, Coping Response Type, and Demographic Control Variables

	B	*SE*	β	*t*	*p*
Critical Incidents	0.14	0.06	0.14	2.34	0.02*
Emotion-Focus	-0.00	0.02	-0.05	-0.48	0.63
Problem-Focus	-0.00	0.02	-0.04	-0.41	0.68
Dysfunctional	0.13	0.02	0.58	8.10	0.00**
Male	0.09	0.17	0.03	0.53	0.59
Military History	-0.00	0.15	-0.00	-0.06	0.95
Married/Cohab	0.00	0.14	0.00	0.01	0.99
White	0.01	0.14	0.00	0.09	0.93
Years Worked	0.00	0.02	0.06	0.44	0.66
Age	-0.00	0.01	-0.03	-0.25	0.80
Rank	-0.08	0.17	-0.03	-0.49	0.62

Note. Results: $F(11, 208)=8.72$, $p=0.00$, Adj. $R^2=0.28$
* $p<.05$, ** $p<.01$

Research Question #2) Is hyperarousal associated with a specific type of critical incident?

Hypothesis #3: Critical incidents in which an individual's life is perceived to be in danger will be associated with increased hyperarousal symptom severity.

In order to investigate what types of critical incidents contribute to hyperarousal symptom severity, a multiple linear regression analysis was conducted on hyperarousal to understand the effects of frequency of critical incident exposure.

4.5.2 Model Interpretation

Table 14. Multiple Regression Analysis Predicting Hyperarousal

	B	*SE*	95% CI	*t*	*p*
Threatened by Weapon	0.13	0.10	[-0.07, .32]	1.29	0.20
Use of Force	-0.09	0.03	[-.15, -0.03]	-2.95	0.00**
Life Threatening Situation	0.09	0.03	[0.04, 0.15]	3.28	0.00**
High Speed Chase	-0.05	0.09	[-0.23, 0.13]	-0.54	0.58
Seen Abused Child	0.20	0.10	[-0.00, 0.40]	1.91	0.10
Seen Abused Adult	-0.03	0.03	[-0.83, 0.03]	-1.03	0.44
Seen Neglected Child	0.09	0.10	[-0.11, 0.28]	0.86	0.47
Made Death Notification	-0.82	0.07	[-0.23, 0.65]	-1.10	0.27

Results: $F(8, 243)=3.85$, $p=0.00$, Adj. $R^2=0.11$ *$p<.00$, **$p<.01$

The critical incident use of force had a significant inverse relationship with hyperarousal [B = -0.09, t = -2.95, p = .00], such that the more severe hyperarousal symptoms were associated with individuals using force less. Being involved in a life-threatening situation was positively associated with increased hyperarousal [B = 0.09, t = 3.28, p = .00], supporting the hypothesis that critical incidents involving a personal threat would result in increased hyperarousal symptoms. None of the other critical incidents included in the analysis, being threatened with a weapon, being involved in a high-speed chase, being exposed to an abused or neglected child, or being exposed to an abused adult were significantly related to hyperarousal.

Research Question #3 - Do coping mechanisms mediate the relationship between critical incident exposure and hyperarousal symptom severity?

Hypothesis #4: Coping mechanisms that are considered problem-focused will mediate the relationship between critical incident exposure and hyperarousal symptom severity.

4.5.3 Model Interpretation

In order to examine if coping mechanisms mediate the relationship between critical incidents and hyperarousal symptom severity, mediation analyses were conducted using a structural equation modeling approach (SEM) to mediation analysis. Table 15 shows the statistics of each path in the mediation analysis. Monte Carlo significance tests (See Table 16) revealed that none of the 14 coping mechanisms mediated the relationship between critical incidents and hyperarousal.

Table 15. Statistics of Each Path, Indirect Effects, and Total Effects

Path	*B*	z	*p*	Indirect Effect	Total Effect	Direct Effect
Substance Use				0.03	0.16	0.12
CI→Hyperarousal	0.12	2.35	0.01**			
CI→SU	0.02	1.76	0.08			
SU→ Hyperarousal	1.54	5.92	0.00**			
Self-Blame				0.01	0.16	0.15
CI→Hyperarousal	0.15	2.96	0.00**			
CI→SB	0.00	0.40	0.69			
SB→Hyperarousal	1.26	7.94	0.00**			
Active Coping				0.01	0.16	0.14
CI→Hyperarousal	0.14	2.59	0.01**			
CI→AC	0.13	1.42	0.15			
AC→Hyperarousal	0.11	2.97	0.00**			
Denial				0.00	0.16	0.16
CI→Hyperarousal	0.16	2.98	0.00**			
CI→Denial	-0.00	-0.12	0.90			
Denial→Hyperarousal	1.19	4.73	0.00**			
Emotional Support				0.00	0.16	0.15
CI→Hyperarousal	0.15	2.73	0.00**			
CI→ES	0.02	0.89	0.37			
ES→Hyperarousal	0.35	2.20	0.02*			
Instrumental Support				0.01	0.16	0.14
CI→Hyperarousal	0.15	2.62	0.00**			
CI→IS	0.03	1.36	0.17			
IS→Hyperarousal	0.47	2.93	0.00**			
Behavioral Disengagement				0.00	0.16	0.15
CI→Hyperarousal	0.15	2.98	0.00**			
CI→BD	0.00	0.19	0.85			
BD→Hyperarousal	1.48	6.57	0.00**			
Venting				0.01	0.16	0.14
CI→Hyperarousal	0.15	2.79	0.00**			
CI→Venting	0.01	0.64	0.52			
Venting→Hyperarousal	1.27	6.65	0.00**			
Reframing				0.01	0.16	0.14
CI→Hyperarousal	0.14	2.60	0.00**			
CI→Reframing	0.12	1.26	0.21			
Reframing→Hyperarousal	0.13	3.46	0.00**			
Plan				0.01	0.16	0.15
CI→Hyperarousal	0.15	2.73	0.00**			
CI→Plan	0.02	0.72	0.47			
Plan→Hyperarousal	0.69	5.04	0.00**			
Humor				0.03	0.16	0.13
CI→Hyperarousal	0.13	3.98	0.00**			
CI→Humor	0.05	1.90	0.06			
Humor→Hyperarousal	0.56	3.98	0.00**			
Acceptance				0.02	0.16	0.13
CI→Hyperarousal	0.13	2.41	0.02*			
CI→Acceptance	0.21	2.20	0.03*			
Acceptance→Hyperarousal	0.11	3.12	0.00**			
Religion				0.00	0.16	0.16
CI→Hyperarousal	0.16	2.85	0.00**			
CI→Religion	-0.00	-0.17	0.86			
Religion→Hyperarousal	0.18	1.37	0.17			
Distraction				0.02	0.16	0.13
CI→Hyperarousal	0.13	2.55	0.01**			
CI→Distraction	0.11	1.23	0.22			
Distraction→Hyperarousal	0.23	6.02	0.00**			

*p<.05, **p<.01

Though the coping mechanisms did not serve as mediators in the relationship between critical incidents and hyperarousal, some of the coping mechanisms were significantly associated with hyperarousal. Substance use (*B*=1.54, *p*<.00), self-blame (*B*=1.26, *p*<.00), active coping (*B*=.11, *p*<.00), denial (*B*=1.19, *p*<.00), instrumental support (*B*=.47, *p*<.00), behavioral disengagement (*B*=1.48, *p*<.00), venting (*B*=1.27, *p*<.00), positive reframing (*B*=.13, *p*<.00), planning (*B*=.69, *p*<.00), humor (*B*=.56, *p*<.00), acceptance (*B*=.11, *p*<.00), and distraction (*B*=.23, *p*<.00) were significantly positively associated with hyperarousal. Religion and emotional support were not significantly associated with hyperarousal.

Table 16. Significance Testing of Indirect Effect

	Indirect Effect	SE	*Z*	*p*
Self-Blame	0.00	0.02	0.34	0.73
Active Coping	0.01	0.01	1.20	0.23
Denial	-0.00	0.02	-0.17	0.86
Substance use	0.03	0.02	1.61	0.11
Emotional Support	0.00	0.00	0.73	0.46
Instrumental Support	0.01	0.01	1.15	0.25
Behavioral Disengagement	0.00	0.02	0.13	0.90
Venting	0.01	0.02	0.57	0.57
Reframing	0.01	0.01	1.10	0.27
Planning	0.01	0.02	0.65	0.51
Humor	0.02	0.02	1.64	0.10
Acceptance	0.02	0.01	1.73	0.08
Religion	-0.00	0.00	-0.17	0.87
Distraction	0.02	0.02	1.14	0.25

**p<.05*

In sum, coping mechanisms were not found to mediate the relationship between critical incidents and hyperarousal, but there were significant direct relationships between critical incidents and hyperarousal, critical incidents and acceptance coping (*B*=.21, *p*<.05), and many of

the coping mechanisms and hyperarousal. The magnitude of this relationship is strongest among coping mechanisms that are considered dysfunctional, which means that among this sample critical incidents are associated with a likelihood that an individual will utilize dysfunctional coping mechanisms.

5.0 Discussion

This study was designed to examine the relationships between critical incidents and hyperarousal symptom severity. This study also sought to examine the role of coping mechanisms in mediating the relationship among law enforcement officers. Descriptive findings of this study suggested that symptoms of hyperarousal, like hypervigilance and sleep issues are a concern for a significant number of participants in the study. Additionally, about half of the sample met the clinical-cutoff of the hyperarousal symptom cluster. High rates of hyperarousal symptoms are concerning among this population and should be further researched, because of the association between hyperarousal and interferences with daily functioning and information processing

This study included a checklist of critical incidents to determine the level of critical incident exposure among the Richmond Police Department which is located in a large metropolitan city. Among this sample, the exposure to critical incidents was a frequent occurrence, with only ten respondents stating that they did not experience a critical incident over a period of six months. Officers reported encounters with dead bodies, being in situations in which they felt they needed to use force, and being present when someone is dying as critical incidents that they encountered most often.

5.1 Critical Incident Type and Hyperarousal

Based on past research regarding the cumulative effects of trauma (Paton et al., 2009), it was hypothesized that that individuals that experienced a greater frequency of traumatic event

exposure in a period of six months would have higher rates of hyperarousal, and the findings reflected that association. It can be concluded that among this sample that the additive effect of critical incidents over the course of six months is significantly positively associated with hyperarousal symptom severity. Past research has found that critical incidents that occur infrequently, like causing harm to another officer, are considered the most severe and put officers at risk of adverse outcomes (Chopko et al., 2015; Weiss et al., 2010). This finding was not reflected among the sample. The experience of being involved in a life-threatening situation was related to increased hyperarousal symptoms, however, life-threatening situations occurred frequently among the sample. Instances in which a police officer felt it was necessary to utilize force were the second most frequent critical incident type and were inversely associated with hyperarousal. Since the symptoms of hyperarousal include jumpiness and hypervigilance it would be expected that the relationship between use of force and hyperarousal would be significantly positive. One possible reason for the inverse association could be that traumatized officers are not in the field and do not have the opportunity to utilize force as frequently as other officers.

Past research has indicated that incidents in which an individual perceives to be a threat to their livelihood can result in more severe symptoms of PTSD (Carlier et al., 1997; Marmar et al., 2006). Based on this research, it was hypothesized that critical incidents that involved a direct, personal threat of injury or harm would result in increased hyperarousal symptom severity. Exposure to life-threatening situations frequently occurred among the sample, with approximately 66% of the sample reporting a life-threatening situation over the period of six months prior to the survey. My hypothesis was supported as individuals who most frequently experienced a life-threatening situation reported increased hyperarousal symptoms severity. However, there were critical incidents related to personal threat and injury that were not significantly related to

hyperarousal severity including: 1) Been threatened with a gun, knife, or other weapon? and 2) Been involved in a high-speed chase where lives were in danger? Future research should explore the nuance between different types of threatening situations which might result in not only hyperarousal symptoms but adverse mental health outcomes in general.

5.2 Demographic Characteristics as Risk Factors

The control variable years employed on the police force was included in the analysis because it was assumed that officers who were employed longer would have higher hyperarousal scores due to the potential that the longer one was employed as a police officer there would be an increased likelihood of more of experiencing more traumatic events, but this was not found in this study. However, it is possible that years employed as a police officer is not an adequate measure of exposure to critical incidents as one's shift or patrol area could be more of an indicator of the number of critical incidents an officer is exposed to during their career. Past research has found that older officers experienced significantly higher prevalence of PTSD than younger officers (Darensburg et al., 2006). However, age of an officer was not significantly related to hyperarousal severity. Similarly, it was assumed that officers with military experience could potentially have experienced trauma during their service, but military experience even among those deployed was not significantly associated with increased hyperarousal symptoms.

There is conflicting evidence on the role of gender among stress outcomes for police with some researchers finding women at increased risk (Brewin et al, 2001; Hartley et al., 2013) and some researchers finding no gender effect (Meffert et al., 2008). Among this sample, there were no gender differences. Past research on law enforcement officers had found that ethnic and racial

minority groups reported experiencing more stress than their White counterparts (Gershon et al., 2009). In this sample there were no significant racial or ethnic differences in hyperarousal symptom severity. Per stress and coping theory, officers with strong social support will be less likely to experience negative outcomes of stress. It was expected that officers with marital status of married or living with their partner would have increased social support and would have lower hyperarousal symptom severity than officers who were single or widowed. Among this sample, no differences in the outcome of hyperarousal were significant regardless of the marital status of the officers. There were also no significant differences in officer rank. The lack of significant association between hyperarousal, problem-focused coping, emotion-focused coping, and control variables highlights the roles of critical incidents and dysfunctional coping in hyperarousal.

Critical incidents that were related to secondary trauma were not significantly associated with hyperarousal symptom severity including: encountering a child who was severely neglected or in need of medical care, encountering an adult who was severely neglected or in need of medical care, and encountering a child who had experienced sexual assault or was in need of medical care. Incidents of secondary traumatization occurred more frequently than most of the other critical incident types. The potential difference between personal trauma and secondary trauma could be that the latter might invoke feelings of anger or numbing, rather than a hyperarousal response. It is possible that officers could be desensitized to these critical incidents due to the frequency of their exposure (Ellis & Knight, 2021).

5.3 Coping and Hyperarousal

Dysfunctional coping style was also significantly related to hyperarousal symptom severity, highlighting the importance of the relationship between coping style and hyperarousal. Surprisingly, problem-focused coping did not significantly buffer the relationship between hyperarousal and critical incidents. The role of dysfunctional coping was not expected to be as significant to the relationship between critical incidents and hyperarousal. While coping mechanisms did not mediate the relationship between critical incidents and hyperarousal among this sample, several coping mechanisms were significantly associated with hyperarousal. The magnitude of these relationships were strongest among coping mechanisms that are considered dysfunctional like substance use, self-blame, venting, behavioral disengagement, and denial.

This study utilized a stress and coping framework (Lazarus & Folkman, 1986) in order to develop a series of hypotheses regarding the relationships between critical incident stressors and hyperarousal. It was assumed that coping mechanisms that are considered problem-focused, like active coping, planning, and the use of instrumental support, would mediate the relationship between critical incident exposure and hyperarousal. However, among this sample, mediation did not occur. Critical incident stress was only significantly associated with an increase in acceptance as a coping mechanism among this population. Acceptance is considered a problem-focused coping skill and was highly utilized among the sample. Coping had a much less significant role in mediating the relationship between critical incidents and hyperarousal than I anticipated. The role of dysfunctional coping was more significant as a contributor to hyperarousal severity than problem-focused coping in mediation.

5.4 Implications

Research has established that police officers experience a high level of critical incidents as part of their job, and that police officers also interact with the public as part of their occupational duties. Officers who are experiencing symptoms of hyperarousal are more likely to respond to an innocuous event in a hypervigilant or overreactive manner. Future research should focus on the influence of hyperarousal symptomology and police-citizen interactions.

Due to the relationship between life threatening events and hyperarousal symptom severity, and the prevalence of these events among this sample, it is important to intervene with police who experience life threatening situations in order to prevent physiological and mental health outcomes. Police officers are a population who do not engage in help-seeking behavior, so it is particularly important to normalize mental health care by creating a self-care routine following a traumatic incident. Interventions following a traumatic event can occur at different time-points following critical incident exposure. The tertiary prevention of traumatic stress symptoms involves treating symptoms following their establishment. Tertiary prevention is rarely utilized by police and is highly stigmatized among the population (Amaranto, 2003). Secondary prevention interventions, like debriefings, occur after the traumatic incident and prior to the development of traumatic stress symptoms (Feldner, Monson, & Friedman, 2007). There is some evidence that debriefings are not effective in the reduction of PTSD and general distress, regardless of the number of sessions attended (Rose, Bisson, Churchill, & Wessely, 2002; Roberts, Kitchiner, Kenardy, & Bisson, 2009). Therefore, primary prevention, or preparation training for traumatic events might be beneficial in this population as it reduces the likelihood of stigmatization, due to the focus of prevention rather than the management of mental health symptoms. Additionally, preparation training for critical incident stress management can assist in the reduction of the perceived threat

of a stressor. Departments should provide resources to officers immediately following an incident, including mandatory time-off in order to destigmatize self-care following a life-threatening critical incident.

Due to the negative physical, psychological, and behavioral effects of stressors on individual police officers and the potential that these effects could negatively impact the manner in which police interact with citizens, future research should focus on the identification of stressors that might influence increases in hyperarousal or associated symptoms, like anger. Additionally, the identification of specific stressors related to distress can assist departmental policies and trainings to prevent or assist law enforcement with the most stressful events or aspects of their occupation. This research could assist officers on an individual level as they will experience less personal distress, but it could also assist officers on a social and occupational level due to the potential behavioral effects associated with hyperarousal. .

5.5 Limitations

There are several limitations to the current study. The first limitation is the cross-sectional study design that relied on the use of retrospective survey data. The study design limits the ability to determine causality of the relationships between critical incidents and traumatic events. The use of retrospective data introduces the potential of recall bias.

The use of self-reported survey data is also a limitation. Police officers are a population that rarely engages in research, and it is possible that a lack of rapport between participants and researchers can result in the underreporting of stressors. Second, police officers might respond to survey questions in a socially desirable manner and downplay mental health symptoms due to

stigma. This is particularly true due the sensitivity and stigma related to some of the survey items. Further, the survey was completed at the workplace and surveys were given to participants by coworkers. While the surveys were placed in envelopes and de-identified, respondents might not have responded accurately or underreported symptoms and stressors, due to the stigma related to mental illness, substance use, and aggression, particularly related to their employment. Research has shown that police officers underreport psychological distress, as it could cause the loss of the use of their firearms or result in limitations of some of their job duties (Perrin et al., 2007).

The purposive sampling method used in this study limits the generalizability of the results. There is potential that police officers who struggling with mental health or experienced a significant critical incident were unable or unwilling to participate in the survey. Therefore, the magnitude of the outcomes of stress among the sample might be much higher due to the potential exclusion of participants effected by stress. Future research should utilize rigorous sampling methods and recruit participants from multiple police departments to ensure a sample representative of the population.

Policing is an occupation that requires individuals to remain vigilant as they frequently encounter dangerous situations. The PCL-5 measures the symptoms of hyperarousal based on the frequency in which the individual is bothered by the presence of the symptom. Since vigilance is considered an occupational necessity, future research should examine hypervigilance in-depth to assess the level that police officers experience hypervigilance throughout their day to day life when it might not be beneficial to them.

Coping mechanisms did not significantly mediate the relationship between traumatic events and hyperarousal. It is possible that coping serves as a moderator in this relationship and future research should investigate the moderating role of coping mechanisms in the relationship

between traumatic events and hyperarousal. Additionally, the role of coping scales rather than individual coping mechanisms should be examined in future research.

Since the perception of a threat has influence on the resulting psychological response (Violanti et al., 2000), it is difficult to measure the influence of one type of event on a group of people without specifically measuring participants' perception of the severity of the event. While this study examined the frequency of the type of trauma associated with response, it did not take into account the individual perception of the severity of that trauma. This dissertation focused on a sample of police officers because they experience a multitude of critical incidents that meeting the criteria of a traumatic event per the DSM. These results are not generalizable, because police officers could be desensitized to experiencing traumatic events due to the frequency of their exposure. The prevalence of critical incidents that they face at work could influence their psychological response to these incidents. Additionally, police officers are trained to anticipate encountering crisis situations, and traumatic events might not affect them in the same way as the general population.

5.6 Conclusion

The stress faced by police officers is important to consider due to the amount of contact that they have with vulnerable and minoritized populations on a regular basis. Additionally, they are at risk of frequent traumatization because of their roles as first responders in many emergency situations. They are also a population that does not typically engage in research, making it difficult to know how critical incident and other occupational stressors affect their mental and physical

health. Further, there are is stigma among police associate with seeking help, specifically for mental health issues which acts as a barrier to treatment and puts them at risk for additional issues.

Traumatic stress is associated with comorbidities such as depression, anxiety, mood disorders, poor physical health outcomes, and substance use issues (Mcgruder et al., 2005; Wang et al., 2010; Kessler, 1995; 2005). The hyperarousal symptom cluster is associated with increased heart rate when resting (Cohen et al., 1997) and heightened physiological responses to unremarkable stimuli (Gerardi et al., 1994). Among law enforcement, the hyperarousal symptom cluster should be examined, not only because of the association with negative physiological and mental health consequences, but due to the potential effects that the symptom cluster can have on work performance and interactions with the community. Specifically, research should focus on hyperarousal symptoms such as anger, irritability, sleep issues, and problems with concentration among police officers.

The identification coping mechanisms utilized by officers that are high in resilience could inform the development of trainings that focus on the improvement of skill sets that have been found to buffer the effects of stressors among law enforcement officers. Additionally, the identification of specific stressors related to distress can assist departmental policies and trainings to prevent or assist law enforcement with the most stressful events or aspects of their occupation. Understanding these relationships could be very important to examine both for the well-being of police officers, their families, and the community.

Appendix Diagnostic Tool

Richmond Police Department

University of Pittsburgh

Participation in this survey is completely voluntary and will in no way cause any benefit or harm your employment with the department. This survey will be reviewed by a researcher at the University of Pittsburgh, and results will be confidential. Thank you for your time and participation.

Survey ID: _____ _____ _____ _____

First two letters of your Mother's maiden name **Last two digits of birth year (e.g. 1979= 79)**

Bibliography

Agnew, R. (1992). Foundation for a general strain theory of crime and delinquency. Criminology, 30(1), 47-88.

Agnew, R. (2001). Building on the foundation of general strain theory: Specifying the types of strain most likely to lead to crime and delinquency. *Journal of research in crime and delinquency*, *38*(4), 319-361.

Agnew, R., & White, H. R. (1992). An empirical test of general strain theory. *Criminology*, *30*(4), 475-500.

Alexander, D. A., & Klein, S. (2009). First responders after disasters: a review of stress reactions, at-risk, vulnerability, and resilience factors. *Prehospital and disaster medicine*, *24*(02), 87-94.

Alpert, G. P., Rojek, J., & Hansen, J. A. (2013). Building bridges between police researchers and practitioners: Agents of change in a complex world. *Final Report to the National Institute of Justice*.

Amaranto, E., Steinberg, J., Castellano, C., & Mitchell, R. (2003). Police stress interventions. *Brief Treatment and Crisis Intervention*, *3*(1), 47.

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (DSM-5®). American Psychiatric Pub.

Arnetz, B. B., Arble, E., Backman, L., Lynch, A., & Lublin, A. (2013). Assessment of a prevention program for work-related stress among urban police officers. *International archives of occupational and environmental health*, *86*(1), 79-88.

Arnsten, A. F., & Goldman-Rakic, P. S. (1998). Noise stress impairs prefrontal cortical cognitive function in monkeys: evidence for a hyperdopaminergic mechanism. *Archives of general psychiatry*, *55*(4), 362-368.

Arter, M. L. (2007). Stress and deviance in policing. *Deviant Behavior*, *29*(1), 43-69.

Ashley, V., Honzel, N., Larsen, J., Justus, T., & Swick, D. (2013). Attentional bias for trauma-related words: exaggerated emotional Stroop effect in Afghanistan and Iraq war veterans with PTSD. *BMC psychiatry*, *13*(1), 86.

Baird, K., & Kracen, A. C. (2006). Secondary traumatization and secondary traumatic stress: A research synthesis. *Counselling Psychology Quarterly*, *19*(2), 181-188.

Bakker, A. B., & Heuven, E. (2006). Emotional dissonance, burnout, and in-role performance among nurses and police officers. *International Journal of Stress Management*, *13*(4), 423.

Barbour, K. A., Eckhardt, C. I., Davison, G. C., & Kassinove, H. (1998). The experience and expression of anger in maritally violent and maritally discordant-nonviolent men. *Behavior therapy*, *29*(2), 173-191.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology*, *51*(6), 1173.

Barrett, E. L., Teesson, M., & Mills, K. L. (2014). Associations between substance use, post-traumatic stress disorder and the perpetration of violence: A longitudinal investigation. *Addictive behaviors*, *39*(6), 1075-1080.

Bayley, D. H. (2002). Law enforcement and the rule of law: Is there a tradeoff?. *Criminology & Public Policy*, *2*(1), 133-154.

Berking, M., Meier, C., & Wupperman, P. (2010). Enhancing emotion-regulation skills in police officers: Results of a pilot controlled study. *Behavior Therapy*, *41*(3), 329-339.

Bishopp, S. A., Piquero, N. L., Worrall, J. L., & Piquero, A. R. (2018). Negative affective responses to stress among urban police officers: A General Strain Theory approach. *Deviant Behavior*, 1-20.

Blau, T. H. (1994). Psychological services for law enforcement. John Wiley & Sons.

Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, *28*(6), 489-498.

Bradley, R., Greene, J., Russ, E., Dutra, L., & Westen, D. (2005). A multidimensional meta-analysis of psychotherapy for PTSD. American journal of Psychiatry, 162(2), 214-227.

Brewer, J. D., Wilford, R., Guelke, A., Hume, I., & Moxon-Browne, E. (2016). The police, public order and the state: policing in Great Britain, Northern Ireland, the Irish Republic, the USA, Israel, South Africa and China. Springer.

Brewin, C. R. (2001). A cognitive neuroscience account of posttraumatic stress disorder and its treatment. *Behaviour research and therapy*, *39*(4), 373-393.

Brezina, T. (1999). Teenage violence toward parents as an adaptation to family strain: Evidence from a national survey of male adolescents. *Youth & Society*, *30*(4), 416-444.

Brown, J. M., & Campbell, E. A. (1990). Sources of occupational stress in the police. *Work & stress*, *4*(4), 305-318.

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Police and Detectives, at https://www.bls.gov/ooh/protective-service/police-and-detectives.htm (visited *April 14, 2021*).

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook*, Social Workers,
at https://www.bls.gov/ooh/community-and-social-service/social-workers.htm (visited *October 28, 2021*).

Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the connor–davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, *20*(6), 1019-1028.

Cannizzo Jr, T. A., & Liu, P. (1995). The Relationship between Levels of Perceived Burnout and Career State among Sworn Police Officers. *Police Stud.: Int'l Rev. Police Dev.*, *18*, 53.

Cannon, W. B. (1916). *Bodily changes in pain, hunger, fear, and rage: An account of recent researches into the function of emotional excitement*. D. Appleton.

Carlan, P. E., & Nored, L. S. (2008). An examination of officer stress: should police departments implement mandatory counseling?. *Journal of Police and Criminal Psychology*, *23*(1), 8-15.

Carlier, I. V., Lamberts, R. D., & Gersons, B. P. (1997). Risk factors for posttraumatic stress symptomatology in police officers: a prospective analysis. *The Journal of nervous and mental disease*, *185*(8), 498-506.

Carver, C. S. (1997). You want to measure coping but your protocol'too long: Consider the brief cope. *International journal of behavioral medicine*, *4*(1), 92.

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: a theoretically based approach. *Journal of personality and social psychology*, *56*(2), 267.

Chan, J. (2007). Police stress and occupational culture. In Police Occupational Culture (pp. 129-151). Emerald Group Publishing Limited.

Chemtob, C. M., Novaco, R. W., Hamada, R. S., Gross, D. M., & Smith, G. (1997). Anger regulation deficits in combat-related posttraumatic stress disorder. Journal of traumatic stress, 10(1), 17-36.

Chopko, B. A., & Schwartz, R. C. (2012). Correlates of career traumatization and symptomatology among active-duty police officers. *Criminal Justice Studies*, *25*(1), 83-95.

Chopko, B. A., Palmieri, P. A., & Adams, R. E. (2015). Critical incident history questionnaire replication: frequency and severity of trauma exposure among officers from small and midsize police agencies. *Journal of traumatic stress*, *28*(2), 157-161.

Clark-Miller, J., & Brady, H. C. (2013). Critical stress: Police officer religiosity and coping with critical stress incidents. Journal of Police and Criminal Psychology, 28(1), 26-34.

Cochran, J. K., & Bromley, M. L. (2003). The myth (?) of the police sub-culture. *Policing: An International Journal of Police Strategies & Management, 26*(1), 88-117.

Cohen, H., Kotler, M., Matar, M. A., Kaplan, Z., Miodownik, H., & Cassuto, Y. (1997). Power spectral analysis of heart rate variability in posttraumatic stress disorder patients. *Biological psychiatry*.

Coker, A. L., Smith, P. H., Thompson, M. P., McKeown, R. E., Bethea, L., & Davis, K. E. (2002). Social support protects against the negative effects of partner violence on mental health. *Journal of women's health & gender-based medicine, 11*(5), 465-476.

Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and anxiety, 18*(2), 76-82.

Cooper, C., Katona, C., & Livingston, G. (2008). Validity and reliability of the brief COPE in carers of people with dementia: the LASER-AD Study. *The Journal of nervous and mental disease, 196*(11), 838-843.

Craun, S. W., Bourke, M. L., & Coulson, F. N. (2015). The impact of internet crimes against children work on relationships with families and friends: an exploratory study. *Journal of Family Violence, 30*(3), 393-402.

Cross, C. L., & Ashley, L. (2004). Police trauma and addiction: Coping with the dangers of the job. *FBI L. Enforcement Bull., 73*, 24.

Darensburg, T., Andrew, M. E., Hartley, T. A., Burchfiel, C. M., Fekedulegn, D., & Violanti, J. M. (2006). Gender and age differences in posttraumatic stress disorder and depression among Buffalo police officers. *Traumatology, 12*(3), 220-228.

Davidson, A. C., Berah, E., & Moss, S. (2006). The relationship between the adjustment of Australian police officers and their partners. *Psychiatry, Psychology and law, 13*(1), 41-48.

Dowling, F. G., Moynihan, G., Genet, B., & Lewis, J. (2006). A peer-based assistance program for officers with the New York City Police Department: Report of the effects of Sept. 11, 2001. *American Journal of Psychiatry, 163*(1), 151-153.

Edwards, F., Lee, H., & Esposito, M. (2019). Risk of being killed by police use of force in the United States by age, race–ethnicity, and sex. *Proceedings of the National Academy of Sciences, 116*(34), 16793-16798.

Eith, C. A., & Durose, M. R. (2011). *Contacts between police and the public, 2008*. Washington, DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Ellis, C., & Knight, K. E. (2021). Advancing a model of secondary trauma: Consequences for victim service providers. Journal of interpersonal violence, 36(7-8), 3557-3583.

Ellison, K. W. (2004). *Stress and the police officer*. Charles C Thomas Publisher.

Ellrich, K., & Baier, D. (2017). Post-traumatic stress symptoms in police officers following violent assaults: a study on general and police-specific risk and protective factors. *Journal of interpersonal violence*, *32*(3), 331-356.

Feldner, M. T., Monson, C. M., & Friedman, M. J. (2007). A critical analysis of approaches to targeted PTSD prevention: current status and theoretically derived future directions. *Behavior modification*, *31*(1), 80-116.

Fetzner, M. G., McMillan, K. A., & Asmundson, G. J. (2012). Similarities in specific physical health disorder prevalence among formerly deployed Canadian forces veterans with full and subsyndromal PTSD. *Depression and anxiety*, *29*(11), 958-965.

Figley, C. R. (1995). Compassion fatigue: Toward a new understanding of the costs of caring.

Folkman, S., & Lazarus, R. S. (1980). An analysis of coping in a middle-aged community sample. Journal of health and social behavior, 219-239.

Folkman, S., & Lazarus, R. S. (1985). If it changes it must be a process: study of emotion and coping during three stages of a college examination. *Journal of personality and social psychology*, *48*(1), 150.

Folkman, S., & Moskowitz, J. T. (2004). Coping: Pitfalls and promise. *Annu. Rev. Psychol.*, *55*, 745-774.

Folkman, S., Lazarus, R. S., Dunkel-Schetter, C., DeLongis, A., & Gruen, R. J. (1986). Dynamics of a stressful encounter: cognitive appraisal, coping, and encounter outcomes. *Journal of personality and social psychology*, *50*(5), 992.

Forbes, D., Creamer, M., Hawthorne, G., Allen, N., & McHugh, T. (2003). Comorbidity as a predictor of symptom change after treatment in combat-related posttraumatic stress disorder. *The Journal of Nervous and Mental Disease*, *191*(2), 93-99.

Galovski, T. E., Peterson, Z. D., Beagley, M. C., Strasshofer, D. R., Held, P., & Fletcher, T. D. (2016). Exposure to violence during Ferguson protests: mental health effects for law enforcement and community members. *Journal of traumatic stress*, *29*(4), 283-292.

Gerardi, R. J., Keane, T. M., Cahoon, B. J., & Klauminzer, G. W. (1994). An in vivo assessment of physiological arousal in posttraumatic stress disorder. *Journal of Abnormal Psychology*, *103*(4), 825.

Gershon, R. (2000). National Institute of Justice final report: "Project SHIELDS.". Washington, DC: National Institute of Justice.

Gershon, R. R., Barocas, B., Canton, A. N., Li, X., & Vlahov, D. (2009). Mental, physical, and behavioral outcomes associated with perceived work stress in police officers. *Criminal justice and behavior*, *36*(3), 275-289.

Glass, A. J. (1974). Mental health programs in the armed forces. *American handbook of psychiatry*, 800-809.

Goldfarb, D. A., & Aumiller, G. S. (2008). The heavy badge.

Goral, A., Lahad, M., & Aharonson-Daniel, L. (2017). Differences in posttraumatic stress characteristics by duration of exposure to trauma. *Psychiatry research*, *258*, 101-107.

Gray, M. J., Bolton, E. E., & Litz, B. T. (2004). A longitudinal analysis of PTSD symptom course: delayed-onset PTSD in Somalia peacekeepers. *Journal of consulting and clinical psychology*, *72*(5), 909.

Green, B. L., Goodman, L. A., Krupnick, J. L., Corcoran, C. B., Petty, R. M., Stockton, P., & Stern, N. M. (2000). Outcomes of single versus multiple trauma exposure in a screening sample. Journal of traumatic stress, 13(2), 271-286.

Grillon, C., Pine, D. S., Lissek, S., Rabin, S., Bonne, O., & Vythilingam, M. (2009). Increased anxiety during anticipation of unpredictable aversive stimuli in posttraumatic stress disorder but not in generalized anxiety disorder. *Biological psychiatry*, *66*(1), 47-53.

Gunzler, D., Chen, T., Wu, P., & Zhang, H. (2013). Introduction to mediation analysis with structural equation modeling. *Shanghai archives of psychiatry*, *25*(6), 390–394. https://doi.org/10.3969/j.issn.1002-0829.2013.06.009

Gutshall, C. L., Hampton Jr, D. P., Sebetan, I. M., Stein, P. C., & Broxtermann, T. J. (2017). The effects of occupational stress on cognitive performance in police officers. *Police Practice and Research*, *18*(5), 463-477.

Haisch, D. C., & Meyers, L. S. (2004). MMPI-2 assessed post-traumatic stress disorder related to job stress, coping, and personality in police agencies. Stress and Health: Journal of the International Society for the Investigation of Stress, 20(4), 223-229.

Hartley, T. A., Sarkisian, K., Violanti, J. M., Andrew, M. E., & Burchfiel, C. M. (2013). PTSD symptoms among police officers: Associations with frequency, recency, and types of traumatic events. *International journal of emergency mental health*, *15*(4), 241.

Hoffmann, J. P., & Cerbone, F. G. (1999). Stressful life events and delinquency escalation in early adolescence. *Criminology*, *37*(2), 343-374.

Hyland, S., Langton, L., & Davis, E. J. (2015). *Police use of nonfatal force, 2002-11*. Washington DC: US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics.

Iacobucci, D., Saldanha, N., & Deng, X. (2007). A meditation on mediation: Evidence that structural equations models perform better than regressions. *Journal of consumer psychology*, *17*(2), 139-153.

Ilie, A., Penney, L. M., Ispas, D., & Iliescu, D. (2012). The role of trait anger in the relationship between stressors and counterproductive work behaviors: Convergent findings from multiple studies and methodologies. *Applied Psychology, 61*(3), 415-436.

Jackson, J., Huq, A. Z., Bradford, B., & Tyler, T. R. (2013). Monopolizing force? Police legitimacy and public attitudes toward the acceptability of violence. *Psychology, Public Policy, and Law*, *19*(4), 479.

Jackson, S. E., & Maslach, C. (1982). After-effects of job-related stress: Families as victims. *Journal of organizational behavior*, *3*(1), 63-77.

Janik, J. (1991). What value are cognitive defenses in critical incident stress. *Critical incidents in policing*, 149-158.

Janoff-Bulman, R. (2010). *Shattered assumptions*. Simon and Schuster.

Johnson, L. B., Todd, M., & Subramanian, G. (2005). Violence in police families: Work-family spillover. *Journal of family violence*, *20*(1), 3-12.

Karlsson, I., & Christianson, S. Å. (2003). The phenomenology of traumatic experiences in police work. *Policing: An International Journal of Police Strategies & Management*, *26*(3), 419-438.

Keinan, G., Shrira, A., & Shmotkin, D. (2012). The association between cumulative adversity and mental health: considering dose and primary focus of adversity. *Quality of Life Research*, *21*(7), 1149-1158.

Kilpatrick, D. G., Resnick, H. S., Milanak, M. E., Miller, M. W., Keyes, K. M., & Friedman, M. J. (2013). National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of traumatic stress*, *26*(5), 537-547.

Kirkcaldy, B. D., Trimpop, R., & Cooper, C. L. (1997). Working hours, job stress, work satisfaction, and accident rates among medical practitioners and allied personnel. International Journal of Stress Management, 4(2), 79-87.

Kiser, L., Heston, J., Hickerson, S., Millsap, P., Nunn, W., & Pruitt, D. (1993). Anticipatory stress in children and adolescents. *American Journal of Psychiatry*, *150*, 87-87.

Kitaeff, J. (2011). Handbook of Police Psychology. Routledge.

Klinger, D. A. (1997). Negotiating order in patrol work: An ecological theory of police response to deviance. Criminology, 35(2), 277-306.

Komarovskaya, I., Maguen, S., McCaslin, S. E., Metzler, T. J., Madan, A., Brown, A. D., ... & Marmar, C. R. (2011). The impact of killing and injuring others on mental health symptoms among police officers. *Journal of psychiatric research*, *45*(10), 1332-1336.

Kop, N., Euwema, M., & Schaufeli, W. (1999). Burnout, job stress and violent behaviour among Dutch police officers. *Work & Stress*

Lazarus, R. S. (1966). Psychological stress and the coping process.

Lazarus, R. S., & Folkman, S. (1984). Coping and adaptation. The handbook of behavioral medicine, 282325.

Lee, A., Isaac, M., & Janca, A. (2002). Post-traumatic stress disorder and terrorism. Current Opinion in Psychiatry, 15(6), 633-637.

Lee, D. A., Scragg, P., & Turner, S. (2001). The role of shame and guilt in traumatic events: A clinical model of shame-based and guilt-based PTSD. British journal of medical psychology, 74(4), 451-466.

Liberman, A. M., Best, S. R., Metzler, T. J., Fagan, J. A., Weiss, D. S., & Marmar, C. R. (2002). Routine occupational stress and psychological distress in police. *Policing: An International Journal of Police Strategies & Management*, *25*(2), 421-441.

Lindsay, V., & Shelley, K. (2009). Social and stress-related influences of police officers' alcohol consumption. *Journal of Police and Criminal Psychology*, *24*(2), 87-92.

MacKinnon, D. P., Cheong, J., & Pirlott, A. G. (2012). *Statistical mediation analysis*. American Psychological Association.

Maguen, S., Metzler, T. J., McCaslin, S. E., Inslicht, S. S., Henn-Haase, C., Neylan, T. C., & Marmar, C. R. (2009). Routine work environment stress and PTSD symptoms in police officers. *The Journal of nervous and mental disease*, *197*(10), 754.

Marmar, C. R., McCaslin, S. E., Metzler, T. J., Best, S., Weiss, D. S., Fagan, J., ... & Mohr, D. (2006). Predictors of posttraumatic stress in police and other first responders. *Annals of the New York Academy of Sciences*, *1071*(1), 1-18.

Marotta-Walters, S., Choi, J., & Shaine, M. D. (2015). Posttraumatic growth among combat veterans: A proposed developmental pathway. *Psychological Trauma: Theory, Research, Practice, and Policy*, *7*(4), 356.

Marshall, E. K. (2006). Cumulative career traumatic stress (CCTS): A pilot study of traumatic stress in law enforcement. *Journal of Police and Criminal psychology*, *21*(1), 62-71.

Martinussen, M., Richardsen, A. M., & Burke, R. J. (2007). Job demands, job resources, and burnout among police officers. Journal of criminal justice, 35(3), 239-249.

Maschi, T., & Morgan, K. Bradley, & C., Hatcher, SS (2007). Exploring gender differences on internalizing and externalizing behavior among maltreated youth: Implications for social work action. *Child and Adolescent Social Work Journal*, *25*, 531-547.

Maslach, C., & Schaufeli, W. (1993). History and conceptual specificity of burnout. *Recent Developments in Theory and Research, Hemisphere*, 44-52.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual review of psychology*, *52*(1), 397-422.

McCreary, D. R., & Thompson, M. M. (2006). Development of two reliable and valid measures of stressors in policing: The operational and organizational police stress questionnaires. *International Journal of Stress Management, 13*(4), 494.

McEwen, B. S. (2004). Protection and damage from acute and chronic stress: allostasis and allostatic overload and relevance to the pathophysiology of psychiatric disorders. *Annals of the New York Academy of Sciences, 1032(*1), 1-7.

Mealer, M., Burnham, E. L., Goode, C. J., Rothbaum, B., & Moss, M. (2009). The prevalence and impact of post traumatic stress disorder and burnout syndrome in nurses. *Depression and anxiety*, *26*(12), 1118-1126.

Meffert, S. M., Metzler, T. J., Henn-Haase, C., McCaslin, S., Inslicht, S., Chemtob, C., ... & Marmar, C. R. (2008). A prospective study of trait anger and PTSD symptoms in police. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies*, *21*(4), 410-416.

Ménard, K. S., & Arter, M. L. (2013). Police officer alcohol use and trauma symptoms: Associations with critical incidents, coping, and social stressors. *International Journal of Stress Management*, *20*(1), 37.

Meyer, B. (2001). Coping with severe mental illness: Relations of the Brief COPE with symptoms, functioning, and well-being. *Journal of Psychopathology and Behavioral Assessment, 23*(4), 265-277.

Mikkelsen, A., & Burke, R. J. (2004). Work-family concerns of Norwegian police officers: Antecedents and consequences. *International Journal of Stress Management, 11*(4), 429.

Mor Barak, M. E., Nissly, J. A., & Levin, A. (2001). Antecedents to retention and turnover among child welfare, social work, and other human service employees: What can we learn from past research? A review and metanalysis. *Social service review*, *75*(4), 625-661.

Neuner, F., Schauer, M., Karunakara, U., Klaschik, C., Robert, C., & Elbert, T. (2004). Psychological trauma and evidence for enhanced vulnerability for posttraumatic stress disorder through previous trauma among West Nile refugees. *BMC psychiatry*, *4*(1), 34.

Nix, J., & Pickett, J. T. (2017). Third-person perceptions, hostile media effects, and policing: Developing a theoretical framework for assessing the Ferguson effect. Journal of criminal justice, 51, 24-33.

Norris, F. H. (1992). Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *Journal of consulting and clinical psychology*, *60*(3), 409.

Oliver, W. M. (2004). Stress in small town and rural law enforcement: Testing the assumptions. *American Journal of Criminal Justice*, *29*(1), 37-56.Orth, U., & Wieland, E. (2006). Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: A meta-analysis. *Journal of consulting and clinical psychology*, *74*(4), 698.

Ozer, E. J., Best, S. R., Lipsey, T. L., & Weiss, D. S. (2003). Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychological bulletin*, *129*(1), 52.

Papazoglou, K. (2013). Conceptualizing police complex spiral trauma and its applications in the police field. Traumatology, 19(3), 196-209.

Pasillas, R. M., Follette, V. M., & Perumean-Chaney, S. E. (2006). Occupational stress and psychological functioning in law enforcement officers. *Journal of Police and Criminal psychology*, *21*(1), 41-53.

Paton, D. (2006). Critical incident stress risk in police officers: Managing resilience and vulnerability. *Traumatology*, *12*(3), 198-206.

Paton, D., & Smith, L. (1999). Assessment, conceptual and methodological issues in researching traumatic stress in police officers.

Paton, D., Violanti, J. M., Burke, K. J., & Gehrke, A. (2009). Traumatic stress in police officers.

Patterson, G. T. (2001). The relationship between demographic variables and exposure to traumatic incidents among police officers. *The Australasian Journal of Disaster and Trauma Studies*, *2*, 1-9.

Patterson, G. T. (2003). Examining the effects of coping and social support on work and life stress among police officers. *Journal of Criminal Justice*, *31*(3), 215-226.

Pearlin, L. I., & Schooler, C. (1978). The structure of coping. *Journal of health and social behavior*, 2-21.

Perez, L. M., Jones, J., Englert, D. R., & Sachau, D. (2010). Secondary traumatic stress and burnout among law enforcement investigators exposed to disturbing media images. Journal of Police and Criminal Psychology, 25(2), 113-124.

Perrin, M. A., DiGrande, L., Wheeler, K., Thorpe, L., Farfel, M., & Brackbill, R. (2007). Differences in PTSD prevalence and associated risk factors among World Trade Center disaster rescue and recovery workers. *American Journal of Psychiatry*, *164*(9), 1385-1394.

Pietrzak, R. H., Goldstein, R. B., Southwick, S. M., & Grant, B. F. (2012). Psychiatric comorbidity of full and partial posttraumatic stress disorder among older adults in the United States:

results from wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *The American Journal of Geriatric Psychiatry*, *20*(5), 380-390.

Pinals, D. A., & Price, M. (2010). Forensic psychiatry and law enforcement. In R. I. Simon & L. H. Gold (Eds.), *The American Psychiatric Publishing textbook of forensic psychiatry* (pp. 413-450). Arlington, VA, US: American Psychiatric Publishing, Inc.

Price, M. (2017). Psychiatric disability in law enforcement officers. Behavioral sciences & the law, 35(2), 113-123.

Ringel, S., & Brandell, J. R. (Eds.). (2011). *Trauma: Contemporary directions in theory, practice, and research*. Sage.

Roberts, N. A., Leonard, R. C., Butler, E. A., Levenson, R. W., & Kanter, J. W. (2013). Job stress and dyadic synchrony in police marriages: A preliminary investigation. Family process, 52(2), 271-283.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. I. (2009). Systematic review and meta-analysis of multiple-session early interventions following traumatic events. American journal of Psychiatry, 166(3), 293-301.

Robinson, H. M., Sigman, M. R., & Wilson, J. P. (1997). Duty-related stressors and PTSD symptoms in suburban police officers. Psychological Reports, 81(3), 835-845.

Robinson, R., Murdoch, P., & Everly, G. S. (2003). *Establishing and maintaining peer support programs in the workplace*. Chevron Publishing Corporation.

Rose, S. C., Bisson, J., Churchill, R., & Wessely, S. (2002). Psychological debriefing for preventing post traumatic stress disorder (PTSD). Cochrane database of systematic reviews, (2).

Rubin, D. C., Berntsen, D., & Bohni, M. K. (2008). A memory-based model of posttraumatic stress disorder: evaluating basic assumptions underlying the PTSD diagnosis. *Psychological review*, *115*(4), 985.

Rudofossi, D. C. (2007). *Working with Traumatized Police Officer-patients: A Clinician's Guide to Complex PTSD Syndromes in Public Safety Professionals*. Baywood Publishing Company.

Sanberg, E. L., Brito, C. S., Luna, A. M., & McFadden, S. M. (2010, September). A guide to occupational health and safety for law enforcement executives. Police Executive Research Forum.

Sapolsky, R. M. (1992). Stress, the aging brain, and the mechanisms of neuron death. the MIT Press.

Savarese, V. W., Suvak, M. K., King, L. A., & King, D. W. (2001). Relationships among alcohol use, hyperarousal, and marital abuse and violence in Vietnam veterans. *Journal of traumatic stress, 14*(4), 717-732.

Schaufeli, W., & Enzmann, D. (1998). The burnout companion to study and practice: A critical analysis. CRC press.

Schell, T. L., Marshall, G. N., & Jaycox, L. H. (2004). All symptoms are not created equal: the prominent role of hyperarousal in the natural course of posttraumatic psychological distress. *Journal of abnormal psychology, 113*(2), 189.

Schnurr, P. P., Lunney, C. A., Sengupta, A., & Waelde, L. C. (2003). A descriptive analysis of PTSD chronicity in Vietnam veterans. *Journal of Traumatic Stress: Official Publication of The International Society for Traumatic Stress Studies, 16*(6), 545-553.

Schnurr, P. P., Spiro, A., Vielhauer, M. J., Findler, M. N., & Hamblen, J. L. (2002). Trauma in the lives of older men: Findings from the Normative Aging Study. *Journal of Clinical Geropsychology, 8*(3), 175-187.

Selye, H. (1956). The stress of life.

Selye, H. (1976). The stress concept. *Canadian Medical Association Journal, 115*(8), 718.

Shim, H. S., Jo, Y., & Hoover, L. T. (2015). A test of general strain theory on police officers' turnover intention. *Asian Journal of Criminology, 10*(1), 43-62.

Smid, G. E., Mooren, T. T., van der Mast, R. C., Gersons, B. P., & Kleber, R. J. (2009). Delayed posttraumatic stress disorder: systematic review, meta-analysis, and meta-regression analysis of prospective studies. *Journal of Clinical Psychiatry, 70*(11), 1572.

Smith, D. A., & Visher, C. A. (1981). Street-level justice: Situational determinants of police arrest decisions. *Social problems*, *29*(2), 167-177.

Soomro, S., & Yanos, P. T. (2018). Predictors of mental health stigma among police officers: the role of trauma and PTSD. *Journal of Police and Criminal Psychology, 1*-9.

Starcke, K., Wolf, O. T., Markowitsch, H. J., & Brand, M. (2008). Anticipatory stress influences decision making under explicit risk conditions. *Behavioral neuroscience*, *122*(6), 1352

Stearns, G. M., & Moore, R. J. (1993). The physical and psychological correlates of job burnout in the Royal Canadian Mounted Police. *Canadian J. Criminology*, *35*, 127.

Stephens, C., & Long, N. (2000). Communication with police supervisors and peers as a buffer of work-related traumatic stress. *Journal of Organizational Behavior*, *21*(4), 407-424.

Steptoe, A., Dockray, S., & Wardle, J. (2009). Positive affect and psychobiological processes relevant to health. *Journal of personality*, *77*(6), 1747-1776.

Steverson, L. A. (2008). *Policing in America: A reference handbook*. ABC-CLIO.

Suris, A., Link-Malcolm, J., & North, C.S. (2011). Predictors of suicidal ideation in veterans with PTSD related to military sexual trauma. *Journal of Traumatic Stress, 24*, 605–608.

Swatt, M. L., Gibson, C. L., & Piquero, N. L. (2007). Exploring the utility of general strain theory in explaining problematic alcohol consumption by police officers. *Journal of criminal justice, 35*(6), 596-611.

Szabo, Y. Z., Warnecke, A. J., Newton, T. L., & Valentine, J. C. (2017). Rumination and posttraumatic stress symptoms in trauma-exposed adults: a systematic review and meta-analysis. *Anxiety, Stress, & Coping, 30*(4), 396-414.

Taft, C. T., Kaloupek, D. G., Schumm, J. A., Marshall, A. D., Panuzio, J., King, D. W., & Keane, T. M. (2007). Posttraumatic stress disorder symptoms, physiological reactivity, alcohol problems, and aggression among military veterans. *Journal of abnormal psychology*, *116*(3), 498.

Tak, S., Driscoll, R., Bernard, B., & West, C. (2007). Depressive symptoms among firefighters and related factors after the response to Hurricane Katrina. *Journal of Urban Health, 84(*2), 153-161.

Tehrani, N. (2004). *Workplace trauma: Concepts, assessment and interventions*. Routledge.

Toch, H. (2002). *Stress in policing*. American Psychological Association.

Trimble, M. R. (2013). Post-traumatic stress disorder: History of a concept. In *Trauma and its wake* (pp. 31-39). Routledge.

Turner, R. J., & Lloyd, D. A. (1995). Lifetime traumas and mental health: The significance of cumulative adversity. *Journal of health and social behavior*, 360-376.

U.S. Census Bureau QuickFacts. (2019). Richmond, Virginia. U.S. Census Bureau. https://www.census.gov/quickfacts (Accessed on September 19, 2021)

U.S. Census Bureau. (2019). 2009-2011 American Community Survey Public Use Microdata Samples. Industry and Occupation. Retrieved from https://www.census.gov/topics/employment/industry-occupation.html

Van der Kolk, B. A., & McFarlane, A. C. (Eds.). (1996). *Traumatic stress: The effects of overwhelming experience on mind, body, and society*. Guilford Press.

Violanti, J. M. (1992). Coping strategies among police recruits in a high-stress training environment. *The Journal of Social Psychology*, *132*(6), 717-729.

Violanti, J. M., & Aron, F. (1993). Sources of police stressors, job attitudes, and psychological distress. *Psychological reports*, *72*(3), 899-904.

Violanti, J. M., & Gehrke, A. (2004). Police trauma encounters: precursors of compassion fatigue. *International journal of emergency mental health*.

Violanti, J. M., Fekedulegn, D., Hartley, T. A., Charles, L. E., Andrew, M. E., Ma, C. C., & Burchfiel, C. M. (2016). Highly rated and most frequent stressors among police officers: gender differences. *American journal of criminal justice*, *41*(4), 645-662.

Violanti, J. M., Marshall, J. R., & Howe, B. (1985). Stress, coping, and alcohol use: The police connection. *Journal of Police Science & Administration*.

Violanti, J. M., Paton, D. E., & Dunning, C. E. (2000). *Posttraumatic stress intervention: Challenges, issues, and perspectives*. Charles C Thomas Publisher.

Violanti, J. M., Slaven, J. E., Charles, L. E., Burchfield, C. M., Andrew, M. E., & Homish, G. G. (2011). Police and alcohol use: A descriptive analysis and associations with stress outcomes. American Journal of Criminal Justice, 36, 344–356.

Violanti, J.M. (1996). Trauma stress and police work. In D. Paton & J.M.Violanti (Eds.), Traumatic stress in critical occupations: Recognition, consequences, and treatment (pp.87-112). Springfield, IL: Charles C. Thomas, Publisher, LTD.

Walker, S. (1985). Controlling the cops: A legislative approach to police rulemaking. *U. Det. L. Rev.*, *63*, 361.

Wang, P. S., Berglund, P., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2005). Failure and delay in initial treatment contact after first onset of mental disorders in the National Comorbidity Survey Replication. *Archives of general psychiatry*, *62*(6), 603-613.

Wang, Z., Inslicht, S. S., Metzler, T. J., Henn-Haase, C., McCaslin, S. E., Tong, H., ... & Marmar, C. R. (2010). A prospective study of predictors of depression symptoms in police. *Psychiatry research*, *175*(3), 211-216.

Waters, J. A., & Ussery, W. (2007). Police stress: History, contributing factors, symptoms, and interventions. *Policing: an international journal of police strategies & management*, *30*(2), 169-188.

Weinberg, M., & Gil, S. (2016). Trauma as an objective or subjective experience: The association between types of traumatic events, personality traits, subjective experience of the event, and posttraumatic symptoms. *Journal of Loss and Trauma*, *21*(2), 137-146.

Weiss, D. S., Brunet, A., Best, S. R., Metzler, T. J., Liberman, A., Pole, N., ... & Marmar, C. R. (2010). Frequency and severity approaches to indexing exposure to trauma: The Critical Incident History Questionnaire for police officers. *Journal of traumatic stress*, *23*(6), 734-743.

Weitzer, R., & Tuch, S. A. (2005). Determinants of public satisfaction with the police. *Police quarterly*, *8*(3), 279-297.

Wester, S. R., Arndt, D., Sedivy, S. K., & Arndt, L. (2010). Male police officers and stigma associated with counseling: The role of anticipated risks, anticipated benefits and gender role conflict. *Psychology of men & masculinity*, *11*(4), 286.

White, A. K., Shrader, G., & Chamberlain, J. (2016). Perceptions of law enforcement officers in seeking mental health treatment in a right-to-work state. *Journal of Police and Criminal Psychology*, *31*(2), 141-154.

White, M. D., Cooper, J. A., Saunders, J., & Raganella, A. J. (2010). Motivations for becoming a police officer: Re-assessing officer attitudes and job satisfaction after six years on the street. *Journal of Criminal Justice*, *38*(4), 520-530.

Wilk, J. E., Quartana, P. J., Clarke-Walper, K., Kok, B. C., & Riviere, L. A. (2015). Aggression in US soldiers post-deployment: Associations with combat exposure and PTSD and the moderating role of trait anger. *Aggressive behavior*, *41*(6), 556-565.

Williams, J. M. G., Watts, F. N., MacLeod, C., & Mathews, A. (1988). *Cognitive psychology and emotional disorders*. John Wiley & Sons.

Wirth, M., Burch, J., Shivappa, N., Violanti, J. M., Burchfiel, C. M., Fekedulegn, D., ... & Charles, L. E. (2014). Association of a dietary inflammatory index with inflammatory indices and the metabolic syndrome among police officers. *Journal of occupational and environmental medicine/American College of Occupational and Environmental Medicine*, *56*(9), 986.

Woody, R. H. (2006). Family interventions with law enforcement officers. *The American Journal of Family Therapy*, *34*(2), 95-103.

Zhao, X., Lynch Jr, J. G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of consumer research*, *37*(2), 197-206.

Zlotnick, C., Franklin, C. L., & Zimmerman, M. (2002). Does "subthreshold" posttraumatic stress disorder have any clinical relevance?. *Comprehensive psychiatry*, *43*(6), 413-419.