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The Transactional Theory of Stress and Coping: Predicting Posttraumatic Distress in Telecommunicators

Dana Marie Dillard
Walden University

Walden University

College of Social and Behavioral Sciences

This is to certify that the doctoral dissertation by

Dana Marie Dillard

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Review Committee
Dr. Amy Sickel, Committee Chairperson, Psychology Faculty
Dr. Charles Diebold, Committee Member, Psychology Faculty
Dr. Patti Barrows, University Reviewer, Psychology Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
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Abstract

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by

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MS, University of Phoenix, 2011

BS, University of Phoenix, 2010

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Telecommunicators (e.g., dispatchers and 911 operators) experience firsthand the death and suffering of friends, family, peers, and strangers in a chaotic work environment characterized by chronic stress and lack of support. Previous research has demonstrated telecommunicators are at increased risk for negative health outcomes; however, existing research does not identify predictive pathways to posttrauma symptoms in telecommunicators. In an application of the transactional theory of stress and coping, I used structural equation modeling to examine occupational antecedents, work-family conflict, negative appraising, and coping as predictors of posttraumatic stress symptoms in telecommunicators. A convenience sample of 103 telecommunicators, recruited through agencies across the United States, completed a series of PTSD, stress, and coping surveys. Results supported three theorems from the transactional theory of stress and coping: (a) Chronic antecedents are correlated with work-family conflict ($r = .54$, $p < .01$), (b) work-family conflict predicted negative appraising ($\beta = .64$, $p < .01$), and (c) coping predicted posttraumatic stress symptoms in telecommunicators ($\beta = .30$, $p = .01$). These findings contribute to the current body of occupational health literature by expanding understanding of telecommunicators' occupational experiences and appraisals and provide insights into modifiable processes and policies that can enhance and protect telecommunicator long term health. Specifically, employee-focused policies directed at preserving work-home balance and reducing chronic stressors in the workplace are recommended. Additionally, further research can be initiated to evaluate effectiveness of policy changes in telecommunicator appraising, health, and wellbeing.

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Dedication

For those we love, for those we have lost, and for the guardians of the Thin Gold Line.

Acknowledgments

This journey would not have been possible without the loving support of my family: my mom, who sees past my flaws and accepts me for who I am, which allows me to pursue who I want to be, my sister, who helps me remember that this is where the magic happens, and my son, who taught me all the important things in life – love, joy, and possibility. To my Dad, I wish I could tell you how much you continue to inspire me and hope that this work captures how you taught me to dream big.

To my District 16 family, including my partner in life, love, and crime, you have provided a break from the madness and a supportive kick when needed and shown more love and support for my crazy pursuits than I probably deserve. I know you asked when you really did not want to hear, but I appreciate that you care. To Jennifer, Dana, and Dawn, I could not have gotten here without you. To Brooke, your fearlessness and love for those without a voice inspire everything I do, and my hope is that this work serves as a tribute to you and to your sacrifice. It will never be enough, but it is all I can offer.

Finally, I would like to offer my sincere gratitude for my committee: my chair, Dr. Sickel, my committee member, Dr. Diebold, and my URR, Dr. Barrows. Dr. Sickel and Dr. Diebold, your unwavering faith in this beautiful beast and in me made this project possible. As someone who struggles with perfectionism, fear of failure and success, and an unshakeable belief that I have no idea what I am doing, I could not have done this without your encouragement. There are simply not enough words for me to express how grateful I am that you both have been here for guidance and support.

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Chapter 1: Introduction to the Study

In this study, I examined key indicators identified in the traumatic stress literature in predicting posttraumatic stress symptoms (PTSS) in telecommunicators in the United States. Traumatic and chronic occupational antecedents, work-family conflict (WFC), negative appraising, and coping appear to influence susceptibility to development of PTSS in general but have not been examined as part of a comprehensive model. Recent work has demonstrated telecommunicators may experience significant traumatization following emergent and critical incidents (Lilly & Pierce, 2013; Pierce & Lilly, 2012), which may lead to increased turnover and absenteeism (Sotebeer, 2011). Furthermore, chronic occupational stressors contribute to acute stress reactivity (Wirtz, Ehlert, Kottwitz, La Marca, & Semmer, 2013) and may increase susceptibility to posttraumatic distress as witnessed in other first responder populations, such as police, fire, and emergency medical technicians (EMTs) (Berger et al., 2012), yet this link has not been explored in telecommunicators.

Despite increased exposure to potentially traumatizing events, emergence of full or clinical posttraumatic stress disorder (PTSD) does not consistently follow exposure in first responder populations, suggesting the importance of other possible contributors. WFC, a specific form of social support conflict, is recognized for its contributing role in stress outcomes, yet WFC has not been examined in telecommunicators nor has it been examined in PTSD, despite evidence that increased WFC corresponds to more negative occupational health outcomes (Lambert, Minor, Wells, & Hogan, 2015).

In addition, mechanisms mediating exposure and distress, including cognitive appraisals and coping, are understudied in this population. Cognitive appraisals have

received little direct attention in the PTSD literature, with methodological issues of confounding often named as the reason for omission (Peacock & Wong, 1990; Peacock, Wong, & Reker, 1993). Despite this, threat and harm appraisals consistently and significantly predict distress in occupational settings (Goh, Sawang, & Oei, 2010; Gomes, Faria, & Gonçalves, 2013; Lucas, Weidner, & Janisse, 2012, Salinas Farmer, 2008). Furthermore, while coping self-efficacy has been shown to mitigate or exacerbate PTSS (Bosmans et al., 2013; Cieslak, Benight, Luszczynska, & Laudenslager, 2011; Lambert et al., 2012), this relationship has received little attention in telecommunicators with Shakespeare-Finch, Rees, and Armstrong (2014) as a notable exception. Lastly, coping has received much attention in the research, but its treatment is often inconsistent, and the effect of coping on PTSS is not well examined, especially in the more recent literature. With this study, I attempted to help bridge the gap in understanding the development of PTSS in telecommunicators in the United States by identifying relationships between chronic occupational antecedents, traumatic occupational antecedents, WFC, negative appraising, coping, and PTSS.

Implications for positive social change resulted from this study by improving understanding about the role of traumatic and chronic stressors in symptom development of trauma-exposed telecommunicators. This understanding may lead to opportunities to improve training and offer interventions, which may help reduce turnover and absenteeism. Additionally, improved understanding about the degree of traumatization may lead to policy change that could improve quality of life, health, and wellness through the offering of mental health programs and improved occupational settings that reduce the stress burden experienced by this population.

In this chapter, I provide an overview of the work by highlighting the background of the study, the problem statement and purpose, and research question. I present a theoretical model to depict predicted relationships between variables and briefly examine the theoretical foundation of the study, the nature of the study, and key definitions, while also identifying assumptions, limitations, and delimitations. Finally, I conclude the chapter with a discussion of the potential significance of the study as bounded by its scope.

Background of the Study

The role of the occupational setting in the development of psychological sequelae is not a new topic in health psychology; however, the extent to which potentially traumatizing events may affect less visible first responder populations is gaining attention. Frontline workers, such as police officers, firefighters, and EMTs, have been identified as at-risk populations for traumatic stress pathology due to their proximity and potentially recurrent exposure to traumatizing events. However, support workers are often overlooked in the literature. These less visible first responders include transportation workers, tow truck drivers, and emergency communications telecommunicators, whose presence at a scene not only receives less attention but may also be underacknowledged. Particularly for telecommunicators, the idea that physical presence is a necessary component for traumatization and posttraumatic stress pathology may be leaving a vulnerable population unable to obtain resources to overcome symptoms of PTSD. However, it is becoming apparent that some telecommunicators do suffer from nonphysical and nonvisual firsthand exposure to potentially traumatizing events, but it is not known how telecommunicators appraise occupational stressors or

how telecommunicators cope with traumatic exposure and occupational stress. Furthermore, telecommunicators often experience overlap and discordance between work and family roles that, if present, may increase susceptibility to detrimental traumatic stress exposure outcomes by altering appraisals and coping attempts. Because these indicators are believed to work as a process, it is unknown if or how certain coping dimensions work together to contribute to, rather than ameliorate, PTSS.

Recent literature has revealed telecommunicators may experience traumatization as evidenced in the form of PTSS following exposure to potentially traumatizing events (Lilly & Pierce, 2013; Pierce & Lilly, 2012; Troxell, 2008); however, most research on posttraumatic stress dichotomizes stress outcomes as the presence or absence of clinical PTSD, which omits valuable information on a potentially significant portion of the population who may suffer from subclinical levels of PTSS (Lowe, Walsh, Uddin, Galea, & Koenen, 2014). Furthermore, appraisal of trauma requires assessment of individual and environmental stressors as well as assessment of individual ability to handle adversity.

The literature supported the idea that acute stress traumatization is more likely to occur with repeat or prior exposure to acute stressors (Green et al., 2000; Kolassa et al., 2010). Additionally, exposure to chronic occupational stressors appears to increase acute stress reactions (Donnelly, 2010; Fjeldheim et al., 2014; Troxell, 2008; van der Ploeg, Dorreesteijn, & Kleber, 2003; van der Ploeg, & Kleber, 2003), suggesting that the body may become overburdened by chronic exposure to stressors (Wirtz et al., 2013). However, the role of chronic occupational stress in the development of PTSS has been underexplored in the trauma literature in general and specifically in telecommunicator populations.

Furthermore, social support has emerged as a key consideration in the traumatic stress literature for the relationship it shares with stress outcomes. However, the precise nature of the mechanisms under which social support exerts its effects on stress outcomes is unknown. Previous research identified the effect of poor social support following traumatization (Robinaugh et al., 2011) and highlighted improving perceived social support in trauma recovery (Hansen, Eriksen, & Elklit, 2014). However, it seems likely that perceived social support is not only affected by trauma but acts as a situation-environment relational antecedent in the form of conflict in social support roles. Conflict in social support roles may then contribute to stress reactivity, and this has been demonstrated in altered neuroimmunological processes leading to increased mental and physical illness in adults in troubled relationships (Jaremka, Lindgren, & Kiecolt-Glaser, 2013). WFC, which represents a potential source of troubled relationships, may increase the stress burden, leading to more negative outcomes, but it is unknown to what degree WFC is present in telecommunicators and if WFC affects appraising and coping in PTSS in telecommunicators.

Despite understanding that coping self-efficacy is an important mediating component between trauma exposure and trauma outcome (Benight, 2012; Benight & Bandura, 2004; Benight & Harper, 2002) and that coping efforts may further mediate symptom expression following exposure (Anshel, Umscheid, & Brinthaupt, 2013; Baschnagel, Gudmundsdottir, Hawk, & Beck, 2009; McLaughlin, 2012), coping and coping self-efficacy have not been well examined in telecommunicators. These variables are explored in greater detail in Chapter 2.

Although the individual elements have been underexplored in telecommunicators, it is the interrelationships between these variables that may create a more nuanced understanding of the expression of PTSS in a potentially vulnerable population, and very little research has examined a model of traumatic and chronic occupational antecedents, WFC, negative appraising, coping, and PTSS. The current study attempted to address these gaps. The purpose of this study was to examine traumatic and chronic occupational antecedents, WFC, negative appraising, and coping and the degree to which they contribute to PTSS expression in telecommunicators.

Problem Statement

Telecommunicators in emergency communications centers face chronic and traumatic stress that significantly affect quality of life, yet these experiences are underexplored and underacknowledged. Research on mental health outcomes for first responders following potentially traumatic events is substantial (e.g., see Burke & Shakespeare-Finch, 2011; Kirby, Shakespeare-Finch, & Palk, 2011; Lambert et al., 2012; LeBlanc et al., 2011; Lucas et al., 2012) and identified the increased risk for PTSD (Berger et al., 2012) but did not address the experiences of telecommunicators. Research examining mental health outcomes in telecommunicators was limited and generally focused on secondary traumatic stress, burnout, or compassion fatigue (APCO RETAINS Workgroup, 2009; Sotebeer, 2011; Troxell, 2008), and studies looking at posttraumatic stress pathology often focused on a dichotomous outcome that excluded telecommunicators experiencing symptoms that are not clinical but that may interfere with daily functioning (Wirtz et al., 2013). Prior research with other first responders, military, and individuals in at-risk occupations identified that occupational stressors,

social support, appraisals, and coping exert an effect on the development of PTSD (Evans, Cowlishaw, & Hopwood, 2009; Li, Guan, Chang, & Zhang, 2014; Louw & Viviers, 2010; Shakespeare-Finch et al., 2014; Sliter, Kale, & Yuan, 2013), yet few researchers used these variables to develop a theoretically driven model to predict nonclinical PTSS (Benight, 2012).

Although diagnostic criteria suggest that exposure to potentially traumatic events may be sufficient to trigger posttraumatic stress pathology (American Psychiatric Association [APA], 2013), key theorists point to the literature to suggest this is inaccurate. Specifically, the contributions of additional stressors, social factors, and mediating processes to the development of negative mental health sequelae are key in posttrauma pathology, and the effects of these contributions remain unknown and largely unexplored in telecommunicators, potentially leaving this population vulnerable. Traumatic and chronic occupational antecedents, WFC, negative appraising, and coping have not been incorporated into a theoretical model in PTSS. In this study, I attempted to reduce the gaps in the literature by examining the predictive value of traumatic and chronic occupational antecedents, WFC, appraising, and coping in PTSS in telecommunicators.

Purpose of the Study

The purpose of this quantitative study was to examine the degree to which the transactional theory of stress and coping predicted PTSS in telecommunicators by identifying the effects of traumatic occupational antecedents, chronic occupational antecedents, and WFC, mediated by negative appraising and coping, on PTSS. Chapter 3 provides a description of the model development process and proposed analyses.

I derived the research question from the identified gaps in the literature; it is summarized in the abbreviated structural model presented in Figure 1. The full measurement and structural models are provided in Chapter 3. Specific hypotheses are not offered in accordance with Jaccard and Jacoby (2010) who note that, in a model-building approach, the purpose is to assess the overall fit of a theoretical model and that a path diagram provides a comprehensive overview of possible theoretical propositions that would otherwise be too numerous to list individually.

Briefly summarizing Figure 1, I originally hypothesized traumatic occupational antecedents, chronic occupational antecedents, and WFC will be positively correlated with each other and will positively affect negative appraising, which will fully mediate a negative effect on coping, which will fully mediate a negative effect on PTSS.

RQ1: To what extent does the Figure 1 model of the transactional theory of stress and coping fit the data in a sample of telecommunicators?

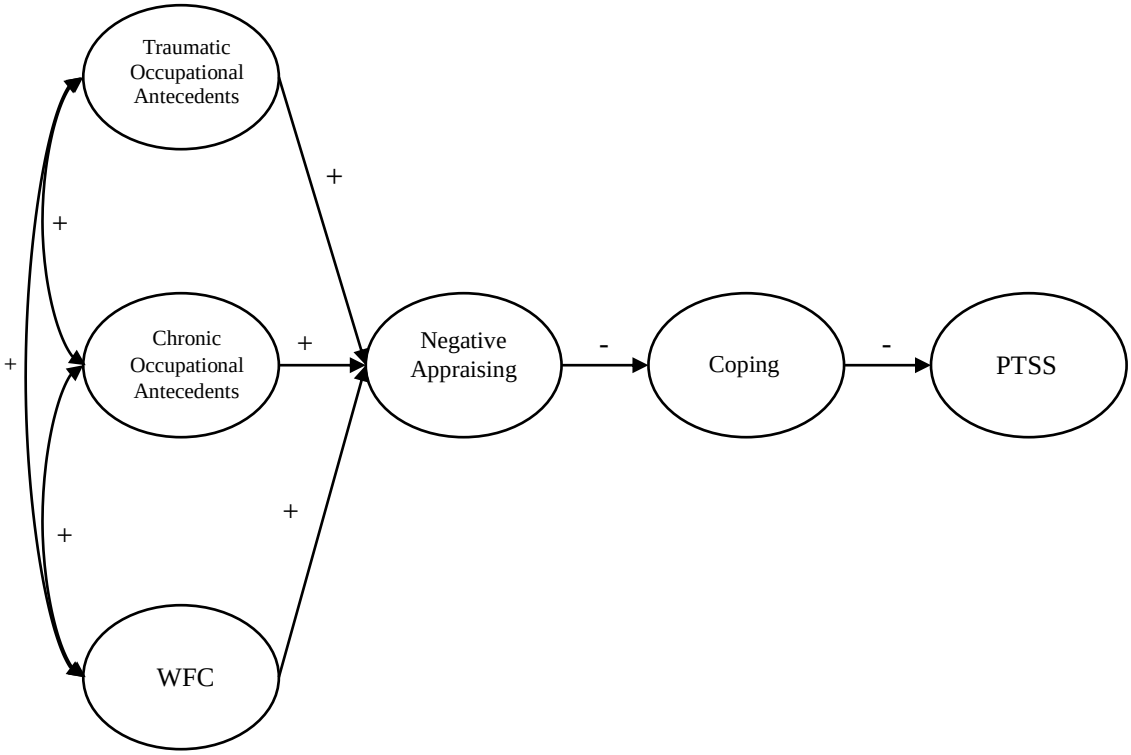

Figure 1. Theoretically constructed structural model of the transactional theory of stress and coping in posttraumatic stress symptom expression in telecommunicators. WFC, work-family conflict; PTSS, posttraumatic stress symptoms.

Theoretical Foundation for the Study

I used the transactional theory of stress and coping to drive this study and supplemented this theoretical foundation with the social cognitive theory of posttraumatic recovery. These theories provided a foundation for exploring the relationships between traumatic and chronic occupational antecedents, WFC, negative appraising, coping, and PTSS. Although informed by the larger body of historic stress research, Lazarus and Folkman (1984) developed the transactional theory of stress and coping to emphasize the transactional nature of stressful encounters in which the path from stressful situation to

outcome is a process that is highly individualized, situationally specific, and inseparable from the cognitions that accompany the experience.

The transactional theory of stress and coping posits that acute and chronic stress outcomes are contingent upon individual and environmental factors. Relationships between stressor exposure and stress outcome are mediated by how benign, threatening, harmful, or challenging those factors are deemed by the individual (primary appraising) and the degree to which the individual feels capable of dealing with threatening, harmful, or challenging appraisals (secondary appraising, which includes coping self-efficacy). These appraisals, in turn, are mediated by the coping strategies the individual enlists to adapt to other than neutral appraisals. Benight and Bandura (2004), building from Bandura's (1986, 1997) social cognitive theory and writings on self-efficacy, put forth the social cognitive theory of posttraumatic recovery to explain the key consideration of coping self-efficacy, the belief in one's ability to respond to adversity, in recovering or failing to recover from traumatic events.

The transactional theory of stress and coping has been used to examine posttraumatic stress outcomes in previous research; however, with a few notable exceptions (Colwell, 2005; Salinas Farmer, 2008), research tends to omit key components, such as appraising or coping, providing limited support for the theory (Burke & Shakespeare-Finch, 2011; Ho & Lo, 2011; Hooberman, Rosenfeld, Rasmussen, & Keller, 2010; Kirby et al., 2011; LeBlanc et al., 2011; Lilly & Pierce, 2013; Pierce & Lilly, 2012; Sliter et al., 2013). These theories suggest that PTSS can be predicted by examining environmental and psychosocial factors, individual appraisals of these factors,

and coping. A more detailed discussion of the transactional theory of stress and coping and self-efficacy appears in Chapter 2.

Nature of the Study

Because the goal of the study was to examine processes and paths that predict PTSS in telecommunicators from environmental and psychosocial factors, mediated by appraising and coping, the research aligned with a quantitative methodology, specifically with that of structural equation modeling (SEM). Previous work with this population has relied on quantitative methods to assess perceptions of events and outcomes (Lilly & Pierce, 2013; Pierce & Lilly, 2012; Sotebeer, 2011; Troxell, 2008), and many studies examining posttraumatic outcomes employ measures that quantify symptom expression to define PTSD.

Data were collected from telecommunicators employed in the United States who responded to an invitation to participate in a survey study. The data were collected from an online survey. The survey included items to assess the variables under investigation: Potentially Traumatic Events Scale (modified from Troxell, 2008) to assess traumatic occupational antecedents and traumatic stressfulness appraisals; Telecommunicator Sources of Stress (modified from Troxell, 2008) to assess chronic occupational antecedents and chronic stressfulness appraisals; WFC Scale (Carlson, Kacmar, & Williams, 2000) to assess WFC; Primary Threat and Harm Appraisal Measure (modified from Feldman, Cohen, Hamrick, & Lepore, 2004) to measure harm or loss appraising; the Firefighter Coping Self-Efficacy (FFCSE) Scale (modified from Lambert et al., 2012) to assess coping self-efficacy; the Brief Coping Orientation to Problems Experienced (COPE) (Carver, 1997) to measure coping; the Impact of Event Scale-Revised (IES-R)

(Weiss & Marmar, 1997) to assess PTSS; and demographic questions to obtain sample characteristics.

The validity and reliability of these measures are largely unknown with this population, which is discussed further in Chapter 3. I sent emails to emergency center communications supervisors and agency heads, selected randomly from a published directory of law enforcement agencies in the United States, for forwarding to all employed telecommunicators in the center. I selected this approach for several reasons. Survey research was time efficient for participants and provided data consistent with a quantitative approach, which was appropriate based upon the research question. An internet survey was more cost effective than other methods. I sent reminder emails to supervisors every 2 weeks during the initial data collection window to assist with response rates. Following the initial 6-week data collection period, agencies were recruited at random to help meet the minimum sample size. Recruitment continued until the minimum sample was achieved. I analyzed data using a two-stage SEM approach in which the fit of the measurement model was assessed in the first phase and the fit of the structural model was assessed in the second phase.

Definitions

The proposed study initially contained three exogenous latent variables and three endogenous latent variables. These variables will be described in greater detail in Chapters 2 and 3; however, brief definitions of the latent variables and population of interest are provided here.

Chronic Occupational Antecedents: Chronic occupational antecedents refer to the situational characteristics of chronicity of job and task demands, organizational factors,

and physical conditions in the work environment that may require appraising and coping efforts (Lazarus, 2012; Repetti, 1987; Sotebeer, 2011; Troxell, 2008)

Coping: Coping refers to actual strategies an individual has employed to mitigate the effects of a perceived stressor, regardless of the perceived success or failure of the action to alleviate the stressor (Carver, Scheier, & Weintraub, 1989; Lazarus, 1999).

Negative Appraising: Appraising involves two components, primary and secondary appraising, in which an individual assesses a potential stressor's relevancy and intersections with goals, beliefs, and desired outcomes and individual perceived ability to cope with demands (Lazarus, 2012; Smith & Lazarus, 1993). Negative appraising refers to increased perceptions of harm or loss, increased perceptions of stressfulness of traumatic and chronic stressors, and increased perceptions of a lack of coping self-efficacy.

Posttraumatic Stress Symptoms (PTSS): PTSD is a pervasive and chronic disorder that is characterized by clusters of symptoms that persist for more than 1 month following exposure to one or more potentially traumatizing events (APA, 2013). PTSS are grouped into symptom clusters that represent intrusion or re-experiencing, hyperarousal, dysphoria, and avoidance (APA, 2013).

Telecommunicators: Telecommunicators, also referred to as dispatchers, calltakers, and 911 operators, are individuals employed by municipal, county, state, federal, and tribal agencies who answer calls for assistance from the public and dispatch appropriate emergency response units according to the nature of the call (Bureau of Labor Statistics, U.S. Department of Labor, 2015; Troxell, 2008).

Traumatic Occupational Antecedents: Traumatic occupational antecedents refer to the situational characteristics of the work environment of number of events, predictability, and novelty (Lazarus, 2012) and may include exposure to a variety potentially traumatizing events in the telecommunicator profession.

Work-Family Conflict (WFC): WFC refers to an incompatible overlap between work and family demands, in which demands from one arena interfere with completion of demands from the other (Carlson et al., 2000).

Assumptions

Although the goal of quantitative research is to generate objective and generalizable results, the act of conducting research requires operating under certain assumptions. While some assumptions can be minimized, they cannot be avoided. For this study, I made assumptions about the population and study design. Because the participants were self-selecting, I assumed that those who responded to the invitation to participate provided an accurate representation of the experiences of telecommunicators. I also assumed that participants responded truthfully and accurately to the best of their ability. Because work with this population is limited, I assumed that the choice of measures used with this population were appropriate. An additional assumption was that the proposed model reflected the phenomenon under investigation. Although there was evidence to support the transactional theory of stress and coping, other theories of the interaction between perceived stressors and outcomes also existed, and those theories, while compelling, were not under investigation in this study and were not analyzed as alternate models.

Scope and Delimitations

The aim of this study was to examine relationships between antecedents and mediating processes in PTSS in telecommunicators. The antecedents and mediating processes selected for investigation may be specific to this population and may not be generalizable to the occupational or lived experiences of other individuals who experience potentially traumatizing events. I selected telecommunicators as a population of interest due to underrepresentation in the trauma literature despite growing evidence that their occupation may affect long term mental health. Although I sought to use a nationwide sample to improve generalizability to the telecommunicator population, participants were self-selecting and convenience based with recruitment occurring at the agency level. The results are not be generalizable to other first responder or nontelecommunicator populations. Additionally, results derived from self-report measures on individual experience of PTSS. Results were not based upon observable behaviors or clinical assessment of PTSS, and the intent was not to identify clinical levels of PTSD, so these results cannot be generalized to clinical presentations of PTSD.

Limitations

There were design and methodology limitations in this study. I used a survey design in this study, and there was the potential for biases to emerge. Sampling selection introduced bias because participation was voluntary and not at random. Those who participated may vary from those who do not. The potential for confounding existed as participants who work for the same agency may have more similar experiences than those who work for different agencies. For instance, all telecommunicators at one agency may be affected by a potentially traumatic event, such as a line-of-duty death, and this may

have confounded results. Possibilities for addressing this confounding variable would have required either creation of dummy variables for every agency with responding participants, which would have overly complicated the research design and necessitated participants' disclosure of their agency, or use of multilevel modeling, which was unavailable with the current computer tool. The possible effects of this limitation are further discussed in Chapter 5. Prior work in trauma has indicated a confounding effect of gender on results, and work with telecommunicators has suggested years of experience may also confound results on trauma outcomes. While not incorporated in the final model, potential covariates of gender and years of experience may have exerted an effect that was neither identified nor examined in the current study and which may limit replicability of the results.

Another limitation to the study was the measures used. Several of the measures used have been employed only a few times, so they have limited reliability and validity information. To address this, reliability was assessed through the use of Cronbach's alpha. Additionally, validity was examined by looking at correlation coefficients of measures. This can demonstrate validity by showing that constructs that were believed to be related to one another were related to one another. Finally, pilot testing helped to address validity issues by allowing feedback from telecommunicators.

Significance

With the present study, I sought to improve understanding of psychological sequelae of the first responder occupational environment in telecommunicators. Filling gaps in the first responder literature may help provide a more accurate and more complete picture of the effect of chronic and traumatic occupational stressors on telecommunicator

health. I was able to provide information on the degree to which telecommunicators experience traumatic exposure. Furthermore, I was able to identify protective and detrimental aspects of the telecommunicators' work environment. By identifying these aspects, it becomes possible to address these issues through policy, education, and intervention. Finally, first responders in general have been denied benefits from worker's compensation following development of PTSD largely because the evidence base to suggest the role of the occupational environment is limited. With this study, I intended to further elucidate the relationship between trauma exposure, the occupational environment, and PTSS in telecommunicators, which may provide an evidentiary basis to suggest occupational responsibility in such claims.

Although such macrolevel implications are desirable, they may be unattainable. Looking at the smaller picture, with this study, I added to the posttraumatic stress literature and provided new directions for research. Increased knowledge and awareness create opportunities for future research that will contribute to the growing posttraumatic stress knowledge base. Perhaps of most importance, the experiences of telecommunicators, who often feel underacknowledged and underappreciated, have been recognized, and hopefully, this research will inspire others to advocate for this group of individuals.

Summary

Telecommunicators are at risk of developing PTSS following exposure to potentially traumatic events; however, the relationship between traumatic and chronic occupational antecedents, WFC, and PTSS were unknown, and processes that may mediate expression of these symptoms were underexplored, particularly in this

population. In this study, I attempted to increase understanding of the relationships among these variables.

In this chapter, I provided the background of the study, problem statement, and purpose statement. Additionally, I outlined the research questions and hypotheses as well as the theoretical framework that guided the development of the proposed and final model. A discussion of the assumptions, scope and delimitations, and limitations followed. Finally, I discussed the potential significance of the study as bounded by the population. A review of the literature follows in Chapter 2, which provides a more detailed examination of the study's theoretical framework and variables.

Chapter 2: Literature Review

Telecommunicators fill a vital role in the first responder network, yet their experiences in emergency services remain underexplored. Traditionally, a telecommunicator would perform primarily as either a calltaker or dispatcher. Calltakers answer incoming calls for service and input information as the call unfolds. Dispatchers are primarily responsible for coordinating responses to incoming calls and handling calls generated by field personnel. Many agencies have combined these roles under the more inclusive job title of telecommunicator. According to the Bureau of Labor Statistics, U.S. Department of Labor (2015), an estimated 98,500 individuals are employed as police, fire, and ambulance dispatchers with an estimated 36,000 projected job openings (O*Net, 2010). These statistics speak not only to the number of telecommunicators at risk to the adverse effects of experiencing potentially traumatic events but also to organizational factors, such as inadequate staffing and mandatory overtime, that serve as additional sources of stress. Although telecommunicators receive training in processing events according to station policy and state and federal law, rarely do telecommunicators receive any information or assistance in handling the emotional sequelae generated from experiencing potentially traumatic events.

Despite recognition as a population at risk for PTSD (Berger et al., 2012; Troxell, 2008), few researchers have provided a systematic and theoretically based framework for exploring PTSD risk and resilience in telecommunicators, a criticism that appears repeatedly in the traumatic stress literature (Benight, 2012). Most research takes a pathogenic approach using medical models in which risk factors are selected as candidates for likelihood of experiencing adverse effects of traumatic experiences

(Benight, 2012). This approach does not assist in developing understanding of the processes that lead to PTSS, nor does it allow development for meaningful social change in the construction of evidence-based intervention, training, or prevention. Furthermore, there is little consensus upon what constitutes a risk factor in the development of posttraumatic adverse effects, including subclinical PTSS and PTSD.

In contrast, significant evidence supports the multidimensional nature of an individual's construction of the meaning of an event. Individuals build meaning from emotions elicited from events based on characteristics of the individual and the situation, personal relevance and resources, and ability to enact strategies to manage possible outcomes (Lazarus, 1999).

In this chapter, I provide a history of the traumatic stress literature by exploring the transactional theory of stress and coping framework from which the research question emerged. I follow with a brief examination of PTSD and connect PTSD to the occupational health literature. I progress through the chapter by addressing the characteristics of the first responder population and the role of the telecommunicator within this population. I follow with an examination of traumatization in emergency services with specific attention to the unique experience of traumatization in telecommunicators. I conceptualize the theoretical relationships between WFC, negative appraising, coping self-efficacy, and coping behaviors with an additional review of the work on the role of the occupational setting in posttraumatic stress pathology. In addition, research on coping self-efficacy and the interrelationship with coping will be reviewed to identify gaps in understanding of traumatic and chronic stress appraisals and outcomes within the telecommunicator population. I close the chapter with a proposed conceptual

model, developed from the transactional theory of stress and coping described herein, along with a summary of the relevant literature.

Literature Search Strategy

I conducted a search of the literature electronically using the resources available through the Walden University and Ashford University research database repositories, which included EBSCOhost, ProQuest, PubMed, and JSTOR. I also searched specific databases from psychological, medical, and sociological disciplines, including PsycARTICLES, CINAHL, MEDLINE, Cochrane Database of Systematic Reviews, and SocINDEX. Of particular use to this search was PTSDPubs (previously the Published International Literature on Traumatic Stress [PILOTS]), a database maintained by the United States Department of Veteran Affairs. Additionally, due to the limited peer-reviewed published literature on telecommunicators, I also reviewed ProQuest Dissertations and Theses. Key terms used solely or in combination included *dispatchers, telecommunicators, and 911; first responders, law enforcement, police, firefighters, emergency medical technicians, and paramedics; trauma exposure, secondary stress, secondary trauma, vicarious stress, vicarious trauma, and secondary traumatic stress syndrome; posttraumatic stress disorder, PTSD, posttraumatic stress symptoms, and shell shock; structural equation modeling and conditional process analysis; primary appraisal, coping, coping style, coping strategy, coping self-efficacy, transactional theory of stress and coping, transactional model of stress and coping, and Lazarus; self-efficacy, social cognitive theory, cognitive relational theory, Bandura, Benight, Schwarzer, and Luszczynska; conservation of resources and Hobfoll;* and *occupational stress.* Due to the lengthy history of research on stress and stress outcomes, searches related to trauma

exposure, PTSD, self-efficacy, and coping in first responder populations was limited predominantly to the last 5 years (2009–2014 at the time of search); however, searches on telecommunicators bore no such restrictions.

Theoretical Framework

Theories of stress have undergone numerous and sometimes tumultuous changes since early interest. The transactional theory of stress and coping, as put forth and refined by Lazarus (1966, 1993, 1999, 2001, 2007; Lazarus & Folkman, 1984), emerged initially from the historic conceptualizations of stress and evolved as an alternate metatheoretical process system from the previous behavioral premises of stress as stimulus or response. In the transactional theory of stress and coping, stress occurs as a series of transactions between the person, environment, and situation (Lazarus & Folkman, 1984) and, depending upon the outcome of the transaction, can generate measurable acute and chronic psychological and somatic distress (Hellhammer, Wüst, & Kudielka, 2009). Appraisals and coping drive these transactions by providing perceptions of relevance, threat or harm, and ability to adapt (Benight & Bandura, 2004; Carver et al., 1989). Applying the cognitive appraisal and coping components of the transactional theory of stress and coping to mediate the relationship between stress experiences of trauma-exposed individuals and outcomes helps establish an evidence base upon which future interventions can be explored.

The Transactional Theory of Stress and Coping

Ideas from early Aristotelian philosophical treatises in ancient Greece but reinterpreted by two generations of clinical, social, and personality psychologists informed the work of Lazarus (2012). Specifically, the works of Allport, Lewin, Murray,

and Tolman of the 1930s, Asch, Bruner, Harlow, Herder, Kelly, McClelland, Murphy, Rotter, Sherif, and White in the 1940s and 1950s, and the radical European traditions of the gestaltists, existentialists, and psychoanalysts influenced Lazarus's (2001, 2012) early conceptualizations of stress, appraising, coping, and emotions. Lazarus drew upon the work of those who rejected the positivist view of psychology mandated by the radical behaviorists, and his view of the role of subjective determination in emotions and stress created a departure from traditional stimulus-response views of stress and health outcomes. However, Lazarus's work was also largely informed by those whom he claimed to reject.

For example, Selye (1978), whose work on the general adaptation syndrome (See Figure 2) and the stress response informed current understanding of physiological reactions to the environment, hinted at the idea of stress as a process that Lazarus (1966; Lazarus & Folkman, 1984) would come to endorse and upon which he and his collaborators would expand. Selye attempted to explain his conceptualization of stress by identifying what stress was and what stress was not. In so doing, Selye noted that stress was not inherently bad and that the stress state and subsequent stress reaction can be either beneficial or detrimental depending upon the context in which it is experienced. Selye characterized the stress state as one of flux that changed as an individual interacted with his or her environment. Of particular note was Selye's conclusion that from this state of flux it would be largely impossible to distinguish between action and reaction because of the nearly simultaneous nature of the action of stressor induced damage and stressor induced defense. Selye labeled these as primary changes, or the damage, and secondary changes, or the defense, and posited that the sum of the secondary changes,

which manifested in the general adaptation syndrome, would provide a scientific option for assessing the totality of damage and defense.

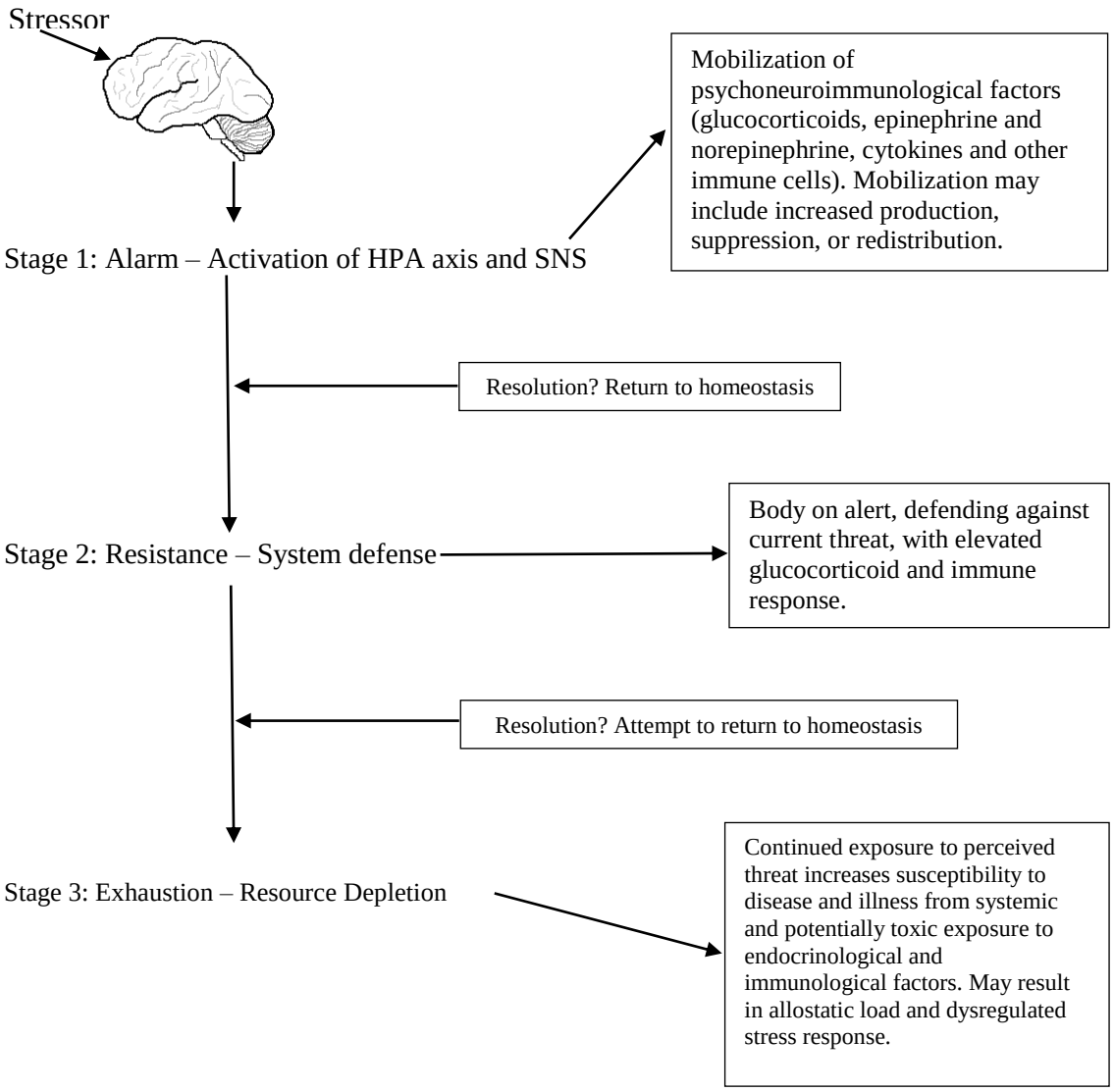

Figure 2. Hans Selye's (1978) general adaptation syndrome. HPA, hypothalamic-pituitary-adrenal axis; SNS, sympathetic nervous system.

The idea of primary and secondary changes would take on new significance in the work of Lazarus, in which the cognitive appraisal of these changes provided the intervening processes for individual differences to exposure to stressor and stress reaction. Inherent in Lazarus's work is the role of cognitive mediation, influencing transactions between the person, environment, individual beliefs, values, and goals, and anticipated outcomes, as depicted in Figure 3.

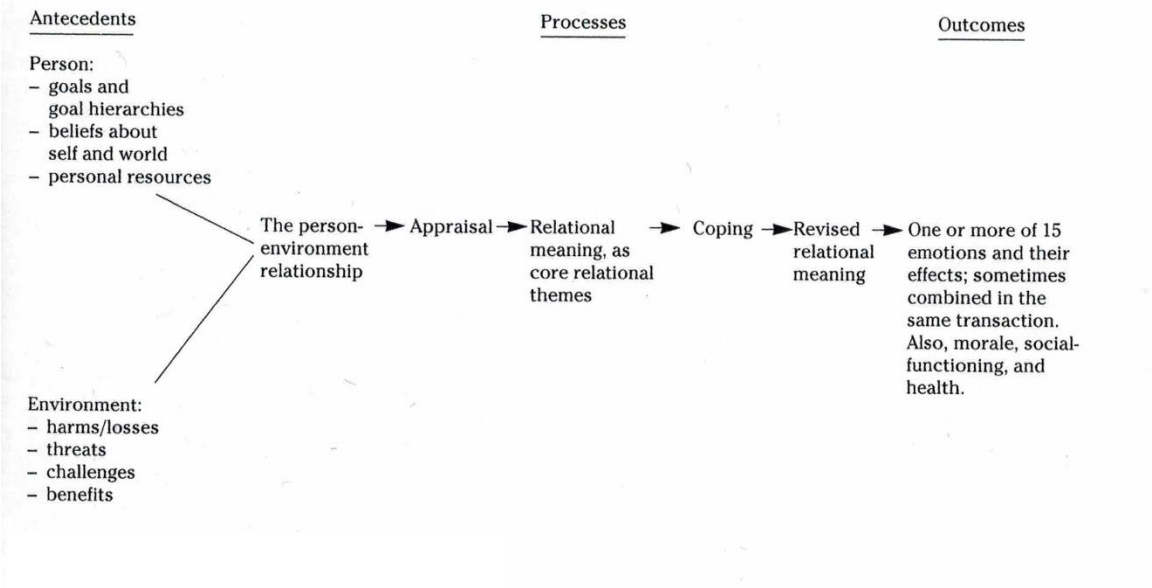

Figure 3. A revised model of stress and coping. Reprinted from *Stress and Emotion: A New Synthesis* by R. S. Lazarus, 1999, p. 198. Copyright 1999 by Springer Publishing Company.

In the transactional theory of stress and coping, individuals filter potentially emotional experiences by appraising the extent to which they believe they can reduce loss, minimize harm, or address challenge and engage in behaviors that specifically affect outcomes. Lazarus (2012) adopted this idea from World War II psychiatrists examining flight crew performance under stress. Lazarus connected with Grinker and Spiegel's (1945) assertion that emotional reactions to potentially emotion-inducing situations did not manifest until the individual processed relevant personal and situational beliefs and experiences and individual ability to influence potential outcomes.

Essentially, appraisals mediate the relationships between antecedents and outcomes (Lazarus, 2012). Early in Lazarus's work, the term perception appeared in place of appraisal; however, Lazarus decided perception did not emphasize the evaluative quality of cognitive mediation properly as it was too neutral. Lazarus changed the designation to appraisal following an encounter with Magda Arnold's (1960a, 1960b) work on personality and emotion, who emphasized the mediational qualities of cognition on the expression and experience of an emotion arousing event. Arnold's work shared with Tolman's work the centrality of motivation and planned action (Lazarus, 2012). Lazarus designated Tolman as the seminal theorist in cognitive psychology as his 1932 work was the first to theorize openly connections between cognition, motivation, and purposive future oriented behavior. In addition to Arnold, Lazarus (2012) noted other critical thinkers, including Aristotle and Roberston, who identified elements of evaluation, investment and motivation, beliefs, and intensity as key to individual emotional experience.

From these early thinkers arose Lazarus's (1966, 2001, 2012) early conceptions of appraisal theory, which were to undergo several changes from his earliest writings to his later propositions. Despite some changes, appraising remained central to Lazarus's work, and he emphasized the verb form of appraising to distinguish between the appraisal product and the act of building meaning. Although the terms are often used interchangeably, Lazarus argued for the use of appraising to emphasize active construction of meaning, subject to change as situations are reevaluated and new experiences, information, and beliefs are applied to the constructed meaning. Lazarus initially identified two forms of appraising: primary appraising and secondary appraising. Primary appraising refers to the process in which an individual examines the relevance of a situation, the degree to which it interacts with personal beliefs, values, goals, and commitments, and potential outcomes if situational investment occurs (Lazarus, 2012). If the individual identifies no relevance, no intersection with beliefs, values, goals, or commitments, or no stake in potential outcomes, the situation does not receive additional considerations (Lazarus, 2012). Primary appraising consists of motivational relevance and motivational congruence (Smith & Lazarus, 1993). Motivational relevance refers to the intersection with beliefs, commitments, and values, whereas motivational congruence refers to the intersection with goals and desires (Smith & Lazarus, 1993).

Secondary appraising occurs when relationships between person and environment have meaning (Lazarus, 2012). During secondary appraising, the individual identifies what options are available for handling the situation. According to Smith and Lazarus (1993), secondary appraising consists of accountability, problem focused coping potential, emotion focused coping potential, and future expectancy. Accountability refers

to the task of assigning blame or credit for outcomes (Smith & Lazarus, 1993). Future expectancy is the determination of whether or not the situation and its motivational congruence are likely to change (Smith & Lazarus, 1993). During secondary appraising, individuals assess their coping self-efficacy, which is individual belief in ability to manage a situation (Chesney, Neilands, Chambers, Taylor, & Folkman, 2006). Coping self-efficacy derives from Bandura's (1997) self-efficacy theory and Benight and Bandura's (2004) social cognitive theory of posttraumatic growth, emphasizing personal agency in creating change through belief in ability.

For relevant transactions, appraising leads to three possible variants: harm and loss, threat, and challenge (Lazarus, 2001, 2012). Harm and loss occurs when damage has already occurred, whereas threat infers the potential for future damage (Lazarus, 2012). Challenge, as noted by Lazarus, shares a commonality with Selye's term eustress and refers to situations that require adaption and attention but may generate the potential for growth and individual enhancement or achievement. Lazarus discussed an additional process of appraising, reappraising, to recognize the fluidity of situation-person transactions. For example, during reappraising, an individual may find that one's coping abilities and coping resources are sufficient to mitigate threat or are insufficient to meet a challenge. In these situations, the primary appraisal variant and secondary appraisal options may no longer apply. Reappraising is not a distinct form of appraising but rather represents the act of revisiting primary and secondary appraisals as events change (Smith & Kirby, 2011).

The transactional process becomes more apparent when examining the directions of influence, as shown in Figure 4.

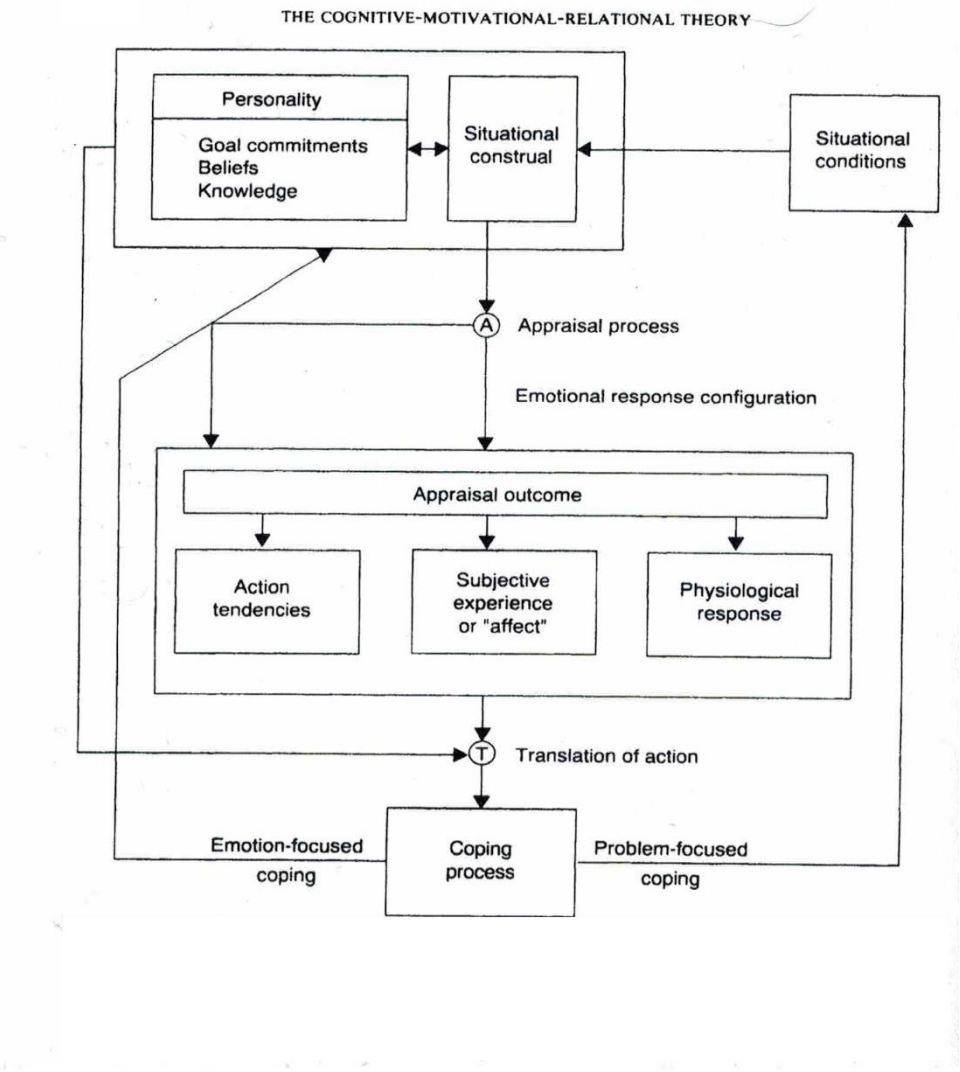

Figure 4. Model of the cognitive-motivational-emotive system. Reprinted with permission from *Emotion & Adaptation* by R. S. Lazarus, 1991, p. 210. Copyright 1991 by Oxford University Press.

In Figure 4, the person-environment relationship, influenced by additional situational conditions, shares a bidirectional influence over appraisal processes, which, in turn, affect emotional response configurations and immediate responses to the appraisal and determine coping processes through the translation of action. Emotion focused coping mediates the relationship between the person-environment relationship and appraisals,

whereas problem focused coping mediates situational construal through construction of the situational conditions. In turn, changes in the person-environment relationship as a function of initial appraisal processes and emotion focused coping may mediate the translation of action.

Lazarus (1999) emphasized the totality of the system, suggesting that failure to identify potential variables at any part of the system provides an incomplete or distorted picture of an emotion system. The potential variables fall into three categories: antecedent variables, mediating process variables, and outcomes. Specific variables can act as antecedents, mediating processes, and outcomes at different times due to the highly interdependent nature of the process approach; however, despite their interdependence, the variables only occupy one position at any specific moment (Lazarus, 1999).

Antecedent variables. Antecedent variables are the prerequisite situational and personal constraints that interact, which may require appraising (Lazarus, 1999). Demands and resources are examples of situational conditions, and situational conditions include formal elements of novelty, predictability, ambiguity, imminence, timing, and chronicity (Lazarus, 1999, 2012). Personal variables include self-concepts and world beliefs. Personal beliefs are constructed partially by the self but also through interactions with others, connecting the construction of personal meaning to larger social and cultural systems of beliefs (Lazarus, 1999, 2012).

Mediating process variables. Mediating process variables include appraising, action tendencies, and coping. Appraising, discussed above, is the evaluation of relevance and actionable options, which translate into an emotion comprised of a set of core relational themes (Lazarus, 1999). Core relational themes are the products of person-

environment appraisals and individual meaning (Lazarus, 1999). For example, the core relational theme of anxiety involves uncertainty (a situational antecedent) and a perception of threat (an appraisal product) (Lazarus, 1999). Action tendencies refer to physiological processes corresponding to core relational themes (Lazarus, 1999). Action tendencies serve as both mediating process variables and outcomes. For example, activation of the hypothalamic-pituitary-adrenal axis and sympathetic adrenal medullary system during person-environment appraisals is both the result of perceived threat, possibly generating feelings of anxiety or thrill leading to coping behaviors, and may also serve as an impetus for reappraising the threat or challenge of a situation and appropriate actions. It is these physiological action tendencies that Lundberg and Frankenhaeuser (1980) found to correspond to subjective evaluations of perceived stress and core relational themes of emotions. Coping processes provide a means for changing the situation or appraisal of the person-environment relationship (Lazarus, 1999).

Outcomes. Outcomes are proximal or distal. Proximal or short term outcomes include immediate subjective affect and action tendencies; distal or long term outcomes include chronic or recurrent patterns of appraisal and coping that affect subjective wellbeing, social functioning, and somatic health (Lazarus, 1999). PTSS and PTSD as long term outcomes will be discussed in detail below.

Recent PTSD Studies Employing the Transactional Theory of Stress and Coping

Lazarus's (1999, 2012) assertion of the importance of specificity and totality are often overlooked in contemporary research, particularly in regard to the transactional theory of stress and coping and PTSD. Although researchers have examined coping processes in outcomes (Hooberman et al., 2010; Kirby et al., 2011; LeBlanc et al., 2011;

Sliter et al., 2013), antecedent effects on outcomes (Burke & Shakespeare-Finch, 2011; Ho & Lo, 2011), and other portions of Lazarus's system theory, such as world assumptions (Lilly & Pierce, 2013) and peritraumatic cognitions and appraisals (Ehlers, Mayou, Bryant, 1998; Fairbank, Hansen, & Fitterling, 1991; Pierce & Lilly, 2012), few have examined a full conditional process in relationship to potential antecedents, mediating processes, and outcome (Benight, 2012).

Benight is one such example who, although naming Hobfoll's (1989) conservation of resources (COR) theory as a framework, identified outcomes (PTSS) from situational constraints (losses) through mediating processes (coping self-efficacy) in a specific context (hurricane recovery) (Benight, Cieslak, Molton, & Johnson, 2008; Benight et al., 1999). However, the transactional theory of stress and coping is underrepresented in the PTSD literature (Benight, 2012; Lazarus, 1999; Salinas Farmer, 2008). Both Salinas Farmer (2008) and Colwell (2005) framed their work on traumatic events using the transactional theory of stress and coping. Salinas Farmer (2008) explored the role of peritraumatic appraisals and self-efficacy in mediating the person-environment relationship and recovery of severe burns, whereas Colwell examined the role of personal antecedents, cognitive appraisals, coping strategies, and outcomes of traumatic experiences of police officers. Both found support for examining the interactive effects of antecedents and appraising on physical and mental outcomes following trauma and endorsed future attempts to identify conditional processes in PTSS and PTSD.

Criticisms of the Transactional Theory of Stress and Coping

Although Lazarus's (1999) transactional theory of stress and coping provided a comprehensive theoretical approach for examining stress and emotion process, critics

have identified major points of contention with the system process. Two major critics, representing different approaches, cite a similar criticism: reliance on subjective interpretations of an event. Dohrenwend and Dohrenwend (1974), who endorsed the stress-as-stimulus concept, averred the importance of quantifiable life events without relying on individual interpretation of these events. Hobfoll (1989), on the other hand, emphasizes the role of loss of resources as an objective indicator of situational constraints.

Although Hobfoll's COR has been used as a framework for understanding PTSD and for examining WFC and job demands and resources, it has not provided sufficient information regarding cognitive appraisal and reappraising in the development and maintenance of traumatic stress (Salinas Farmer, 2008). In addressing this criticism, Lazarus (2012) contended that these alternate views both fail to acknowledge that the subjective determination of relevance provides context for loss or event. Loss or event cannot be deemed distressing until after examining the extent of distress and suffering, making such examinations reliant on subjective appraisal without assessing those cognitions while also employing circular reasoning. Additionally, Dohrenwend and Shrout (1985) criticized attempts to operationalize antecedents, mediating processes, and outcomes as the standard measures employed tended to confound variables. This argument led to what Deutsch (1986) referred to as the "Stress Wars," a debate over theory, conceptualization, and operationalization of variables (Dohrenwend & Shrout, 1985, 1986; Green, 1986; Lazarus, DeLongis, Folkman, & Gruen, 1985; Lazarus & Folkman, 1986). The Stress Wars were never fully resolved, and issues of confounding have been addressed by other researchers (e.g., Peacock & Wong, 1990).

Rationale for the Transactional Theory of Stress and Coping Framework

Despite criticisms and counterpoints to the transactional theory of stress and coping, the stress process conceptualization inherent in the theory provides a framework for testing a predictive model in traumatic stress research. However, Lazarus's full model is rarely employed in examinations of stress related outcomes, and partial models do not allow for refutation or support of the transactional theory of stress and coping as they fail to convey the covariance and mediating processes inherent in the model.

Relationship to proposed study. In examining the literature related to the transactional theory of stress and coping, certain trends, mirrored in the core premises, became apparent. Specifically, development and maintenance of distress depend upon a series of situational and personal characteristics that interact in meaningful ways for an individual. As a core premise of the transactional theory of stress and coping, these interactions are captured in a theoretical model (see Figure 1). In the current study, I addressed the overarching research question: To what extent does the transactional theory of stress and coping fit the data in a sample of telecommunicators? The transactional theory of stress and coping provided a model and information on key independent and mediating variables in examining PTSS outcomes. Additionally, each premise of the transactional theory of stress and coping allowed examination of characteristics of and relationships between variables of an at risk population that has not been well studied.

Contribution to current body of literature. Lazarus's (1999) and Lazarus and Folkman's (1984) work are often cited in the stress literature and have formed the foundation for a significant body of research on coping, yet despite this emphasis on transactional stress processes, very few researchers have identified variables at each

process stage. I attempted to address this gap in this study by incorporating the antecedents, mediating processes, and outcomes that Lazarus (1999, 2012) emphasized. Furthermore, I advanced understanding of the transactional theory of stress and coping in this population by providing support for the roles of and relationships between chronic occupational antecedents and WFC, negative appraising, and coping in outcomes proposed within the theory.

Posttraumatic Stress Disorder

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*), PTSD is commonly conceptualized as a cluster of heterogeneous symptoms emerging following a traumatic event that overwhelms an individual's ability to cope (APA, 2013). Inherent in this definition is the role of appraisals and coping occurring in a specific context. The traditional triarchic pattern of PTSD symptoms from clinical definitions include avoidance, reexperiencing, and hyperarousal (APA, 2000); however, newer models of PTSD suggest either a four- or five-factor model of PTSD symptoms, indicating a need to explore the factor structure of PTSS to better understand development and clinical presentation. Four factor models include the numbing model, in which symptom patterns include reexperiencing, hyperarousal, effortful avoidance, and emotional numbing, and the dysphoria model with symptom patterns of intrusion, hyperarousal, dysphoria, and avoidance (Wang et al., 2013). In contrast to the three factor PTSD model of the *DSM-IV-TR*, the *DSM-5* model of PTSD resembles the four-factor numbing model (Charak et al., 2014), based on evidence of the superiority of four-factor models in PTSD symptoms (Cox, Mota, Clara, & Asmundson, 2008). More recently, five factor models of PTSD have found significant support in the literature across multiple

populations and contexts (Charak et al., 2014; Pietrzak et al., 2014; Pietrzak, Tsai, Harpaz-Rotem, Whealin, & Southwick, 2012). These challenges to the previous three factor model of PTSD represent a more nuanced understanding of the disorder and suggest a systemic dysregulation of the appraisal process in which specific situational considerations may assist in predicting PTSS (Pietrzak et al., 2014).

Symptoms such as avoidance may be triggered by the connection between anticipatory behavioral, neuroendocrinological, and psychoneuroimmunological responses that, left untreated, may increase susceptibility to additional diseases and disorders intimately connected to these response pathways, including cardiovascular disease, depression, diabetes, and metabolic syndrome. These disorders share strong patterns of comorbid presentation with PTSD (Zoladz & Diamond, 2013). Although increasing knowledge of the neurophysiology of PTSD has provided treatment options and a deeper understanding of both normal and disordered stress responses, this knowledge has not led to better understanding of PTSD vulnerability and susceptibility, largely because of the conflicting literature regarding biological and behavioral markers (Zoladz & Diamond, 2013).

A major point of contention in the etiology of stress pathologies is the role of stressor severity and duration and how continued exposure to trauma and chronic stressors affects PTSS. The roles of chronic occupational stress and continuous traumatic stress are underexplored in the posttraumatic stress literature and merit specific consideration in the expression of stress disorders in first responder populations. For example, Wirtz et al. (2013) noted that occupational role uncertainty, an example of an antecedent situational condition, shared a significant relationship with cortisol reactivity

under situations of a stress inducing task; however, the stress inducement task does not necessarily represent exposure to a traumatic event as defined by the *DSM-5*.

In contrast, Cerdá et al. (2013) examined ongoing traumatic events and stressors in the context of post-hurricane recovery and found that acute stressors contributed significantly to initial PTSS and functional impairment as well as increased functional impairment over time. Although no association between ongoing post-hurricane stressors and initial PTSS or functional impairment emerged, ongoing, chronic stressors were significantly associated with later PTSS and impairment, suggesting a role of chronic stress appraisals in the delayed onset subtype of PTSD (Cerdá et al., 2013). Caution is needed in generalizing the results, though, as the population included hurricane victims; however, Cerdá et al emphasized the importance of investing in strategies to minimize ongoing stressors to promote long term mental health in disaster victims. In one of the few comprehensive reviews of predictors of posttraumatic stress in police and first responders, Marmar et al. (2006) specifically noted the roles of routine work environment stress, social support, peritraumatic appraisals, and problem solving coping in PTSD symptom expression. Despite the evidence supporting the inclusion of ongoing situational considerations occurring with or following traumatization, few studies have examined the routine occupational setting in PTSS.

First Responder Populations: Work Environment, Traumatic Stress, and PTSS

First responders are generally identified as those who respond to emergency situations and include police officers, firefighters, and EMTs or paramedics. First responders are at an increased risk of developing PTSD due to their exposure and proximity to the suffering of others and personal danger in uncontrollable situations

(Berger et al., 2012). In a recent worldwide systematic review and meta-regression analysis of PTSD in law enforcement officers, firefighters, and ambulance personnel, Berger et al. (2012) estimated a worldwide pooled current PTSD prevalence of 10% in rescue workers, with higher prevalence of PTSD in rescue workers in Asia and ambulance personnel. This prevalence should be interpreted with caution as rates varied from 0% to 46% prevalence in the studies reviewed (Berger et al., 2012). Although the physical and psychological dangers to the physically-present traditional first responder should not be diminished, in general, each of the emergent and traumatizing situations to which a first responder responds must first be heard and handled by a telecommunicator.

Telecommunicators occupy a unique occupational niche in emergency service response and provision. They are not physically on-scene of dangerous and life-threatening situations; instead, they are isolated in call centers. However, they are often present and directly connected to the event through direct communication with victims, perpetrators, and responding units, as well as witnesses, uninvolved parties, and news media. Telecommunicators are not sworn officers or licensed professionals who have received specific education or training on handling incidents prior to employment; rather, they tend to have either a high school diploma or some college (Troxell, 2008). Individuals at risk in critical situations are not just strangers calling for assistance but are coworkers, friends, and sometimes family members who are dispatched by the telecommunicators to dangerous and potentially life threatening situations in which the outcomes are uncontrollable and often unknown (Troxell, 2008). Telecommunicators serve as the link between individuals experiencing a personally devastating event and the help that can be provided to those individuals. Telecommunicators often must obtain

information from emotionally distraught or physically injured individuals to enact an appropriate response to an exact location while also ensuring the safety of responding units by identifying known, possible, and inferred threats and risks to those who respond. Not only are telecommunicators responsible for the outcomes of the injured or victimized parties, but they are also responsible for the safety and security of the responding units.

Although telecommunicators do not typically experience direct sights, smells, or tactile sensations during an event, they are exposed directly to traumatic sounds and events as they unfold. Often, telecommunicators have a presence at a scene and have developed a mental picture of the event (Troxell, 2008) before the conventionally envisioned first responders arrive and are providing instruction, gathering information, and distantly evaluating the scene. Despite having been identified as an at risk population as early as 1984 by Sewell and Crew due to stressors common to first responders and those unique to emergency services communications, telecommunicators are largely overlooked in the traumatic stress literature.

For telecommunicators, continued repeat traumatization is an occupational hazard. Traumatic events are unanticipated and largely uncontrollable, with telecommunicators acting reactively to developing situations. Telecommunicators must be able to evaluate, adapt to, and cope effectively with emerging situations quickly; however, the coping strategies used to manage life threatening and in progress situations may be inadequate or damaging in managing chronic daily stressors in work and home life, leaving them vulnerable to long term psychological distress. Emergency services communications tends to have high rates of turnover, with an average of 19%, and retention continues to be a source of concern for center supervisors (APCO RETAINS

Workgroup, 2009). Job demands and inadequate job resources contribute significantly to turnover intentions and absenteeism (Sotebeer, 2011). It remains unknown if turnover intentions and absenteeism are directly related to psychological distress stemming from work conditions; however, certain factors, including perceived recognition and exposure to emotional strain, have been found to predict psychological distress, but significant individual differences affect the perceptions of those stressors (APCO RETAINS Workgroup, 2009). Identifying individual differences may provide opportunities for aiming efforts that would reduce or prevent occupation related psychological distress. It is evident from the literature that occupational stressors are routinely identified as distressing for trauma-exposed telecommunicators, yet the degree to which occupational stress appraisals affect distress outcomes is unknown.

Although limited, contemporary research on telecommunicator stress has focused on distress through traumatization (Lilly & Pierce, 2012; Pierce & Lilly, 2013; Troxell, 2008), absenteeism and turnover as a function of job demands and resources (Sotebeer, 2011), coping (Anshel et al., 2013; Latter, 2003), humor in telecommunicator emotion management (McLaughlin, 2012), and self-efficacy (Shakespeare-Finch et al., 2014). Older work, such as that by Shuler (1997) and Weber (1986) demonstrated the importance of occupational stressors and transference of stressors from work to home in the lived experiences of telecommunicators. Although identifying subclinical or partial and full PTSD as a potential occupational hazard, existing research has not examined intraindividual differences or how any such differences may influence posttraumatic stress vulnerability and resilience in trauma-exposed telecommunicators.

Trauma Exposure and Posttraumatic Distress

Telecommunicators experience duty related trauma regularly in their professional lives. Pierce and Lilly (2012) found of the 171 telecommunicators surveyed, participants experienced, on average, 15.32 types (*SD* = 3.5) of potentially traumatic events out of a list of 21 events throughout their career. Over 75% of the respondents indicated exposure to certain call types, including fires, domestic batteries, and armed robbery, while fewer reported exposure to calls involving family and friends (55%), riots (38.6%), officer shot (31.6%), or line-of-duty death (32.3%) (Lilly & Pierce, 2013). Exposure to these types of traumatic incidents corresponds with burnout and secondary traumatic stress (Troxell, 2008). Important to note in this group is the repeated exposure to potentially traumatic events with many telecommunicators indicating having handled multiple types of potentially traumatic calls throughout their careers. Prior exposure to trauma corresponds with significantly greater distress to such a degree that Green et al. (2000) recommended that complex trauma histories must be examined in trauma-related studies.

Kolassa et al. (2010) demonstrated that decreases in spontaneous remission of PTSD share a direct relationship with the number of traumatic events experienced. Although working within a population of war exposed refugees in Uganda, thus limiting the generalizability of these results to other populations, Kolassa et al. showed that each exposure to a potentially traumatic event resulted in an 8% reduction of spontaneous remission. With their increased and repetitive exposure to potentially traumatic events, telecommunicators may be at increased risk of PTSD; however, this risk was not demonstrated in Pierce and Lilly's (2012) work in which only 3.5% of the respondents met the cutoff score for a PTSD diagnosis, a rate similar to the U.S. national 6- (3.8%)

and 12-month prevalence (4.7%) rates identified by Kilpatrick et al. (2013). The diagnosis results are questionable, though, from a methodological standpoint as the respondents were not randomly selected and may have, as noted by Pierce and Lilly, been a particularly resilient group of telecommunicators. Alternatively, individuals prone to PTSD may not remain in the telecommunicator profession, indicating a need for studies that are longitudinal or that use sampling procedures that are not convenience based (Pierce & Lilly, 2012). Furthermore, telecommunicators' posttraumatic experiences may not be considered clinical under traditional diagnostic criteria but may rather emerge at a subclinical level, leading to functional impairment, disability, and suicidality (Cerdá et al., 2013; Marshall et al., 2001).

Although evidence suggests increased risk of exposure for telecommunicators, the psychological effect of exposure is less understood. Pierce and Lilly's (2012) study was the first to examine PTSD symptoms specifically in telecommunicators. Of note were the telecommunicators' reports of peritraumatic distress in which telecommunicator scores (M = 2.93) were greater than those reported in Brunet et al.'s (2001) study of police officers (M = 1.17, SD = .64) and civilians (M = 1.52, SD = .69) (Pierce & Lilly, 2012). Gender may provide one explanation for these results, as women typically indicate greater levels of peritraumatic distress than men, and women comprised the majority (73.6%) in Pierce and Lilly's work. Pierce and Lilly urged caution in interpreting peritraumatic distress because retrospective recollections of distress may be exaggerated; however, peritraumatic distress is commonly referenced as a significant predictor in the development of PTSD.

In line with *DSM-5* diagnostic criteria (APA, 2013), telecommunicators' exposure to trauma may include violent and accidental events involving close family members or friends (criterion A3) and may include gory and traumatizing accounts of violent, accidental, or malicious events that occur within the context of a workplace (criterion A4). While these events are necessary in the development of PTSD, they are not sufficient, as many telecommunicators do not develop clinical PTSD, and the development and expression of PTSS are not understood in this population.

Work Environment

An underexplored concept in the PTSS and PTSD literature is the cumulative effect of acute and chronic stressors in trauma-exposed populations. Telecommunicators do not face one singular episode of a potentially traumatizing event. Instead, unexpected trauma becomes part of the daily repertoire of incoming stressors that must be appraised and managed. Work related to allostatic load is particularly important in this regard – as a system endures more and more perceived stress, it begins to compensate through dysregulation (Wirtz et al., 2013). In turn, dysregulation may increase susceptibility to adverse acute stress reactions in individuals who previously may have exhibited resilience (Wirtz et al., 2013). For telecommunicators exposed to trauma, chronic stressful work environments that leak into family life may represent an erosion of resilience in which previously protective individual differences in self-efficacy and coping are challenged because the perception of coping self-efficacy is reduced as additional, uncontrollable stressors continue to be added regardless of individual effort to suspend or ease those stressors.

In the transactional theory of stress and coping, Lazarus (1999) referred to the role of the social environment at work and referenced Repetti's (1987) four factor structure of the work situation as relevant in examining occupational health outcomes. Repetti (1987, 1993) focused primarily on social interactions as a function of the work environment and noted significant relationships between perceived workload, coworker and supervisor interactions, mood, and health complaints; however, the occupational environment presents challenges and threats aside from social interactions. As in much of the research on stress and outcomes, disagreement abounds on the degree of specificity necessary to obtain meaningful results. Troxell (2008) and other researchers of occupational stress in first responders (Lambert et al., 2012; McCreary & Thompson, 2006; Van Hasselt et al., 2008) have used career specific measures, noting that certain qualities of some professions are not adequately covered by more general measures. However, general measures of occupational stress have also provided useful information on the role of occupational stressors in mental, physical, and occupational health. Occupational stress has been examined in telecommunicators, although this body of research is also limited. Only three studies were identified in which telecommunicators' occupational environment was evaluated (Flanagan, 2013; Sotebeer, 2011; Troxell, 2008). Flanagan (2013) compared two measures used to explore occupational stress in law enforcement officers with the experiences of telecommunicators. Although not a formal study, Flanagan adapted McCreary and Thompson's (2006) Organizational and Occupational Police Stress Questionnaires and Van Hasselt et al.'s (2008) Law Enforcement Officer Stress Survey for use with telecommunicators and found consistent overlap between officers' and telecommunicators' sources of stress.

In her examination of indirect traumatization in telecommunicators, Troxell (2008) included a measure of typical sources of occupational stress for telecommunicators developed from an online survey posted on the website of a popular 911 magazine that is no longer available. Troxell explained sources of occupational stress occupy three broad categories: job and task demands, organizational factors, and physical conditions (Troxell, 2008). In her analysis, Troxell found the most efficient model for predicting compassion satisfaction in telecommunicators, explaining 5.3% of the variance, included sources of stress, gender, and education. Additionally, burnout significantly associated with several professional variables, including years of experience, $F(1, 483) = 4.894$, $p < .001$, $r(483) = .10$, sources of stress, $F(1, 485) = 61.459$, $p < .001$, $r(483) = .335$, overtime practices, $F(1, 479) = 6.059$, $p = .014$, $r(479) = .109$, and work status, $F(1, 472) = 12.844$, $p < .001$, $r(472) = -.161$, room tone, $F(1, 484) = 40.055$, $p < .001$, $r(484) = .276$, and staffing adequacy, $F(1, 474) = 30.778$, $p < .001$, $r(474) = -.247$ (Troxell, 2008). However, in Troxell's full and most efficient model of burnout, room tone, sources of stress, and full- or part-time status explained 13.2% of variance.

Troxell (2008) also explored relationships between personal and professional variables and secondary traumatic stress, finding signification relationships between secondary traumatic stress and gender, $F(1, 486) = 4.774$, $p = .029$, $r(486) = -.10$, work status, $F(1, 472) = 7.981$, $p = .005$, $r(472) = -.130$, overtime practices, $F(1, 479) = 4.855$, $p = .028$, $r(479) = .10$, room tone, $F(1, 484) = 36.197$, $p < .001$, $r(484) = .264$, staffing adequacy, $F(1, 474) = 17.413$, $p < .001$, $r(474) = -.188$, and sources of stress, $F(1, 485) = 42.500$, $p < .001$, $r(485) = .284$. Troxell identified the best model of secondary traumatic

stress included gender, work status, years of experience, room tone, staffing adequacy, and sources of stress, which explained 9.6% of variance in secondary traumatic stress ratings. With relatively low amounts of explained variance, Troxell recommended developing more comprehensive models of stress appraisals and coping in telecommunicator distress.

Alternatively, Sotebeer (2011), using a more general measure of occupational stress, examined relationships between job demands and job resources to absenteeism and turnover intentions in telecommunicators. Sotebeer (2011) found significant relationships between job demands and absence due to work, $r(214) = .303$, $p < .01$, job demands and turnover intention, $r(214) = .303$, $p < .01$, job resources and long term absence, $r(214) = .162$, $p = .017$, job resources and absence due to work, $r(214) = -.409$, $p < .01$, and job resources and turnover intention, $r(214) = -.482$, $p < .01$.

Despite limited work on direct relationships between occupational stressors and PTSD, researchers have consistently found significant relationships between occupational stressors and burnout as well as burnout and PTSD, suggesting a need to explore if a relationship between occupational stress appraisals and PTSS exists.

Work-Family Conflict and Gender

While her work on coping and physiological responses, discussed below, is relevant to the current investigation, Frankenhaeuser (1980) also found that women, but not men, experiencing heightened occupational distress were less able to return to a physiological baseline of arousal after leaving work, suggesting that occupational distress creates a lasting effect on quality of life, particularly for females. Women experiencing occupational stress in the form of increased hours were less able to employ successful

coping strategies both at work and at home (Frankenhaeuser, 1980). Although both men and women occupy telecommunicator positions, women occupy a majority of telecommunicator positions, and many studies report a clear majority of respondents as female (92.6% in Jenkins [1997]; 74% in Lilly and Pierce [2013]; 73.6% in Pierce and Lilly [2012]; 68.3% in Shakespeare-Finch et al. [2014]; and 72.5% in Troxell [2008]). Additionally, Troxell (2008) found that 35.6% of her respondents indicated a spouse, partner, or significant other occupied a first responder position, and of those, a majority (73.2%) indicated that their partner worked in the same jurisdiction. Separating work and home may be difficult for telecommunicators who find many overlaps between their personal and professional lives. For many telecommunicators, occupational stressors may have pervasive work and family domain effects as a critical incident may involve sending a loved one to a dangerous call, listening to a loved one call for help, or enduring the chronic stressors of inferiority, lack of recognition, and scapegoating that have been cited as major contributors to telecommunicator stress (Troxell, 2008). Alternatively, the close proximity of a loved one who knows and understands the nature of the work may provide a better support system and may help mitigate stress appraisals by reducing challenge and threat perceptions, enhancing coping self-efficacy, and enabling beneficial coping strategies by enhancing compatibility of work and home roles, but this view has not been explored in telecommunicators.

Consistently, incompatible overlaps in personal and professional domains have been linked with poorer physical, psychological, and occupational outcomes (Netemeyer, Boles, & McMurrian, 1996; Wang, Chang, Fu, & Wang, 2012), yet neither work-to-family interference nor family-to-work interference has been examined in

telecommunicators. These interferences, collectively referred to WFC, represent a multidimensional mismatch between home and work demands. Informed by the work of Greenhaus and Beutell (1985), Carlson et al. (2000) defined these dimensions as the interface between forms of WFC (time, strain, and behavioral) and directions of WFC (work-to-family and family-to-work). Greenhaus and Beutell described the domain conflicts as role pressure incompatibility. Time conflicts reflect commitments to one domain reducing available time to fulfill commitments in the other domain (Greenhaus & Beutell, 1985). An example of work-to-family time conflict would include inadequate staffing levels and mandatory overtimes, which occur in many emergency communications call centers (Troxell, 2008) and may require that telecommunicators spend more hours at work that would, under conditions of no mandatory overtime or adequate staffing, be spent at home (or at least away from work). Strain conflicts represent the degree to which stressors from one domain impede performance in the other through increased anxiety, tension, physical and mental fatigue, and irritability (Greenhaus & Beutell, 1985). For example, telecommunicators who do shiftwork may find that they are too tired to engage with others outside of work, and lack of sleep may make them irritable and quick to anger with family members. Switching the direction of conflict, engaging in family activities may leave a telecommunicator with limited opportunities to sleep, making him or her cranky or irritable at work. Finally, behavior-based conflict refers to incompatible expressions of behavior across domains (Greenhaus & Beutell, 1985). For example, telecommunicators may have to remain aloof and detached from traumatic calls to process information effectively. This aloofness may not be appropriate when dealing with strain in situations with family and loved ones. In

general, WFC studies have shown that individuals experience work-to-family interference more frequently than family-to-work interference, and significant cultural differences exist in the reporting of family-to-work interference (Anafarta, 2011).

From a salutogenic perspective, Fiksenbaum (2014) identified the protective role of supportive work-family occupational environments on occupational health and life satisfaction. Despite early work by Netemeyer et al. (1996) demonstrating significant relationships between work-to-family interference, family-to-work interference, and sales self-efficacy, few studies have replicated or further explored the mediating or moderating effects of individual differences between WFC and occupational health outcomes. In one of the few studies to address this gap, Wang et al. (2012) examined the role of psychological capital in mediating WFC and burnout in Chinese female nurses. Psychological capital is a collection of psychological resources employed by individuals to overcome threat and harm appraisals and includes self-efficacy, hope, optimism, and resilience (Wang et al., 2012).

Family-to-work interference and work-to-family interference correlated significantly and positively with emotional exhaustion, $r(1330) = .48$, $p < .01$ and $r(1330) = .21$, $p < .01$, respectively, and cynicism, $r(1330) = .34$, $p < .01$, and $r(1330) = .35$, $p < .01$, respectively (Wang et al., 2012). However, family-to-work interference and work-to-family interference correlated with professional self-efficacy in opposite directions: Family-to-work interference exhibited a negative relationship with professional self-efficacy, $r(1330) = -.21$, $p < .01$, whereas work-to-family interference exhibited a significant, positive relationship with self-efficacy, $r(1330) = .06$, $p < .05$ (Wang et al., 2012). Family-to-work and work-to-family interference negatively interacted with

psychological capital, $r(1330) = -.10$, $p < .01$ and $r(1330) = -.16$, $p < .01$, respectively (Wang et al., 2012). Additionally, psychological capital partially mediated the relationships between family-to-work interference, work-to-family interference, emotional exhaustion, and cynicism. Psychological capital did not mediate the relationship between work-to-family interference and professional efficacy, although it did mediate the relationship between family-to-work interference and professional efficacy (Wang et al., 2012). This result merits cautious interpretation, though, as it seems the results would be confounded by measuring similar constructs (i.e., self-efficacy, an aspect of psychological capital, as a mediator and professional self-efficacy as an indicator of degree of burnout); it is unknown if self-efficacy as an aspect of psychological capital is referring to a state (as aligning with Benight and Bandura's [2004] theoretical perspective) or trait (as described by Schwarzer [1992]) designation.

Lambert et al. (2015), although using a unidirectional approach in predicting WFC, looked to identify antecedents of WFC in correctional staff. Although Lambert et al. specified the bidirectional effect of WFC, their intent was that conflict in one domain causes conflict in both domains (i.e., work conflict leads to strain in family and work domains). Lambert et al. focused on work-to-family interference, in line with Nohe, Meier, Sonntag, and Michel's (2015) matching hypothesis, as work sources of conflict may be more amenable to intervention at an organizational level. Specifically, Lambert et al. found support for the significant role that occupational stressors had in predicting WFC, as opposed to the hypothesized protective role of job resources. The development of Lambert et al.'s scales is questionable as they used partial versions of existing measures and, although calculating Cronbach's alpha, did not verify the factor structure

of the newly created measures, criticisms discussed in a previous response to Lambert and Hogan's (2010) examination of WFC as an antecedent of burnout (Smith, 2011). Despite these limitations, Lambert et al. identified several significant predictors of WFC including role overload, role conflict, perceived dangerousness of the job, and age.

WFC is consistently examined within the context of burnout, job satisfaction, life satisfaction, and depression; however, examination of WFC in the development, maintenance, and remission of clinical and sub-clinical PTSD is limited. A search of the PILOTS database using the search phrase work family conflict AND posttraumatic stress yielded only 10 results, of which only one, a study by Cowlishaw, Evans, and McLennan (2010), was relevant to this discussion. Works citing Cowlishaw et al. did not explore the relationship between WFC and PTSS. Cowlishaw et al. developed a theoretical model of WFC in volunteering. In Cowlishaw et al.'s specified model, work involvement predicted on call time investment, which predicted WFC. PTSS correlated with work involvement and predicted WFC and volunteer burnout (Cowlishaw et al., 2010). WFC predicted partner support and volunteer burnout (Cowlishaw et al., 2010). Of interest, Cowlishaw et al. indicated that this model exhibited best fit using Akaike's information criterion (AIC) and Schwarz Bayesian information criterion (BIC) goodness of fit indices; however, they noted that a model with WFC specified as an exogenous variable also demonstrated acceptable fit, though the data were not provided.

Two additional relevant studies were also identified. Evans et al. (2009) explored the role of family functioning in chronic PTSD. Although not explicitly using a WFC framework, family functioning significantly corresponded with PTSD symptoms, and these relationships grew stronger over time (Evans et al., 2009). In an interesting result,

Evans et al. noted that while family functioning was a strong predictor of PTSD symptoms, PTSD was not a predictor of disrupted family functioning over time.

Hobfoll, Vinokur, Pierce, and Lewandowski-Romps (2012), using the COR theoretical framework, examined WFC and war stressors in PTSS and depression symptoms, perceived physical health, and functioning in deployed Air Force personnel. From Hobfoll et al.'s perspective, traumatic stress is the dramatic loss of resources over a short period of time, whereas occupational stress results in a slower decline of resources. Slow depletion of resources, as during chronic occupational stress, may impede resilience and recovery when a traumatic loss occurs, making it important to identify both chronic and acute sources of stress when examining PTSS.

Hobfoll et al. (2012) modeled stressors as a single composite latent factor. This score, obtained from a composite stressor variable score on occupational stressors, financial stressors, exposure to trauma, length of deployment, and WFC, significantly predicted PTSS, $\beta = .43$, $p < .001$, and resource loss, $\beta = .68$, $p < .001$ (Hobfoll et al., 2012). Resource loss predicted PTSS, $\beta = .13$, $p < .05$, and partially mediated the effect of stressors on PTSS (Hobfoll et al., 2012). Additional outcomes related to resource gains, perceived health, perceived functioning, and depressive symptoms are also available from Hobfoll et al. but will not be discussed here. Hobfoll et al.'s work provides important clues in determining the direction of effect in the stressor-strain relationships as additional models with alternate paths were explored and were not found to have better fit.

Despite this initial evidence of the role of traumatic, occupational, and WFC stressors in the development of PTSD, the collapse of stressors into a single latent factor

does not allow exploration of the contribution of the individual types of stressor. This collapse is particularly detrimental in devising appropriate intervention strategies because it is unknown if interventions, prevention, or training should focus on chronic occupational stressors, traumatic experiences, or the work-family interface. Additionally, the measure used to assess WFC was a two-item scale derived from work by Frone, Russell, and Cooper (1992). The measure is a very basic assessment of WFC that does not include the multiple domains and multidirectional dimensions specified by Greenhaus and Beutell (1985) and elaborated upon by Carlson et al. (2000). The two items used by Hobfoll et al. (2012) only examine work interfering with family, and Hobfoll et al. did not include the family interfering with work items also used by Frone et al. Hobfoll et al.'s and Evans et al.'s (2009) works are significant for establishing relationships between WFC and PTSD; however, their samples were drawn specifically from military and veteran populations, making it difficult to generalize the results to first responders and other civilians. Cowlishaw et al.'s (2010) study, while applicable to civilian populations, is limited by the context of volunteer work and the use of two WFC subscales from Carlson et al.'s measure.

Although a substantial body of research indicates a significant relationship between WFC and occupational health outcomes, the placement of conflict in the stressor-strain relationship has been inconsistent (Nohe et al., 2015). In their meta-analysis, Nohe et al. (2015) limited their review to works using a longitudinal panel design to elucidate the direction of causation between the WFC and strain relationship. In addition to the direction of effect, Nohe et al. (2015) sought to elaborate the degree to which WFC effects occurred within the same domain (i.e., the effect of work-to-family

interference on the work domain and family-to-work interference on family domain) or according to the dominant perspective of cross-domain effects (i.e., the effect of work-to-family interference on the family domain and family-to-work interference on the work domain). Nohe et al. (2015) found that work-to-family interference and family-to-work interference share reciprocal relationships with strain, supporting the loss spiral proposed by Hobfoll and Freedy (1993). In this way conflict between home and work domains generate strain, and strain, in turn, increases perceptions of WFC. Additionally, Nohe et al. (2015) found stronger support for the effect of work-to-family interference on work strain than that of family-to-work interference, which supports appraisal theories of the stressor-strain relationship. By exploring multidirectional and domain effects, Nohe et al. (2015) married the concepts of resource loss and threat appraisals, an idea supported by Lazarus (2012). As discussed previously, Lazarus contended that the salience of loss, as defined by Hobfoll (1989), occurs within the context of appraising the degree to which actual or perceived loss or the threat of loss has personal relevance and whether or not loss, or threat of loss, may be mitigated through perceptions of ability to cope and actual coping efforts.

Appraising: The Link between Trauma Exposure, Chronic Stressors, Self-Efficacy, Coping Styles, and Posttraumatic Distress

Exposure to trauma does not uniformly result in adverse outcomes. Many individuals exposed to traumatic events do not suffer posttraumatic distress and are able to return to pre-event functioning, while others exhibit posttraumatic growth following traumatic exposure. Individual differences in stress appraisals and personal coping resources appear to mediate the relationship between acute trauma exposure and long

term psychological distress and somatic complaints (Bryant & Guthrie, 2007; LeBlanc et al., 2011; McFarlane, Williamson, & Barton, 2009; O'Donnell, Elliott, Jones Wolfgang, & Creamer, 2007), but the relationship between traumatization and distress is further complicated when individuals face chronic daily stressors (Cerdá et al., 2013; Marmar et al., 2006). According to the transactional theory of stress and coping, the extent of coping effectiveness and psychological distress resulting from chronic stressors occurring subsequent to and continuous from traumatization will be influenced by self-evaluation of coping ability.

Cognitive Appraisals

In the transactional theory of stress and coping, appraising serves as the foundation for construction of meaning in any person-environment encounter, yet appraising is not well understood and is an underrepresented theoretical construct in the stress literature. One problem, noted by Peacock and Wong (1990) and reiterated in Peacock et al. (1993), is the confounding of appraisal components and coping. The issue of confounded measures is a consistent theme in stress research, as mentioned previously in criticisms of the transactional theory of stress and coping. With appraising, confounding occurs when coping processes are included in the operationalization of appraising, such as when reappraisal is referred to as an appraising process of evaluating motivational relevance and congruence and as a problem- or emotion-focused coping process used to minimize perception of threat (Peacock et al., 1993). Appraising may need to be context specific to identify the degree of situational relevance, congruence, and accountability, but few studies have specifically examined these components.

In the traumatic stress literature, commonly used measures of trauma cognitions include Foa, Ehlers, Clark, Tolin, and Orsillo's (1999) Posttraumatic Cognitions Inventory, which is a useful and validated measure for examining beliefs about self and world, and Brunet et al.'s (2001) Peritraumatic Distress Inventory. The Posttraumatic Cognitions Inventory is framed from a medical model of psychopathology and examines negative beliefs about self, negative beliefs about world, and self-blame (Foa et al., 1999). The Posttraumatic Distress Inventory, used to assess *DSM-IV* criteria for PTSD, assesses fear, hopelessness, or terror resulting from a traumatizing event (Brunet et al., 2001). Peritraumatic dissociation has been identified as a significant predictor of PTSD in several meta-analyses (Breh & Seidler, 2007; Ozer, Best, Lipsey, & Weiss, 2003); however, the predictive value of peritraumatic dissociation disappears when controlling for other variables, including existing psychological problems (van der Velden & Wittmann, 2008), and lack of methodological rigor prevents clear consensus on the causal relationship between peritraumatic dissociation and posttraumatic stress (Lensvelt-Mulders et al., 2008). From a transactional theory of stress and coping perspective, peritraumatic dissociation may emerge as a core relational theme arising from person-environment interactions with primary and secondary appraisals, although this perspective has not been explored. Likewise, peritraumatic distress has been identified as a risk factor for PTSD and depression in telecommunicators (Lilly & Pierce, 2013). Specifically, peritraumatic emotional distress significantly correlated with both PTSS, $r(169) = .34$, $p < .001$, and depressive symptoms, $r(169) = .36$, $p < .001$ (Lilly & Pierce, 2013). Although these are important aspects to investigate in PTSD, it is uncertain if they

tap into the primary and secondary appraisal components identified by Smith and Lazarus (1993).

Although many studies include a conceptual link to primary appraisal, few have examined the multidimensional properties proposed by Lazarus and Folkman (1984). Instead, many have relied on a single question of how stressful an encounter was perceived to be. Franks and Roesch (2006), in an attempt to consolidate findings, performed a meta-analysis on primary appraisal and coping in cancer. Their meta-analysis included 15 studies and 1,473 participants and although they identified a method for comparing coping strategies, did not specify how appraising was conceptualized or operationalized in the included works (Franks & Roesch, 2006). Although most relationships between appraisal and coping did not reach levels of significance, they did exhibit small to medium effect sizes (Franks & Roesch, 2006). For example, problem focused coping and threat appraisals, which did reach statistical significance ($p < .01$), had a weighted correlation of .20, and harm/loss appraisals and avoidance coping, also significant ($p < .01$), had a weighted correlation of .23 (Franks & Roesch, 2006).

Peacock and Wong (1990) designed the Stress Appraisal Measure to address the lack of a systematic approach in examining specific appraisal components of threat, challenge, centrality, and controllability. Additionally, Peacock and Wong incorporated an assessment of overall perception of stressfulness to determine how processes of appraising translated to subjective interpretation. The original Stress Appraisal Measure was designed to examine anticipatory stress, and its psychometric properties have since been questioned and reevaluated (Roesch & Rowley, 2005), yet it remains one of the only options for examining the appraisal processes discussed by Lazarus and Folkman (1984).

Anshel, Robertson, and Caputi (1997) adapted the Stress Appraisal Measure in their exploration of police stress and found threat and challenge to be significant predictors of perceived stressfulness of acute police occupational stressors. Threat and challenge predicted 62% of variance of perceived stressfulness in policing encounters (Anshel et al., 1997). Likewise, Feldman Reichman, Miller, Gordon, and Hendricks-Munoz (2000) found that the appraisal component of uncontrollability, confrontive coping, and avoidance predicted 58% of the variance of distress experienced by mothers of infants in neonatal intensive care units. Appraisals remain salient in the experience of occupational stress (Goh et al., 2010; Gomes et al., 2013; Lucas et al., 2012). Notably and consistent with the transactional theory of stress and coping, Gomes et al. (2013), although working with academic personnel in Portugal, found that threat perception, challenge perception, coping potential, and control perception all correlated significantly with aspects of burnout and the occupational situation.

In one of the most comprehensive tests of the transactional theory of stress and coping in PTSS, Salinas Farmer (2008) included several aspects of primary and secondary appraisal. PTSS significantly and positively correlated with threat potential, $r(165) = .431$, $p \leq .01$, controllability, $r(165) = .360$, $p \leq .01$, predictability, $r(165) = .238$, $p \leq .01$, meaningfulness, $r(165) = .397$, $p \leq .01$, stability, $r(165) = .522$, $p \leq .01$, and globality, $r(165) = .443$, $p \leq .01$ (Salinas Farmer, 2008).

Self-Efficacy

Self-efficacy, introduced in Bandura's (1986) social cognitive theory and applied to traumatic stress in Benight and Bandura's (2004) social cognitive theory of posttraumatic growth, refers to an individual's belief in his or her ability to manage

environmental demands effectively. Self-efficacy interacts bidirectionally with environmental and personal factors to enhance personal agency (Bandura, 1992).

Bandura (1992) asserted that self-efficacy beliefs work via cognitive, motivational, affective, and selection processes. Self-efficacy can lead to enhancements or decrements in behavior through goal setting and rehearsal of anticipatory situations (Bandura, 1992). Self-efficacy feeds motivational processes, rooted in cognitions shaped by perceptions of ability, expectations of outcomes, and achievable courses of action, by allowing an individual to evaluate past and future performances to shape future actions (Bandura, 1992). Self-efficacy has less effect on motivation when outcomes are uncontrollable or when outcome expectancies are unachievable based on assessment of available resources (Bandura, 1992). Self-efficacy plays a central role in self-regulation of emotional states by influencing to which elements of the environment an individual attends and how those elements are appraised (Bandura, 1992).

Self-efficacy may reduce threat and enhance challenge during primary appraisal, secondary appraisal, and reappraisal through identification of resources (Bandura, 1992; Benight & Bandura, 2004). By directly influencing appraisals, enhanced self-efficacy can empower individuals who have perceived a situation as stressful, creating possibilities to change the environment to reduce threat, as in problem focused coping, or capitalize on more positive emotive states, as in emotion focused coping (Bandura, 1992; Lazarus, 2012). Finally, selection processes involve self-efficacy as individuals, through personal agency, possess the ability to choose the environments in which they believe they can succeed and thrive (Bandura, 1992). According to this view, individuals who elect to work in emergency communications may believe they are capable of handling the nature

of the work at the time of hiring and that they can thrive in the first responder environment. In this regard, threats to self-efficacy following exposure to potentially traumatizing events combined with chronic occupational stressors in emergency communications centers and significant WFC may be particularly damaging. This may occur because the organizational environment represented an initial selection process over which the telecommunicator had control but comes to represent a source of personal failure when environmental demands exceed perceived coping abilities; however, this is an underexplored area of research, particularly in first responder populations.

Although an integral component of social cognitive theory, self-efficacy also emerged as a key mediator in the stressor-appraisal-outcome relationship initially discussed by Lazarus and Folkman (1984). According to the transactional theory of stress and coping, individuals evaluate the degree to which transactions between person and environment can be managed effectively. Individuals engage in coping processes to manage person-environment transactions that generate stressful appraisals (Lazarus & Folkman, 1984). As discussed above, stress appraisals take two forms: primary appraisals and secondary appraisals (Lazarus & Folkman, 1984). Primary appraisals identify the nature of the environment's influence on wellbeing as relevant or irrelevant (Lazarus & Folkman, 1984). Relevant cues can be benign-positive or stressful, and stressful appraisals can be deemed as challenging if outcomes can include growth or gain, threat if outcomes include anticipated loss, and harm/loss if damage has already occurred (Lazarus & Folkman, 1984). Threat and challenge appraisals rarely occur in a vacuum, and person-environment transactions often include elements of both potential gain and anticipated loss (Lazarus & Folkman, 1984).

Secondary appraisal involves identifying what can be done in the event of a relevant primary appraisal (Lazarus & Folkman, 1984). As Lazarus and Folkman stated, secondary appraisals are evaluative appraisals that include identifying not only what coping strategies may be implemented but also the degree to which the individual feels confident in his or her ability to engage in a particular set of actions. The process of self-evaluation of coping ability is coping self-efficacy (Bandura, 1992; Chesney et al., 2006; Lazarus & Folkman, 1984). In an alternate approach, Jerusalem and Schwarzer (1992) asserted dispositional self-efficacy can be viewed as an antecedent in the transactional process.

General self-efficacy as antecedent. Jerusalem and Schwarzer (1992) integrated the transactional theory of stress and coping with social cognitive theory, identifying reciprocal pathways in which person and environment variables act as causal antecedents leading to physical, affective, psychological, and social changes, with mediating processes of cognitive appraisals intervening between antecedents and effects. Self-efficacy serves as a dispositional antecedent, exerting influence on appraisals and outcomes (Jerusalem & Schwarzer, 1992). Research has supported the validity of general self-efficacy measures in predicting trauma outcomes. Regehr, Hill, Knott, and Sault (2003) used the Self Efficacy Scale, a measure of general belief in success, to explore the relationship between traumatic stress and depressive symptoms in new and experienced firefighters. Experienced firefighters (n = 58, mean years of experience=11.69, SD=8.84) had significantly lower self-efficacy than new recruits (n = 65), as well as lower levels of family support and employer support (Regehr et al., 2003). Self-efficacy significantly and negatively correlated with distress, as measured by the Impact of Events Scale, $r(121)$ = -

.30, $p \leq .05$, and the Beck Depression Inventory, $r(121) = -.35$, $p \leq .01$, and with years of experience, $r(121) = -.30$, $p \leq .01$ (Regehr et al., 2003). These results were consistent with other works examining general self-efficacy (Ogińska-Bulik, 2005) and research including both general and specific measures of self-efficacy in health outcomes (MacEachron & Gustavsson, 2012).

Coping self-efficacy as mediating process. Benight and Bandura (2004) developed the social cognitive theory of posttraumatic growth in which coping self-efficacy is central in overcoming adversity. A key difference in the two perspectives involves the nature of self-efficacy with Schwarzer and his contemporaries (1992; see also Luszczynska, Scholz, & Schwarzer, 2005) endorsing general self-efficacy as a dispositional antecedent and Bandura and contemporaries (1995, 1997; see also Benight & Bandura, 2004) asserting situation specific coping self-efficacy beliefs as a mediating process. Research involving specific natural disasters, such as Hurricane Andrew (Benight et al., 1999), a Colorado fire and flash flood (Benight & Harper, 2002), Hurricane Katrina (Cieslak et al., 2009; Luszczynska, Benight, Cieslak et al., 2009), the Enschede fireworks disaster in the Netherlands (Bosmans et al., 2013), and accidents, including motor vehicle accidents (Benight et al., 2008; Cieslak et al., 2011; Luszczynska, Benight, Cieslak et al., 2009) have used context specific measures, which support Bandura's (1997) assertion that the context of coping self-efficacy must be specified because individual beliefs of ability vary dependent upon environmental demands and resources available for coping within the situationally specific domain. In each of these works, coping self-efficacy related to the disaster or accident and mediated the relationship between loss and distress (Benight et al., 2008; Luszczynska, Benight,

Cieslak et al., 2009), acute stress response and long term distress (Benight et al., 2008; Benight & Harper, 2002; Cieslak et al., 2011), and intermediate distress and long term distress (Bosmans et al., 2013). Significant gender differences emerged in Bosmans et al.'s (2013) longitudinal work, which supported the possible effect of gender as a moderator of self-efficacy beliefs in health-related outcomes of collective traumas identified in a systematic review of self-efficacy as a mediator (Luszczynska, Benight, & Cieslak, 2009).

Self-efficacy in first responder populations. Although similar in some respects, collective traumas differ from the experiences of first responder populations. In the previous studies, a specific event could be identified from which loss, ongoing stress, intrusive thoughts, and avoidant behaviors emanate. In first responder populations, individuals may be exposed to multiple potentially traumatizing events, and the expectation is that additional traumatizing events will be experienced during one's career. To address this, some researchers have employed career specific coping self-efficacy measures to examine relevant outcomes. For example, Lambert et al. (2012) developed the FFCSE to measure firefighters' self-appraisals of their ability to handle stressors specific to firefighting. The FFCSE significantly predicts 7% of general distress and 5% of PTSS severity over and above social support and work related stress (Lambert et al., 2012). Cicognani, Pietrantoni, Palestini, and Prati (2009) examined quality of life at work dimensions, coping strategies, and psychosocial variables in volunteer and fulltime emergency workers in Italy. Cicognani et al. measured coping self-efficacy using the context specific measure of Perceived Personal Efficacy for members of volunteer associations. Prati, Pietrantoni, and Cicognani (2010) used this measure again in

examining the moderating effect of self-efficacy between stress appraisals and professional quality of life. In both studies, coping self-efficacy shared a significant relationship with professional quality of life measures, including compassion satisfaction, compassion fatigue, and burnout (Cicognani et al., 2009; Prati et al., 2010).

Regardless of researchers' use of context-specific or general self-efficacy measures, in a systematic review of collective trauma, self-efficacy exerted medium to large effects on general distress, weighted average r = -.50, Z = -14.52, heterogeneity $\chi^2(6) = 22.49$, $p < .001$, including PTSS frequency, weighted average r = -.77, Z = -7.21, heterogeneity $\chi^2(1) = 25.05$, $p < .001$, and severity, weighted average r = -.36, Z = -8.43, heterogeneity $\chi^2(3) = 15.98$, $p < .001$, in cross-sectional studies (Luszczynska, Benight, & Cieslak, 2009). Simmen-Janevska, Brandstätter, and Maercker (2012) supported Luszczynska, Benight, and Cieslak's (2009) finding in their literature review of motivational abilities in posttraumatic stress. Self-efficacy consistently and robustly predicted severity of posttraumatic distress in multiple contexts (Simmen-Janevska et al., 2012).

Strong evidence from critical (Simmen-Janevska et al., 2012) and systematic (Luszczynska, Benight, & Cieslak, 2009) reviews support the inclusion of self-efficacy in models exploring posttraumatic distress, yet only one study to date, conducted by Shakespeare-Finch et al. (2014), has been identified examining self-efficacy in telecommunicators or the role it may play in mediating distress following trauma exposure and chronic stress. Shakespeare-Finch et al. examined the effects of social support and self-efficacy on wellbeing and posttraumatic outcomes in 60 emergency medical dispatchers in Australia. In their review of self-efficacy, Shakespeare-Finch et al.

cited both Bandura's (1997) work as well as Prati et al. (2010), Cicognani et al. (2009), and Hirschel and Schulenberg (2009), representing a mix of coping self-efficacy and general self-efficacy. The measure used in Shakespeare-Finch et al.'s work assessed general self-efficacy across a variety of situations. In general, dispatchers reported high levels of self-efficacy, and self-efficacy significantly correlated with psychological well-being, $r(58) = .60$, $p < .001$ (Shakespeare-Finch et al., 2014). Shakespeare-Finch et al. used hierarchical multiple regression analyses to develop models for predicting psychological wellbeing in participants ($N = 60$) and PTSS and posttraumatic growth in trauma-exposed participants ($n = 44$). Self-efficacy explained 22% of variance in psychological wellbeing, and receiving social support explained an additional 21% of variance (Shakespeare-Finch et al., 2014). In their final model of PTSD, Shakespeare-Finch et al. identified receiving support and shift work as significant negative predictors but noted that self-efficacy was not a significant predictor. Similarly, self-efficacy was not a significant predictor for posttraumatic growth; only receiving social support was a significant predictor, explaining 20% of the variance (Shakespeare-Finch et al., 2014).

Shakespeare-Finch et al. (2014) theorized that the lack of relationship between self-efficacy and PTSS and posttraumatic growth may be due to the lack of controllability of the emergency situations handled by dispatchers; however, the primary appraisal of controllability of the trauma situation has not been evaluated. Self-efficacy did predict psychological wellbeing, which may reflect a dispositional quality of self-efficacy. Dispatchers may feel efficacious in handling the general nature of work, and challenges to self-efficacy during situations in which control is reduced may represent a role for situation specific coping self-efficacy.

Because the construct is understudied in this population, several limitations arise from the existing literature. Particularly problematic is that no context specific measure of coping self-efficacy exists for telecommunicators. This limits the ability to measure the context specific aspect of self-efficacy endorsed by Benight and Bandura (2004), unless a new measure is created or an existing measure is adapted for this population. However, Luszczynska, Benight, and Cieslak (2009) and Simmen-Janevska et al. (2012) both noted that studies employing general self-efficacy scales generated results similar to those using context specific scales. An additional limitation is that most researchers have looked at coping self-efficacy within the context of singular catastrophic events with ongoing stressors related to that specific incident, such as manmade or natural disasters, motor vehicle accidents, and terrorist events. Although some work has explored coping self-efficacy in escalating military conflicts, combat trauma, and the firefighting profession, little attention has been given to self-efficacy in first responder populations who experience numerous potentially traumatizing events throughout their careers that happen within different contexts and which may require different approaches to managing. Self-efficacy may exert a different effect in situations where mastery experiences may increase feelings of efficacy yet generate more pronounced feelings of failure, leading to greater distress, when new critical incidents that resemble previous critical incidents conclude traumatically or do not provide opportunities for exerting control through mastery. For these reasons, it is necessary to explore context specific coping self-efficacy and telecommunicators' appraisals of occupational stressors, WFC, coping styles, and distress.

Coping

Although self-efficacy has a clear and well-established role in stress appraisals and subsequent distress, it does not operate solely on distress directly but exerts its effects indirectly through attention and coping strategies employed to reduce acute and ongoing distress (Bandura, 1995). By itself, efficacious individuals, those who believe in their ability to cope with a situation, view stressors as less threatening, are less vigilant to manageable potential sources of danger, and exercise control over thoughts that may produce anxiety (Bandura, 1995). However, self-efficacy also shares a bidirectional, reciprocal relationship with coping in that strategies successfully reducing distress provide mastery experiences that in turn reinforce an individual's belief that he or she can cope successfully with a similar stressor in the future (Bandura, 1995).

Coping bridges the gap between cognition and action by providing executable strategies for managing and mitigating emotional reactions (Carver et al., 1989). Strategies that reduce distress may, however, be maladaptive even if they initially provide relief. For example, alcohol or substance use is one coping strategy that may provide initial relief from a stressful situation; however, over time, dependence on this coping strategy may become maladaptive. The individual may feel efficacious in handling a stressor because the strategy reduced distress associated with the original stressor, but it may lead to heightened harm, loss, or threat appraisals of ongoing stressors and distress as the preferred coping strategy becomes harder to employ successfully when faced with multiple or ongoing stressors.

In Lazarus and Folkman's (1984) work, coping involves processes employed to manage emotions generated following appraisal of a nonneutral stressor. Assessments of

coping vary substantially between researchers and theoretical orientations. In general, coping strategies tend to be grouped into categories, and these groupings may have evaluations of the degree to which the strategies are beneficial, adaptive, detrimental, or maladaptive. Some examples of coping patterns identified in the critical incident, traumatic stress, and occupational stress literature include adaptive or maladaptive strategies (Kirby et al., 2011); anger, distancing, planned effort, positive reappraisal, and social support (Jenkins, 1997); emotion focused, avoidance focused, and problem focused coping (Baschnagel et al., 2009); problem oriented, avoidance strategies, social support, positive action, or transcendent oriented (D'Amico, Marano, Geraci, & Legge, 2013); negative coping strategies (Latter, 2003); maladaptive avoidant and ruminative coping (Littleton, Axsom, & Grills-Taquechel, 2011); approach coping, seeking emotional support, avoidance, and cognitive coping (Louw & Viviers, 2010); task, emotion, and avoidant coping (LeBlanc et al., 2011); social support, acceptance/redefinition, and problem solving (Kaur, Chodagiri, & Reddi, 2013); and active and passive coping (Li et al., 2014).

These distinctions, though, do not remain constant across measures or populations and even vary substantially over time. The numerous distinct categories make it difficult to identify what coping is. In her comparison of coping process and defense mechanisms as adaptational processes, Cramer (1998, 2000) identified the key features of coping processes as being conscious, intentionally used, situationally determined, nonhierarchical processes, associated with normality and purposefully directed at changing a troubling, anxiety provoking, or threatening situation. According to Carver et al. (1989), the original measure of coping, Lazarus and Folkman's Ways of Coping,

divided coping into problem focused and emotion focused. With this approach, problem focused coping emphasized behaviors enacted to change the stressor, while emotion focused coping included actions designed to minimize emotional discomfort (Carver et al., 1989). However, the categorization dichotomized in the Ways of Coping rarely fits so neatly into two factors (Carver et al. 1989).

In an attempt to address this, Carver et al. (1989) developed a theory driven measure, the COPE, which includes 13 separate scales examining distinct properties of coping, including active coping, planning, suppression of competing activities, restraint, seeking instrumental social support, seeking emotional social support, focusing on and venting of emotions, behavioral disengagement, mental disengagement, positive reinterpretation and growth, denial, acceptance, and turning to religion. In their review of the factor analysis of the original COPE, Carver et al. noted that the coping efforts measured are not the only ways of coping available and that the evolution of coping research demands attention to processes that are relevant to the population studied while also respecting the need to keep assessment measures of a reasonable length. A major point of contention raised by Carver et al., similar to the debate in self-efficacy, is the degree to which coping efforts are stable or situational.

Telecommunicators offer an opportunity to explore individual differences in dispositional versus situational coping as stable coping preferences may arise as a function of the occupational environment, and such dispositional coping qualities have been predictive of PTSS, as in Baschnagel et al.'s (2009) prospective study of individuals indirectly exposed to the September 11th attacks in the United States. Baschnagel et al., using the Coping Inventory for Stressful Situations (CISS), investigated the predictive

power of emotion-, problem-, and avoidance-focused coping in the subsequent development of PTSD at one and three months following the attack. The CISS measures general or dispositional coping strategies. Emotion focused coping significantly predicted PTSS, particularly for females at one month following the attacks, and emotion focused coping corresponded with worsening dysphoria in all subjects and in hyperarousal and intrusion symptoms in women (Bashnagel et al., 2009). At three months, emotion focused coping significantly predicted dysphoria symptoms (Baschnagel et al., 2009). A limit of this study is the population, which included 305 undergraduate students indirectly exposed to the September 11th attacks; furthermore, the factor structure of the CISS was not examined with this group (Bashnagel et al., 2009). It would be useful to identify if particular patterns of emotional coping, such as self-blame, worry, or rumination, grouped meaningfully to predict symptoms, which Baschnagel et al. indicated occurred in previous studies of PTSD, and may be particularly relevant for telecommunicators whose occupational roles suggest they have control over traumatic outcomes.

Coping efforts enable individuals to exert control over damaging or threatening situations. Highly efficacious individuals are capable of undertaking demanding work, so long as they are capable of controlling the outcomes by employing effective coping strategies, without exacting a psychophysiological toll (Frankenhaeuser, 1980). Recent work by Shakespeare-Finch et al. (2014) provided preliminary evidence that emergency medical dispatchers identify themselves as highly efficacious individuals. However, individuals who believe in their ability to exert control (e.g., have high self-efficacy) but are not successful in controlling the situation through their selected coping strategies are at greater risk of morbidity and mortality as evidenced by studies evaluating individuals

exhibiting Type A (hostility, urgency, and high achievement) patterns of behavior (Harbin, 1989) or Type D (distressed with negative affectivity and social inhibition) patterns of behavior (Grande, Romppel, & Barth, 2012). Lazarus and Folkman (1984) implied that the specific patterns of behavior in Type A, and presumably Type D, individuals led to increased mortality and morbidity as a result of the interaction between perceived efficacy and enacted coping strategy. Frankenhaeuser (1980) suggested that Type A individuals require fairly heavy workloads to remain engaged and find it difficult to cope with nonwork situations that involve passivity, which again implicates domain conflicts as a potentially significant stressor.

Limited work has examined coping styles in first responders and specifically as predictors of distress in telecommunicators. Troxell (2008), whose work was discussed above, specifically noted that a limitation of her study was a lack of inquiry into strategies that mitigated feelings of horror, hopelessness, and distress at the time of the dispatcher's self-identified most traumatic call. Latter (2003) examined burnout in emergency dispatchers by examining coping strategies, vicarious traumatization, and psychological distress. Framed from a partial transactional theory of stress and coping perspective, Latter's proposed model specified negative coping strategies, including mental disengagement, focus on and venting of emotions, behavioral disengagement, and denial from Carver et al.'s COPE scales, as an antecedent to vicarious traumatization, a post-traumatic stress condition experienced by those who indirectly experience the suffering of others. Latter's justification for these negative coping strategies stemmed from the uncontrollability and ambiguity assumed to be part of the telecommunicators' jobs. This approach, while beneficial in identifying possible relationships to

psychological distress and burnout in Latter's model does not identify protective factors and does not address the issue of inconsistent factor loadings that Carver et al. (1989) recommend considering in the use of their scales.

An older study by Jenkins (1997) explored the relationships among distress symptoms, coping, and social support in emergency dispatchers who experienced Hurricane Andrew. In this regard, Jenkins' work shared similarities to previous trauma work as many of the telecommunicators were directly impacted by the storm, whether or not they were on duty as the hurricane hit. Jenkins performed a factor analysis of responses to the Ways of Coping Scale, yielding five coping factors, including distancing, social support, positive reappraisal, planned effort, and anger. Jenkins discovered that telecommunicators who used critical incident stress debriefing were significantly more likely to indicate avoidance, point-biserial $r(63) = .32$, $p < .01$, but were also more likely to have experienced greater property loss, point-biserial $r(44) = .31$, $p < .05$, fewer social contacts, point-biserial $r(64) = -.24$, $p < .06$, n.s., and more anger coping, point-biserial $r(64)$, $p < .07$, n.s. In her stepwise multiple regression analyses, Jenkins found coping by seeking social support provided 10% of the variance in intrusion symptoms, distancing for 7% of the variance in avoidance symptoms, and anger for 6% of variance in avoidance. Additionally, coping by positive reappraisal provided 8% of the unique variance in worst psychosomatic symptoms, and social network and anger significantly predicted scores of general psychological distress (Jenkins, 1997). As Jenkins noted, a limitation of this work is that telecommunicators were both directly and indirectly affected by the hurricane in their personal, professional, and community lives, and disentangling the distress from each of these levels was not possible. Furthermore,

Jenkins indicated that future work should assess the contributing factors of routine occupational stress in addition to trauma considerations, a recommendation that has been neglected in most work on telecommunicators.

In addition to perceived self-efficacy, coping behaviors provide insight into individual differences by mediating self-evaluations, including those of professional efficacy, and specific occupational stress outcomes, including burnout (D'Amico et al., 2013; Li et al., 2014). In a more recent work, Anshel et al. (2013) examined the effect of an exercise and coping skills intervention on dispatchers' perceived stress in an exploratory study. A major limitation of the study was its small sample size ($N = 9$). Anshel et al. employed an avoidance/approach coping framework in which approach coping included strategies that were threat-oriented such as planning, gathering information, venting, or arguing and avoidance coping included strategies that were escape-oriented such as ignoring or physically and psychologically distancing oneself from a threat. From these broad categories, Anshel et al. argued that effective coping uses a combination of the strategies dependent upon situation, which may be difficult for telecommunicators who, showing characteristics similar to other law enforcement personnel, tended to rely on approach coping by vigilantly attending to threats.

While these strategies may be useful when attending to emergent and emerging incidents, the tendency to dwell on other sources of stress seemed to exacerbate both perceived stress and job dissatisfaction. Of particular value, Anshel et al. (2013) included dispatcher narratives from four participants who discussed with their performance coaches individual sources of stress and strategies for addressing them. Of the included narratives, each dispatcher indicated as a source of stress a coworker or family member

that contributed significantly to his or her self-appraisals and ability to function at work (Anshel et al., 2013). Although the narratives were edited, none of these narratives included information on distressing or traumatic calls as lasting sources of stress or distress; rather, the dispatchers focused on an inability to manage the interpersonal conditions of the call center and of home life effectively (Anshel et al., 2013). Because of this, including a measure of social support coping may provide valuable information on the contribution of these relationships to pathological distress as a function of occupational setting and exposure to traumatization.

From the scant existing literature, telecommunicators appear to engage in unique patterns of coping that allow them to process distressing information and continue to function while acting in their occupational setting; however, it is unknown if these strategies are pathogenic, salutogenic, or neutral when faced with chronic stressors that cross individual domains and roles or if these strategies interact with self-evaluations of efficacy to create specific symptoms of posttrauma distress.

Summary

Lazarus's (2012) transactional theory of stress and coping is an appraisal theory rooted in the assumption that individuals assign subjective meaning to an event, and subjective meaning, influenced by macro- and micro-level factors, elicits specific response patterns and emotions. Major theoretical propositions include the interactive nature of person-environment-outcome evaluation and the role of cognition in engaging in effective coping to mediate those transactions. The transactional theory of stress and coping emphasizes the role of constant evaluation in a dynamic person-environment relationship. From the transactional theory of stress and coping, specific antecedent,

mediating process, and outcome variables can be examined. These variables have found considerable support across the literature in traumatic stress but have not been examined within the context of a theoretical model that may explain relationships to posttrauma outcomes in telecommunicators. Telecommunicators serve as the first line of response in emergency and emergent situations, yet their experiences are often overlooked or minimized. A lack of understanding of posttrauma distress in emergency services communications further underscores the need to examine critically factors that increase risk and resilience so that those who protect both civilians and other first responders can thrive.

While previous research has focused largely on the traumatizing nature of first responder work in police, firefighters, and paramedics, very little work has focused on telecommunicators. Of those works with telecommunicators, attention has been given to job demands and resources (Sotebeer, 2011), coping (Anshel et al., 2013; Latter, 2003; McLaughlin, 2012), and trauma exposure and posttraumatic outcomes (Lilly & Pierce, 2013; Pierce & Lilly, 2012; Troxell, 2008), but there is a dearth of information on many aspects of the telecommunicator experience. With the exception of Troxell (2008) who identified multiple sources of situational stress antecedents, only social support, self-efficacy, and world assumptions have been examined as potential antecedents for posttraumatic outcomes (Lilly & Pierce, 2013; Shakespeare-Finch et al., 2014). Sotebeer (2011) identified the role of job demands and resources on absenteeism and turnover but did not further elucidate pathways between antecedents and outcomes. Peritraumatic distress has also been examined (Lilly & Pierce, 2013); however, peritraumatic distress may serve as a function of primary and secondary appraisal, an idea not explored in the

current literature. Coping has also been examined (Anshel et al., 2013; Latter, 2003; McLaughlin, 2012) but often not systematically or in accord with the theory identified as a driving framework.

Although the body of literature on traumatic stress is large and growing, there are important gaps that I attempted to address in the current study. A pressing gap involved the population of interest. The experiences of telecommunicators are underexplored in the contemporary literature. Although underexplored, the emerging research demonstrated considerable need to identify the degree to which telecommunicators experience work related distress in their daily lives and what variables contribute to that distress. From work with other populations, development of posttraumatic distress is a complex process that is often collapsed into categorical constructs that do not provide information on how future interventions can be shaped to disrupt distress. Much of the work on PTSD has been framed from within the Western medical model of risk. This has led to the idea that certain individuals are more prone to development of PTSD while neglecting to note the extraordinary experiences of first responders who are exposed repeatedly to horrific events. This distinction is important because if individuals are identified as PTSD-prone there arises the possibility of discriminating against the PTSD personality as well as stigmatization of those who do develop PTSD because they are viewed as somehow inferior to those who are able to recover after trauma exposure. Furthermore, PTSD is often dichotomized into yes/no diagnosis, which ignores the substantial evidence suggesting subclinical, yet functionally impairing, levels of PTSD in first responders. Instead of solely focusing on personality or genetic factors, identifying key situational and personal antecedents and mediating process variables allows future work to enhance

resilience rather than identify potential weakness. The chronic work environment and WFC are specific situational factors that can be modified that have not been well studied in the PTSD literature. Self-efficacy can be enhanced through training, and strategies for coping with trauma can be taught and promoted in the occupational setting. Self-efficacy has been identified as a key mediator in distress pathways, yet it has not been incorporated well into prediction models of PTSS with telecommunicators. Peritraumatic distress, which may be a core relational theme arising from appraisals, is known to be related to PTSS but is not well-understood in how it affects symptom development. Cognitive appraisals, a key target in cognitive behavioral therapies, may be another target for intervention. However, before these interventions can be developed or enacted, there must exist an evidence base upon which to support them. As such, I evaluated a model of the transactional theory of stress and coping in this study containing the variables of chronic occupational antecedents, traumatic occupational antecedents, WFC, negative appraising, and coping as predictors of PTSS. A conceptual map of the key variables in the transactional theory of stress and coping is outlined in Figure 5.

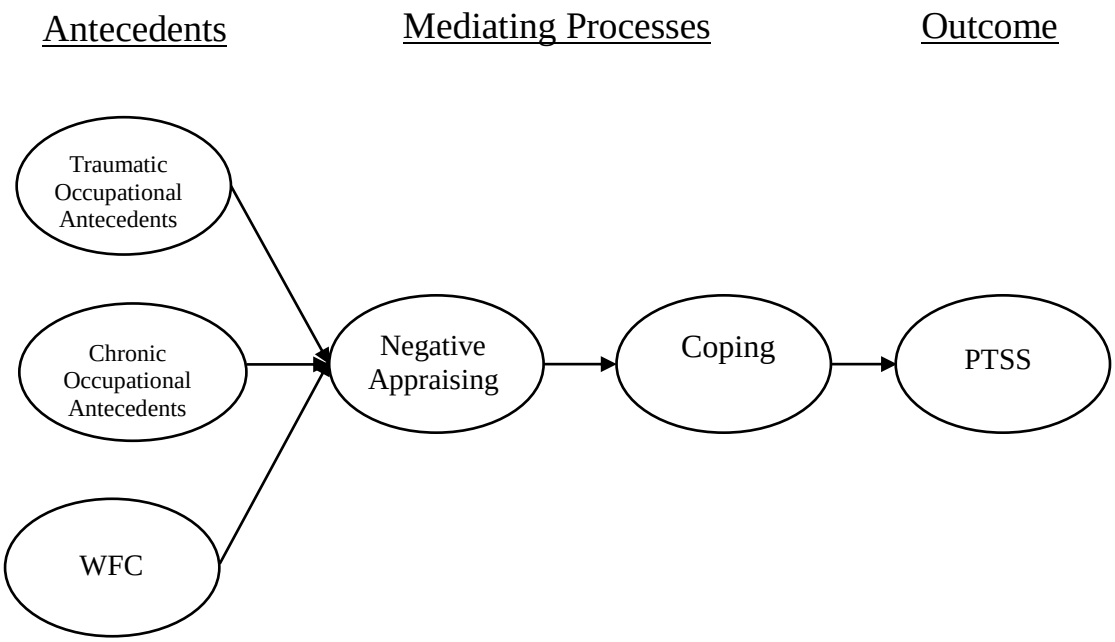

Figure 5. Proposed conceptual diagram of the transactional theory of stress and coping on PTSS in a sample of telecommunicators. WFC, Work family conflict; PTSS, Posttraumatic stress symptoms

With this study, I provided information on the identified variables possibly contributing to distress in the telecommunicator population upon which future interventions and prevention strategies can be based while nesting the work firmly within a theoretical framework that can be tested in future research. From this current study, I attempted to fill gaps in the evidence to support intervention at the levels in which there is the most potential to affect change. This research may also serve to inform policy and disability law, as culpability in occupational induced posttraumatic stress has gained national attention, requiring a strong evidence base upon which recommendations can be made (R. Clark, personal communication, January 27, 2015).

This review of the literature served to direct the development of the research question and has informed design and methodology, which are covered in Chapter 3.

Chapter 3: Research Method

In this chapter, I provide an overview of the research design and methodology that were proposed to collect and analyze data relevant to the research question that arose from the literature review. The purpose of this quantitative study was to examine the degree to which the transactional theory of stress and coping predicted PTSS in telecommunicators. Although previous research has examined the incidence and prevalence of PTSD in telecommunicators, limited research examines specific relationships that contribute to the occurrence of PTSS in this population. For example, Pierce and Lilly (2012) found that although incidence of clinical PTSD was rare, with only 3.5% of their sample reaching a diagnostic cutoff score, many telecommunicators indicated higher levels of peritraumatic distress than comparison populations, including police officers and civilians. However, no information on the frequency of symptom expression in each of the symptom categories (intrusion, avoidance, or hyperarousal) was provided, painting an incomplete picture on the nature of distress in this population.

To address this deficit, examination of a structural model provided information through exploration of the covariance structures of traumatic occupational antecedents, chronic occupational antecedents, WFC, negative appraising, and coping in PTSS. Development of the covariance matrix required specification of measurable observed indicators that reflect an underlying latent construct. For this study, I provided a list of the latent and observed variables to be examined in Table 1, and I demonstrated the hypothesized relationships between and among variables in the structural model depicted in Figure 6. The full measurement model, Figure 7, appears later in the chapter. I pilot tested the survey instrument to assess item clarity and completion time. Prior to the main

data analysis of the structural model, the fit of the measurement model was assessed. Included in this chapter are discussions on research design and rationale; methodological issues of the population under investigation, sampling and sampling procedures, procedures for recruitment, participation, and data collection, information on the pilot study, instrumentation and operationalization of constructs, and data analysis plans; threats to validity; and ethical procedures.

Table 1

Study Variables, Type, and Instrumentation

Variable Name	Type	Instrumentation
Traumatic Occupational Antecedents	Exogenous Latent	Reflected in number of events, unpredictability, and novelty
Number of Events	Reflective Indicator	PTE Scale (modified from Troxell, 2008)
Unpredictability	Reflective Indicator	Items assessing predictability of events in PTE Scale (modified from Troxell, 2008)
Novelty	Reflective Indicator	Items assessing familiarity from training and experience of events in PTE (modified from Troxell, 2008)
Chronic Occupational Antecedents	Exogenous Latent	Reflected in chronicity of job and task demands, organizational factors, and physical conditions.
Chronicity of Job and Task Demands	Reflective Indicator	Items assessing chronicity of demands in TC Sources of Stress (modified from Troxell, 2008)
Chronicity of Organizational Factors	Reflective Indicator	Items assessing chronicity of organizational factors in TC Sources of Stress (modified from Troxell, 2008)
Chronicity of Physical Conditions	Reflective Indicator	Items assessing chronicity of physical conditions in TC Sources of Stress (modified from Troxell, 2008)
WFC	Exogenous Latent	Reflected in WFI and FWI
WFI	Reflective Indicator	Subscale of WFC Scale (Carlson et al., 2000)
FWI	Reflective Indicator	Subscale of WFC Scale (Carlson et al., 2000)
Negative Appraising	Endogenous Latent	Reflected in negativity, stressfulness, and lack of coping self-efficacy
Harm or Loss	Reflective Indicator	Primary Threat and Harm Appraisal Measure (Feldman et al., 2004)
Traumatic Stress Perceptions	Reflective Indicator	PTE Scale (Modified from Troxell, 2008)
Chronic Stress Perceptions	Reflective Indicator	TC Sources of Stress (modified from Troxell, 2008)
Lack of Coping Self-Efficacy	Reflective Indicator	FFCSE Scale (modified from Lambert et al., 2012)
Coping	Endogenous Latent	Reflected in problem focused, emotion focused, approach, and socially supported dimensions
Problem Focused	Reflective Indicator	Proposed factor of Brief COPE (Carver, 1997; Nahlen Bose et al., 2015)
Emotion Focused	Reflective Indicator	Proposed factor of Brief COPE (Carver, 1997; Nahlen Bose et al., 2015)
Nonavoidance	Reflective Indicator	Proposed factor of Brief COPE (Carver, 1997; Nahlen Bose et al., 2015)
Socially Supported	Reflective Indicator	Proposed factor of Brief COPE (Carver, 1997; Nahlen Bose et al., 2015)
PTSS	Endogenous Latent	Reflected in hyperarousal, intrusion, and avoidance
Hyperarousal	Reflective Indicator	Subscale of IES-R (Weiss & Marmar, 1997)
Intrusion	Reflective Indicator	Subscale of IES-R (Weiss & Marmar, 1997)
Avoidance	Reflective Indicator	Subscale of IES-R (Weiss & Marmar, 1997)

Notes. PTE, Potentially Traumatic Events; TC, telecommunicator; WFC, work-family conflict; FWI, family-to-work interference; WFI, work-to-family interference; FFCSE, Firefighter Coping Self-Efficacy; COPE, Coping Orientation to Problems Experienced; IES-R, Impact of Event Scale-Revised

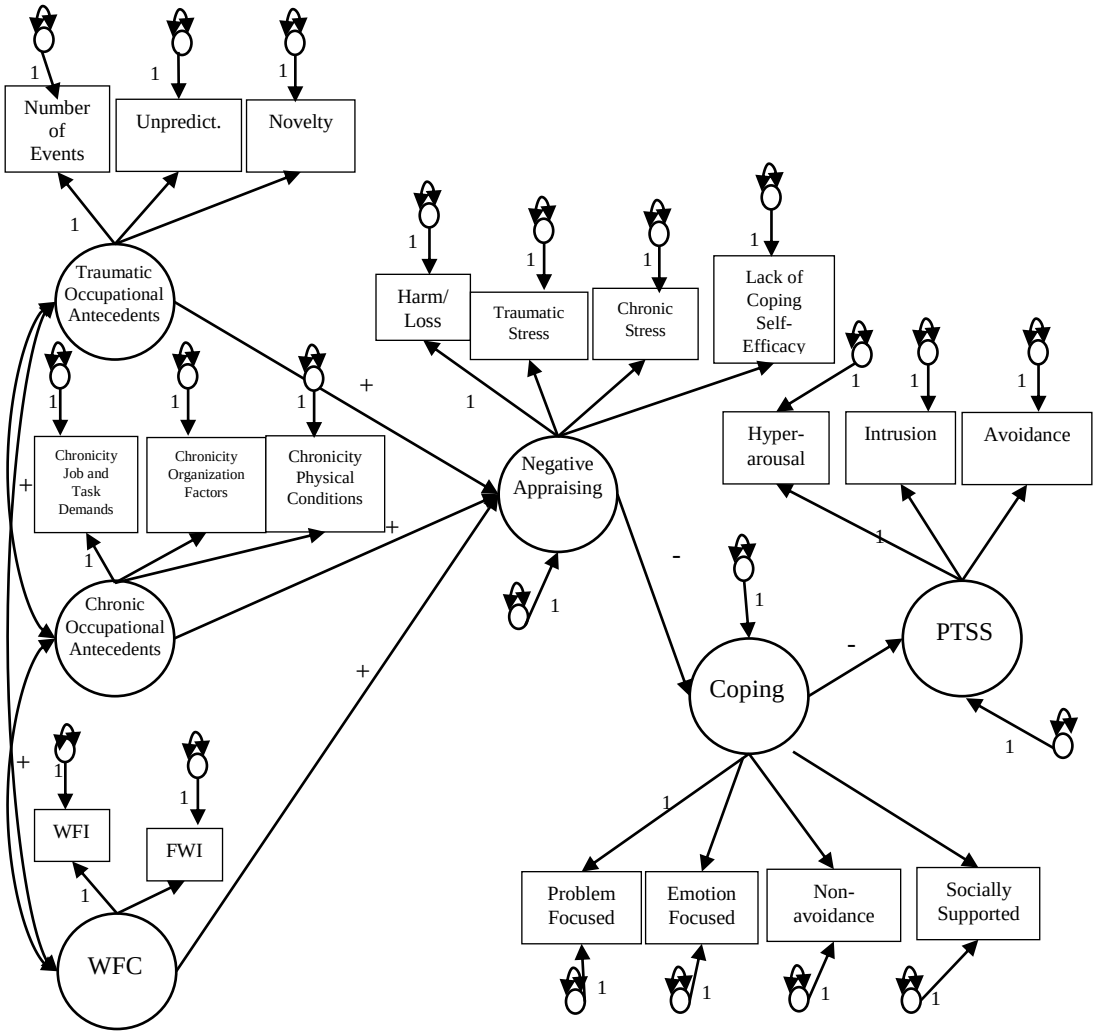

Figure 6. Preliminary structural model of the transactional theory of stress and coping in posttraumatic stress symptoms in telecommunicators. Unpredict., unpredictability; WFI, work-to-family interference; FWI, family-to-work interference; WFC, work-family conflict; PTSS, posttraumatic stress symptoms.

Research Design and Rationale

The purpose of this study was to examine the degree to which traumatic occupational antecedents, chronic occupational antecedents, and WFC, mediated by appraising and coping, predicted PTSS in a sample of telecommunicators. Table 1 shows specification of variables under investigation, and Figure 6 depicts the original structural model to be tested.

A quantitative analysis of the transactional theory of stress and coping in telecommunicators was appropriate for this study, as the purpose was to examine the fit of the theory to this population and to estimate path coefficients based upon observed and latent variables. Traumatic occupational antecedents, chronic occupational antecedents, and WFC functioned as exogenous predictors of PTSS that I allowed to co-vary. Negative appraising was hypothesized to mediate the relationship between traumatic occupational antecedents, chronic occupational antecedents, and WFC and coping, and coping was hypothesized to mediate the relationships between negative appraising and PTSS. Although the items used to assess the indicators were scored at the ordinal level (i.e., on Likert-type scales), subscale scores serving as indices were used as parcels, allowing the indicators to be measured at a continuous level as discussed by Bovaird and Koziol (2012) and Kline (2011). This is discussed further in the data analysis plan and the Results and Discussion sections.

For this study, sampled telecommunicators responding to a survey questionnaire provided data that I used to develop and test the model. Prior work with telecommunicators has demonstrated the survey to be a useful tool for obtaining

attitudinal, occupational, and non-clinical posttraumatic distress information (e.g., Latter, 2003; Lilly & Pierce, 2013; Pierce & Lilly, 2012; Sotebeer, 2011; Troxell, 2008). The proposed survey questionnaire is in Appendix A, and I obtained permissions for obtaining consent to use and, when necessary, modify existing measures.

A cross-sectional design, though not optimal, provided a starting point for examining the degree to which traumatic occupational antecedents, chronic occupational antecedents, and WFC affect PTSS in telecommunicators. Alternatively, a qualitative method would have provided valuable depth on the experiences of telecommunicators but would not have provided data that would allow statistical examination of relationships (Marczyk, DeMatteo, & Festinger, 2005). Although ability to establish causality is debated (Kline, 2011; Pearl, 2009), cross-sectional designs can provide an overview of the degree to which a phenomenon occurs at a specific moment in time and allows examination of relationships between and among variables, and Mueller and Hancock (2010) recommended causal interpretations of structural models, assuming that certain conditions have been met, which are discussed further below. A quantitative approach using SEM was appropriate when examining relationships between latent variables (Kline, 2011). Ideally, this investigation would have been prospective and longitudinal with data collection occurring at hiring and at a follow-up time; however, time and monetary constraints prevented this approach.

Methodology

I address methodology in the following section and include a description of the population, sampling procedure, recruitment, participation, and data collection

procedures, instrumentation and operationalization, data analysis plan, threats to internal and external validity, and ethical considerations.

Population

The target population for this study included telecommunicators in emergency communications centers in the United States. First-responders have been examined extensively due to their exposure to trauma; however, telecommunicators have been excluded disproportionately from the first responder literature. Studies that have examined telecommunicator experiences have included convenience samples with self-selected respondents from social media pages (Lilly & Pierce, 2013; Pierce & Lilly, 2012) and populations limited to one or a few communications centers (Anshel et al., 2013; Latter, 2003; Sotebeer, 2011).

Troxell's (2008) sample was the largest and included multiple agencies but was limited to telecommunicators who worked in the state of Illinois and was also convenience-based as all telecommunicators in a center were invited to participate. The Illinois Department of Employment Security (n.d.) estimated 3,882 individuals employed as "police, fire, and ambulance dispatchers" (Bureau of Labor Statistics, U.S. Department of Labor, 2015, para. 1), a term synonymous with telecommunicators, in Illinois in 2014; however, Illinois telecommunicators compose only 4% of the estimated 97,077 nationally employed telecommunicators (Projections Central, n.d.). Troxell contacted 61 centers in Illinois and identified a potential sample of 984 telecommunicators. Troxell had a response rate of 50.97% (N = 497), which represented 12.8% of Illinois' telecommunicators and 0.51% of national telecommunicators, thus limiting

generalizability due to potential state regulations and training policies in Illinois and specific centers and agency history that might confound results.

Populations of telecommunicators in individual states tend to be relatively small, making up less than 1% of total estimated telecommunicator employees in many instances (see Appendix B). For example, employment in Alaska is estimated at 370 telecommunicators, which is 0.38% of the total estimated telecommunicator population in the United States. Alaska is also part of the large West FBI region, which contains Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. An estimated 17,756 telecommunicators, which comprise 18.29% of the total estimated telecommunicator population, work in the West region. The smaller Pacific subregion, which comprises Alaska, California, Hawaii, Oregon, and Washington, has an estimated 10,656 telecommunicators, which composes 10.98% of the telecommunicator population. The remaining regions include New England, with an estimated 6,270 telecommunicators, Middle Atlantic, with 12,140 telecommunicators, East North Central, with 13,379 telecommunicators, West North Central, with 8,074 telecommunicators, South Atlantic, with 19,698 telecommunicators, West South Central, with 11,890 telecommunicators, and Mountain, with 7,100 telecommunicators. Additional information on telecommunicator employment by state and region is available in tables in Appendix B.

Sampling and Sampling Procedure

Although a simple random sampling procedure would have generated the most generalizable results to the population, this method was neither efficient nor cost-effective (Groves et al., 2009). Instead, a convenience sample was used, which, according

to Groves et al. (2009) and Osborne (2013), limits generalizability of results but was the most efficient and cost-effective method available at this time. I initiated contact with agency administrators across the United States to request assistance with distributing recruitment information within their respective agencies. Although I employed a multistage sampling procedure to develop primary sampling units as described by Stapleton (2010), the process was convenience-based because all telecommunicators within a center were invited to participate contingent upon meeting eligibility as opposed to randomly selecting individuals for participation within each agency, an issue elaborated upon by Osborne (2013). The use of clusters of individuals from the same agency introduced a likely violation of the assumption of independence of observations as discussed by Osborne (2013). This issue can lead to inaccurate degrees of freedom, parameter estimates, and standard errors (Osborne, 2013). Another option for recruiting participants would have been through the use of national professional organizations. However, although there are organizations for emergency communications services personnel, membership is optional, and the experiences of those who elect to join such an organization may differ substantially from the majority of telecommunicators. For example, one national organization, the National Emergency Number Association (2014), has only 7,000 members, of whom not all are telecommunicators.

I selected agencies based upon crime-reporting regions used by the Federal Bureau of Investigation, U.S. Department of Justice (FBI, 2014). The FBI (2014) defined four large crime-reporting regions including the Northeast, Midwest, South, and West and, from these larger regions, identified nine smaller subregions. These regions include New England, Middle Atlantic, East North Central, West North Central, South Atlantic,

East South Central, West South Central, Mountain, and Pacific (FBI, 2014). For example, the Middle Atlantic region comprises New Jersey, New York, and Pennsylvania (FBI, 2014). The Middle Atlantic reports 12.36% of crime in the United States (FBI, 2014) and employs an estimated 12.52% of the telecommunicators in the United States (Projections Central, n.d.).

In an attempt to approximate Troxell's (2008) response rate and participation, which included 61 agencies, I intended to contact seven agencies from each region for a total solicitation of 63 agencies. Agencies were selected at random from a national directory of tribal, federal, state, county, and municipal law enforcement administrations, the *2015 National Directory of Law Enforcement Administrators* (National Public Safety Information Bureau, 2015), that covers over 36,000 law enforcement agencies nationwide. Although the directory is extensive, its use introduced potential coverage errors discussed by Groves et al. (2009) and Stapleton (2010) as some communication centers were represented multiple times, while other centers may not have been represented at all. Agencies having identical contact information were eliminated; however, instances arose where an agency was dispatched by a centralized communication center, and the duplicate entry was not identifiable until after contact had been initiated. For example, a municipal police department was dispatched out of a county dispatch center. The point of contact for the municipal department was the Chief of Police, even though hiring and employment were managed by the county communications center. When requesting assistance with recruitment material distribution from communication center representatives, I intended to inquire which departments the agency covered to avoid duplicate solicitations; however, because

responses from agencies were so limited, this did not occur. Additionally at issue with the directory was the exclusion of privately-funded communications centers, such as those that answer calls for service from vehicle onboard navigation and assistance communications, and agencies that exclusively dispatch ambulance or fire personnel.

Following selection of agencies, agency representatives were contacted to identify willingness to distribute recruitment material. Initial contact occurred via telephone and email outreach and included an overview of the study, inclusion criteria, and determination of agency coverage. I asked willing representatives for information on the agencies covered by the communications center and for the number of telecommunicators employed at that center for estimation of response rates. If an agency representative did not want his or her center included or did not respond, an alternate selection was made for that region. Following initial data collection, the requisite complete sample size was not met, and additional requests were distributed in 2-week waves until a suitable sample size was achieved.

Power Analysis

Power analysis for SEM is complicated and can be controversial, and no consensus exists concerning determining sample size (Jackson, 2003). However, power analysis options are available, and common methods involve examination of power (π) as a function of sample size (N), degrees of freedom (df), root mean square error of approximation (RMSEA) under conditions of the null and alternative hypothesis (ε_0 and ε_1, respectively), and alpha (α) (Lee, Cai, & MacCallum, 2012). MacCallum, Browne, and Sugawara (1996) suggested using the conventional standard power of .80 and alpha of .05 and, for a test of close fit, allowing ε_0 to equal .05 and ε_1 to equal .08. The

recommendation to use a test of close fit acknowledges the meaninglessness of a test of exact fit and the expectation that with a large enough sample size a test of exact fit will always result in rejection of an already false null hypothesis (Lee et al., 2012). Using the formula provided by Kline (2011), the preliminary model depicted in Figure 6 has 46 free parameters for estimation and 190 observations, leaving 144 *df*. With a preliminary estimated 144 *df* from early model specification, a power analysis, using software developed by Preacher and Coffman (2006), identified a requisite minimum sample size of 104 participants; however, employing Osborne's (2013) recommended power of .95 resulted in an increase to 152 participants. The early model specification of latent variables and their indicators was derived from previous conceptualizations of the factor structure of the measures; however, it was questionable if the measurement model would fit with the data as demonstrated by the inconsistent and contested structure of PTSS and coping in previous research. The measurement model was examined in the preliminary data analysis, which will be discussed below, and respecification of the final measurement model was made to address goodness of fit.

Contrary to the standard power analysis, Kline (2011) noted the requirement that SEM is a large-sample technique and supported partial rejection of most SEM research involving sample sizes with less than 200 participants. The previous power analyses did not meet Kline's requirement for a sample size greater than 200 participants. Kline argued for consideration of free parameters as an indicator for establishing sample size. An early analysis of Figure 6 shows 46 free parameters that required estimates. Additionally, sample size depends upon estimation method used and normality of distributions: larger sample sizes may be required for estimation methods other than

maximum likelihood or when distributions deviate from normality (Kline, 2011), which cannot be determined until after data collection. An alternative method for determining sample size, described by Jackson (2003), is the *N:q* rule, which describes the ratio of the number of cases (*N*) to the number of model parameters (*q*). An ideal ratio, according to Kline, is 20:1, which would indicate a present sample size of 920 participants; a less optimal, but still acceptable ratio is 10:1, which would indicate a sample size of 460 participants. The desired sample size for the main study was 460 participants, which surpassed the minimum suggested by the power analysis using a greater selected power and would have also met the acceptable *N:q ratio.* Mueller and Hancock (2010) indicated that a 5:1 ratio of cases to free parameters is acceptable when using maximum likelihood estimation, which would have led to an acceptable minimum sample size of 230 participants.

Procedures for Recruitment, Participation, and Data Collection

Data collection was contingent upon approval from Walden University's Institutional Review Board (IRB). Following IRB approval (Approval number 09-26-16-0305258), agency representatives who indicated willingness to assist were sent an email (see Appendix C) for distribution at their sites. The email included the purpose of the study, eligibility information, volunteer and confidential nature of the study, my contact information, informed consent information, and a link to a website for the survey.

The study website, which was available through SurveyMonkey, introduced the study and discussed informed consent, which was implied based upon completion of the survey. The survey followed informed consent. Additionally, the number for the National Suicide Prevention Lifeline was posted in informed consent and appeared at the

beginning and end of the survey. The initial data collection period ran for 6 weeks. During that 6 weeks, two reminder emails were sent to supervisors, once at the beginning of the third week and once at the beginning of the fifth week, for distribution at their centers to improve response rates. As sample size was not met during the initial round of data collection, waves of recruitment occurred in 2-week periods to meet sample size. Telecommunicators from agencies whose primary work duty included answering calls for service, dispatching units, and taking or receiving radio traffic, or any combination of those duties, were invited to participate.

Additional Information for Pilot Study

I performed a pilot study to ensure that the survey tool was suitable for the participants and that the questions were clear. The pilot study also helped identify completion time and allowed pilot participants to comment on any questions needing clarification due to limited previous use in general or with the target population. For example, the FFCSE (Lambert et al., 2012), described below, was constructed for use with firefighters. Although similarities between the occupations exist, including potential exposure to traumatic events and organizational policies affecting perceptions of occupational stress, differences also exist in the operational demands of the work and the sensory modality of potential traumatization. The pilot study provided the opportunity to examine if the developed survey tool was appropriate for the population, if the wording was clear and concise, and how long the instrument took to complete. By piloting the survey questionnaire, I intended to help clarify wording and establish approximate time required to complete the survey.

Following IRB approval, I pilot tested the questionnaire (available in Appendix A) with a convenience sample of telecommunicators. I intended to pilot the instrument using four agencies in northwest Illinois; however, only one agency indicated willingness to participate. Agencies contacted for participation in the pilot study were not contacted for participation in the main study to prevent contamination from taking the survey multiple times.

An agency representative was asked for willingness to send an email to telecommunicators. The email (see Appendix C) contained information describing the purpose of the pilot study, my contact information, confidentiality, the volunteer nature of participation, and the survey website. Additional questions regarding survey completion time, clarity of questions, and suggestions for improvement were added to the survey tool. Following review of the pilot data, no revisions were needed to be made.

Instrumentation and Operationalization of Variables

For the survey questionnaire, I compiled seven measures to operationalize each of the study variables and included a demographics section to capture sample characteristics. There were three preliminary eligibility questions that also provided demographics information. The pilot study survey questionnaire is available in Appendix A. The final version of the questionnaire was the same as the pilot study tool with the omission of items 9j and 9k. The layout of the survey differed due to the use of a digital medium. As displayed in Table 1, the outcome variable in this study was PTSS; the predictor variables were traumatic occupational antecedents, chronic occupational antecedents, and WFC, and the mediating variables were negative appraising and coping. The questionnaire used in this study contained sections that provided information related

to each variable, including demographic information and study eligibility questions, traumatic and chronic occupational antecedents, WFC, negative appraising, coping, and PTSS. Table 2 describes the survey questionnaire and the variable each item addresses.

Table 2

Operationalization of Constructs in Survey Tool

Latent Variable	Indicators	Theoretical Score Range	Survey Item
Traumatic Occupational Antecedents	Number of events	0-21	1
	Novelty[1]	0-105	1
	Unpredictability[1]	0-105	1
Chronic Occupational Antecedents	Job and Task Demand Chronicity	0-75	2a, 2c, 2f, 2h, 2j, 2k, 2l, 2o, 2p, 2q, 2r, 2s, 2u, 2v, 2w
	Organizational Factors Chronicity	0-30	2b, 2d, 2e, 2i, 2m, 2t
	Physical Conditions Chronicity	0-10	2g, 2n
WFC	Work-to-Family Interference	9-45	4a-4c, 4g-4i, 4m-4o
	Family-to-Work Interference	9-45	4d-4f, 4j-4l, 4p-4r
Negative Appraising	Harm or Threat Appraisal	6-30	3, 5
	Traumatic Stress Perceptions	0-105	1
	Chronic Stress Perceptions	0-115	2
	Lack Coping Self-Efficacy[1]	20-140	6
Coping	Problem Focused	4-16	7b, 7g, 7n, 7z
	Emotion Focused	10-40	7l, 7m, 7q, 7r, 7t, 7v, 7y, 7aa, 7bb, 7cc
	Nonavoidance[1]	8-32	7a, 7c, 7d, 7f, 7h, 7k, 7p, 7s
	Socially Supported	6-24	7e, 7i, 7j, 7o, 7u, 7x
PTSS	Hyperarousal	0-24	8d, 8j, 8o, 8r, 8s, 8u
	Intrusion	0-32	8a, 8b, 8c, 8f, 8i, 8n, 8p, 8t
	Avoidance	0-32	8e, 8g, 8h, 8k, 8l, 8m, 8q, 8v
Demographic Questions	Agency Type		Preliminary questions
	Gender		9a
	Age		9b
	Years Experience		9c
	Education		9d
	Partner Status		9e, 9f
	Household Status		9g
	Race		9h
	Ethnicity		9i

[1] Questionnaire items will be reverse-scored.

Eligibility questions. In this section of the survey, respondents were asked to demonstrate telecommunicator employment status to determine eligibility with the following questions: For which types of agencies do you provide services: Fire, Police, Ambulance? and Does your position involve answering emergency or non-emergency calls for service or dispatching units in response to calls for service? Participants were also asked to indicate whether they dispatch for municipal, county, state, federal, or tribal police agencies and to provide their job title, which were used to describe sample characteristics. Participants who indicated No to the question regarding calls for service or dispatching or who do not indicate providing services for emergency service agencies were to be excluded from subsequent analysis.

Potentially Traumatic Events Questionnaire. Troxell (2008) created a measure to examine the diagnostic A2 criterion of trauma exposure according to the requirements of the *DSM-IV-TR* (APA, 2000). The Potentially Traumatic Events Questionnaire went through two iterations and consisted of two sections. The piloted version of Troxell's questionnaire included 17 items that telecommunicators would indicate as having handled within the prior month, the degree to which the event was deemed stressful for the telecommunicator, and how stressful that event would be for the typical telecommunicator. A typical item listed is "Shooting victim If checked, how stressful?" Stressfulness is indicated through a 6-point Likert scale of 0 (*Not Stressful at All*) to 5 (*Extremely Stressful*). In the second section, Troxell asked telecommunicators to describe the most traumatic call handled. The recalled event was then explored using traumatization questions from an additional survey tool. The delineation resulted in scales that measured potentially traumatic events and traumatic events (Troxell, 2008). In the

final version of the measure, Troxell increased the number of events to 21 items and omitted the Likert-scale of perceived stressfulness, replacing them with a check box to indicate whether or not a handled potentially traumatic incident induced fear, helplessness, or horror. However, because of the deletion of the A2 criterion, the indication of horror or helplessness is not relevant. Exposure without experience of terror is sufficient in the *DSM-5* (APA, 2013).

Troxell (2008) developed the Potentially Traumatic Events Questionnaire using input from 16 telecommunicators and from a currently unavailable survey at a popular magazine. In her final study, Troxell received 497 responses to her survey evaluating telecommunicator distress in which the Potentially Traumatic Events Questionnaire was featured. Pierce and Lilly (2012) also included the Potentially Traumatic Events Questionnaire in their exploration of telecommunicator distress and PTSD, which included 171 telecommunicator participants. These are the only identified instances in which the scale has been administered, and the piloted version has not been used in other studies. Thus, the scale has not been widely used and lacks sufficient investigation of psychometric properties (Lilly & Pierce, 2013). Despite limited use, Troxell showed significant correlations between potentially traumatic event exposure and secondary traumatic stress, $r(488) = .174$, $p < .001$, and burnout, $r(488) = .172$, $p < .001$. In her piloted version, Troxell indicated that the majority of telecommunicators, 8 of 12 participants, felt that the version of the scale that inquired into perceived personal stressfulness was more relevant to their experience than just inquiring into exposure and also suggested inquiring into other aspects of call handling and appraising (Troxell, 2008). To score the scale, Troxell summed total perceived stressfulness for all calls

handled; however, no telecommunicators indicated having experienced all events. Number of events ranged from 1 to 14 (M = 5.87, SD = 4.01) (Troxell, 2008). For each item experienced, a participant was asked to mark the degree of perceived stressfulness. In her piloted sample with 12 participants, Troxell observed a range of scores of 0 to 55 with an average score of 12.94 (SD = 14), indicating that telecommunicators perceived their exposure as a little stressful.

In the proposed model, the score of perceived stressfulness functioned as a traumatic stress perceptions index that served as one indicator for negative appraising. In addition to requesting information about perceived stressfulness, participants were asked to identify novelty and predictability of each experienced event. To determine the unpredictability indicator of traumatic occupational antecedents, telecommunicators were asked to indicate on a scale from of 0 (*Not Predictable at All*) to 5 (*Extremely Predictable*) how predictable the events of a potentially traumatic call were. These items were reverse scored to assess unpredictability, and a higher score indicated higher unpredictability. To determine novelty, telecommunicators were asked to indicate on a scale of 0 (*Not Routine at All*) to 5 (*Extremely Routine*) how routine each event felt based upon training and experience. These items were also reverse scored to assess novelty, which served as an indicator for traumatic antecedents. A higher score indicated higher novelty. The number of events experienced also served as an indicator for traumatic antecedents. It was expected that traumatic stress perceptions, novelty, and unpredictability each represented one factor as depicted in Figures 6 and 7. I obtained permission to use and modify the scale.

Telecommunicator Sources of Stress Scale. To address the absence of a career specific measure of telecommunicator occupational stress, Troxell (2008) developed a list of common stressors that was used as a survey in a popular magazine; however, no standardized or validated measure has been identified for this population. An example of a source of stress is "Lack of Training." In her work, Troxell used the Telecommunicator Sources of Stress Scale to develop a sources of stress index, which was a sum of items experienced. While the index provided an idea of the types of stressors experienced, it did not clarify the degree to which these types of stressors were perceived as stressful to the individual or how often the situations were experienced. The items were used as part of the demographic makeup of the participants; however, Troxell's source of stress index was found to be significant in models predicting compassion satisfaction, burnout, and secondary traumatic stress. The sources of stress index significantly correlated with secondary traumatic stress, $r(485) = .284$, $p < .001$, and burnout, $r(485) = .335$, $p < .001$ (Troxell, 2008).

The scale highlights stressors specific to the telecommunicator occupational experience but is limited in its ability to detect the degree to which these stressors affect telecommunicators situationally and cognitively. To address this, telecommunicators were asked to assess how often in the last 30 days they had encountered the stressor by answering the following question: How often in the last 30 days have each of these sources of stress bothered you? Chronicity was measured through a 6-point Likert scale of 0 (*Never*) to 5 (*Daily*). Higher scores indicated more chronic conditions. It was expected that chronicity would produce three factors as discussed by Troxell (2008): job and task demand chronicity, organizational factors chronicity, and physical conditions

chronicity. These factors served as indicators for chronic occupational antecedents. Addition of a Likert-type scale on perceived stressfulness addressed cognitive appraisals of chronic occupational stressors. Chronic stress perceptions were measured through a 6-point Likert scale of 0 (*Not Stressful at All*) to 5 (*Extremely Stressful*) with higher scores indicating higher perceived stressfulness of chronic stressors. I obtained permission to use and modify the scale.

WFC Scale. WFC refers to a mismatch between work and family domain demands. Several scales have been used to operationalize WFC, but they differ in regard to psychometric development, comprehensiveness of concept coverage, and length (Matthews, Kath, & Barnes-Farrell, 2010). Carlson et al. (2000) developed a WFC scale that assesses the bidirectional nature of WFC (i.e., work-to-family interference and family-to-work interference) and different sources of pressure (i.e., time-, strain-, and behavior-based pressures). The instrument has been used extensively and has withstood psychometric evaluation (Matthews et al., 2010). A sample item is "I am often so emotionally drained when I get home from work that it prevents me from contributing to my family." Participants respond on a Likert-type scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).

In the initial development and validation of the measure, Carlson et al. (2000) reported acceptable internal consistency using Cronbach's coefficient alpha for six dimensions of WFC: time-based work interference with family ($\alpha = .87$), strain-based work interference with family ($\alpha = .85$), behavior-based work interference with family ($\alpha = .78$), time-based family interference with work ($\alpha = .79$), strain-based family interference with work ($\alpha = .87$), and behavior-based family interference with work ($\alpha =$

.85). Examination of differential relationships between the subscales and several antecedents and outcomes established construct validity and showed discriminant validity (Carlson et al., 2000). For example, strain-based work interference with family significantly predicted work role conflict, work role ambiguity, work involvement, family satisfaction, and life satisfaction but not work social support or organizational commitment (Carlson et al., 2000). All three scales of work interference with family predicted work involvement; whereas, all three scales of family interference with work predicted family role conflict and family social support (Carlson et al., 2000). Of the six scales, only behavioral-based family interference with work significantly predicted organizational commitment (Carlson et al., 2000).

Although their work evaluated the validity of an abbreviated measure of Carlson et al.'s (2000) scale, Matthews et al. (2010) showed support for a two-factor model of WFC in which strain-, time-, and behavior-based items loaded onto their respective family interference with work or work interference with family dimension. The resultant intercorrelation of .44 between the work-to-family conflict scale and family-to-work conflict scale suggests discriminant validity between the two higher-order scales (Kline, 2011; Matthews et al., 2010). A score for each subscale was determined by summing the responses with higher scores indicating higher perceived work-to-family or family-to-work interference. Scores for each subscale can range between 9 and 45. These subscale scores served as the work-to-family and family-to-work interference indicators for WFC. It was expected that the WFC scale would produce two factors, as depicted in Figures 6 and 7. I requested permission to use the WFC scale.

Primary Threat and Harm Appraisal Measure. Very few studies have included measures to assess primary or secondary appraising specifically, although Peacock and Wong (1990) have endeavored to create such a measure. Two major issues with Peacock and Wong's Stress Appraisal Measure are its prohibitive length and its specification for ongoing events. However, Feldman et al. (2004) modified the scale and developed three questions to tap into appraising that were used and modified to assess primary negative appraising with respect to chronic occupational stressors and WFC, with permission. A modified question was "I feel that the stress of being a telecommunicator may be a negative experience for me." Participants responded on a 5-point Likert-scale of 1 *(Strongly disagree)* to 5 *(Strongly agree)*. The Primary Threat and Harm Appraisal Measure demonstrated good internal consistency in the initial threat phase of Feldman et al.'s study (α = .81) and during the harm phase (α = .88). The 3-item Feldman et al. scale was used twice, once to assess primary negative appraising of chronic stressors and once to assess primary negative appraising of WFC. The sum of the six items yielded a primary threat and harm index, which served as an indicator for negative appraising, with higher scores indicating greater perceived harm or threat. It was expected that these items would be unidimensional, as depicted in Figures 6 and 7. I sought permission to use and modify the items.

FFCSE Scale. Coping self-efficacy is an aspect of secondary appraising and is one of the few aspects of appraising that has been examined extensively. Many authors suggest using context specific measures of coping self-efficacy; however, just as psychometrically validated telecommunicator-specific measures of occupational stress and traumatic event exposure are lacking, so too is a telecommunicator-specific coping

self-efficacy measure. Lambert et al. (2012) developed the FFCSE to address the specific coping self-efficacy skills needed in firefighter populations. The FFCSE is a 20-item measure designed to assess self-perception of ability to manage occupational demands. Participants are asked to respond to each statement on a 7-point Likert scale where 1 equals *Not at all capable* and 7 equals *Totally capable.* An example of an item is "Coping with feelings of guilt."

Although the scale is used primarily with firefighters, the specific situations and conditions assessed are prevalent in other first responder settings, including in dispatching. The exception is for items related to visual stimuli, as most potentially traumatic occupational sources of stress for telecommunicators involve sensory modalities other than vision. In their initial development study, Lambert et al. (2012) established reliability, factor structure, and validity in two waves of evaluations involving a total of 581 active duty firefighters. Exploratory factor analysis revealed one factor that accounted for 43% of the variance, and confirmatory factor analysis resulted in model fit estimates that were acceptable, providing evidence of unidimensionality (Lambert et al., 2012). Internal consistency assessments resulted in Cronbach's alpha of .90 at the first evaluations and .92 at the second evaluation (Lambert et al., 2012).

Because telecommunicators are largely underrepresented in the literature, it was unknown if reliability of the FFCSE generalized to telecommunicators. Reliability estimates for telecommunicators were assessed in the preliminary analyses of the main study. To align with the proposed directionality of negative appraising, I reverse-scored items on the FFCSE. A score for the FFCSE was derived by summing all responses with lower scores indicating greater coping self-efficacy. Scores could range between 20 and

140. The FFSCE score served as an indicator to negative appraising, and it was expected to be unidimensional, as depicted in Figures 6 and 7. I obtained permission to use and modify the FFCSE.

Brief COPE. In much of the literature, coping has been a problematic construct to operationalize (Schwarzer & Schwarzer, 1996). Measures often do not withstand psychometric scrutiny or do not have a strong theoretical underpinning (Schwarzer & Schwarzer, 1996). Like many coping measures, Carver's (1997) Brief COPE scale shows inconsistent factor structures across administrations and samples (Schwarzer & Schwarzer, 1996); however, the measure is theoretically driven, offers an option between dispositional and situational coping, and includes multiple coping dimensions, presenting a more nuanced look at coping (Schwarzer & Schwarzer, 1996). Carver assessed reliability of the abbreviated measure in a sample of participants recovering from a traumatic event, which is relevant to this study's population. The Brief COPE consists of 28 items measuring 14 different coping scales. Participants rate each item from 1 (*I haven't been doing this at all*) to 4 (*I've doing this a lot*). Scores for each scale are determined by summing responses on the relevant subscale. A higher score indicates more frequent use of the coping approach for the identified situation, and for each scale, a score of 2 to 8 is possible. An example of an item from the Substance Use scale is "I've been using alcohol or other drugs to make myself feel better." Internal consistency reliability for the scales range from .5 to .9 (Carver, 1997). Table 3 provides additional information on reliability for the Brief COPE subscales.

Table 3

Internal Consistency Reliability of Brief COPE subscales

Scale	$\alpha^{1,2}$
Problem-Focused	.78
Active Coping	.68
Planning	.73
Emotion-Focused[3]	.62
Acceptance	.57
Humor	.73
Positive Reframing	.64
Religion	.82
Self-Blame	.69
Nonavoidance[4]	.51
Behavioral Disengagement	.65
Denial	.54
Self-Distancing	.71
Substance Use	.90
Socially Supported	.62
Emotional Support	.71
Instrumental Support	.64
Venting	.50

[1] Reliability estimates for higher order scales from Nahlen Bose et al. (2015)
[2] Reliability estimates for subscales from Carver (1997).
[3] In Nahlen Bose et al. (2015), the self-blame subscale was omitted.
[4] In Nahlen Bose et al. (2015), the higher order scale was labeled Avoidant Coping, and the self-distancing subscale was omitted.

Low reliability, which is evident from some of the scales and subscales of the Brief COPE, can affect power and effect sizes negatively but may be acceptable with latent variable models if the sample size is sufficient (Kline, 2011). Although Carver (1997) developed the measure to assess 14 separate coping responses, initial factor analysis revealed nine factors. In using this scale, Carver (2007a) recommended against combining scores into a dominant style or overall index but did recommend looking at the relationship between the scales and other variables of interest or extracting second-order factors to use as predictors within the population of interest. Despite this explicit

instruction, few studies report how scales or factors were derived. Some exceptions include Benim (2013) and Jacobson (2004), who both identified three-factor structures using a principal component analysis; Nahlen Bose et al. (2015), who verified a four-factor structure through confirmatory factor analysis; Kimemia, Asner-Self, and Daire (2011), who identified a five-factor structure using exploratory factor analysis; Carr (2010), who employed confirmatory factor analysis to validate a proposed seven-factor structure of the Brief COPE; and Pozzi et al. (2015), who extracted nine factors by employing a principal components analysis. Initial factor structure followed Nahlen Bose et al.'s proposed structure as it encompassed emotion-based, problem-based, social, and nonavoidance components of coping. For the preliminary model, I expected four factors, as depicted in Figures 6 and 7.

IES-R. Multiple options for assessing PTSS exist; however, few measures have been validated as assessment tools with the *DSM-5* (National Center for PTSD, U.S. Department of Veterans Affairs, 2015). Those that have been validated are clinical tools designed for diagnosing PTSD, which was beyond the scope of this study. However, self-report measures that screen for trauma-related distress are available, and these tools have been used extensively. Weiss and Marmar's (1997) IES-R is a 22-item measure used to evaluate three symptom categories of PTSD: intrusion, avoidance, and hyperarousal. Participants identify a stressful event and rate how much each item bothered them over the past 7 days on a scale ranging from 0 (*Not at all*) to 4 (*Extremely*). An example item from the hyperarousal subscale is "I was jumpy and easily startled." Total scores can be obtained for the measure as well as each subscale, with higher scores indicating higher

levels of PTSS (Weiss, 2004). Weiss (2004) recommended using the means of the subscales to allow comparison with other validated PTSD measures.

Overall internal consistency reliability for the IES-R is high across populations and over time, α = .90 in Beck et al. (2008), .96 in Creamer, Bell, and Failla (2003), .93–.96 in King et al. (2009), and .95 in Rash, Coffey, Baschnagel, Drobes, and Saladin (2008). Internal consistency for each of the original subscales is also good to high with most studies replicating Weiss and Marmar's (1997) original reports of internal consistency where Cronbach's α ranged from .87 to .92 for intrusion, .84 to .85 for avoidance, and .79 to .90 for hyperarousal. The IES-R has also been validated against a number of other clinical measures of PTSD, as well as depression and anxiety measures (Beck et al., 2008; Creamer et al., 2003; Rash et al., 2008; Weiss, 2004; Weiss & Marmar, 1997). In subsequent studies of the IES-R, factor structures have diverged from Weiss and Marmar's three-factor structure. King et al. (2009) supported a four-factor structure, which is consistent with *DSM-5* conceptualizations of PTSD, although the labeling of factors differs. Specifically, King et al. supported a model of PTSD from the IES-R that included intrusion, avoidance-numbing, hyperarousal, and sleep. Alternatively, Creamer et al. (2003) found support for a two-factor model of the IES-R. In contrast to King et al. and Creamer et al., Beck et al. (2008) did support the three-factor structure proposed by Weiss and Marmar. The conflicting results suggested a need to verify the factor structure of the IES-R within the current population to assure proper measurement model specification. In the initial model, I expected to use a three-factor model of the IES-R. I requested and obtained permission to use the IES-R.

Demographic questions. Specific demographic questions, based upon recommendations by Troxell (2008), were collected to obtain sample characteristics and to obtain information on the potentially confounding variables of gender and years of experience that could have been entered as covariates in the model. Descriptive demographic information included age, education level, marital and family status, and race and ethnicity.

Data Analysis Plan

Software

Software to be used for analysis included AMOS (Version 25; Arbuckle, 2006) and IBM SPSS (Version 24).

Research Question

RQ1: To what extent does a model of the transactional theory of stress and coping fit the data in a sample of telecommunicators? The basic structural diagram in Figure 1 represented the initial set of hypotheses to be addressed, as per Mueller and Hancock's (2010) recommendation.

Pilot Study Data Analysis

The pilot study assessed the suitability of the survey tool for this population. I examined questionnaire feedback to identify changes that may have been needed to be made prior to further analysis. Additionally, I intended to compile response rates and demographic data; however, due to a small response and concerns over anonymity, these data were omitted from analysis. No changes to the survey tool were deemed necessary, so data collection for the main analyses continued as outlined below.

Preliminary Analysis: Measurement Model

The preliminary analysis of the data served as the first phase of SEM in which the measurement model, shown in Figure 7, was evaluated.

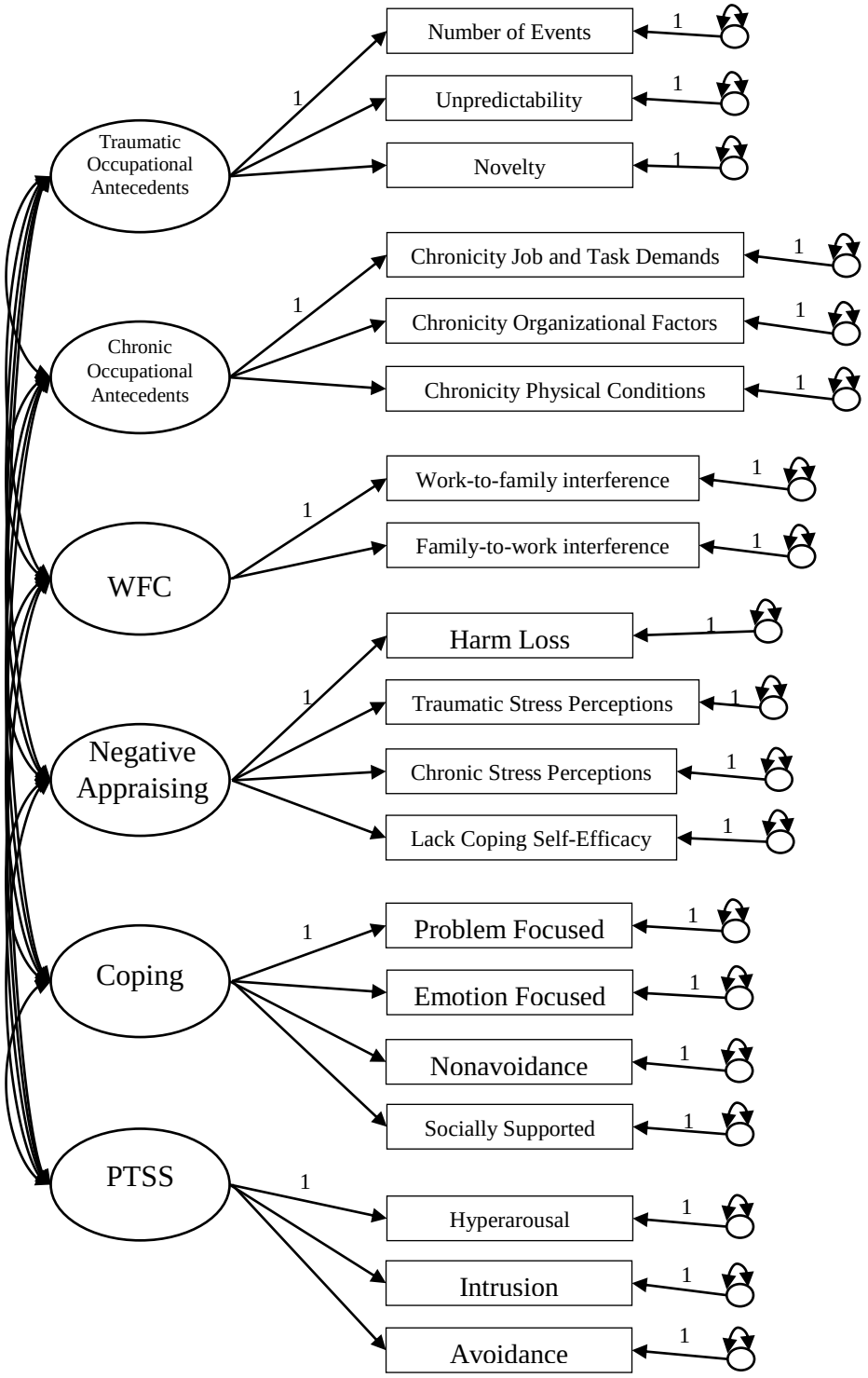

Figure 7. Measurement model of latent variables and indicators.

Discussion of the preliminary analyses of the data included demographic data as recommended by the American Psychological Association (2010) and Nichol and Pexman (2010), addressed data screening and cleaning for all subsequent analyses, and provided internal consistency estimates of measures for the main study sample.

Data were first screened for missingness, extreme scores, and normality. Errors due to data entry should not have been present due to use of an electronic survey. However, issues presented due to skip logic that are discussed in the Results section. Extreme scores were identified by examining *z* transformations in accordance with Osborne (2013) and Tabachnick and Fiddell (2007), in which scores demonstrating extreme deviations (greater than 3.29 or less than -3.29) were examined to determine if the extreme score occurred systematically in one variable or across a specific group of respondents. Assessing the normality assumption began with a visual inspection of histograms and P-P plots, followed by examination of skew and kurtosis statistics, and evaluation of inferential tests of statistically significant deviations from normality.

After identification and resolution of univariate outliers occurred, multivariate normality was assessed by examining Mahalanobis distance, in which outliers are defined as extreme multivariate scores that deviate significantly, but conservatively, from χ^2 distribution (Tabachnick & Fidell, 2007). Cases identified as potentially deviating multivariate normality were to be examined and deleted from further analyses if warranted. In addition to extreme scores and normality, patterns of missingness were examined for randomness, as recommended by Osborne (2013). Multiple imputation was to be used where possible to estimate missing data as it improves generalizability and replicability while also able to address data not missing at random (Osborne, 2013);

however, due to few cases of missingness, mean substitution was used, which is discussed in Chapter 4. Deletions, substitutions, and other discrepancies noted in the initial data cleaning and screening stages are reported in the Results section.

I compiled and reported response rates and demographic data as descriptive statistics. I checked assumptions and addressed deviations where possible as discussed above. Additional assumption testing included bivariate normality (discussed above) and independence of observations (Green & Salkind, 2010). Violation of the assumption of independence of observations occurs when participants are spatially or temporally connected, such as when multiple participants from the same organization provide data (Malone & Lubansky, 2012). There was likely a violation of this assumption, which can result in underestimated standard errors (Malone & Lubansky, 2012). The implications of this violation are discussed in Chapter 5.

Following data screening, cleaning, and assumption testing, preliminary analyses included computing Cronbach's coefficient alpha for each of the hypothesized subscales comprising the measurement model parcels. These were reported to help determine reliability estimates of the scales in this population. This was followed by confirmatory factor analysis of the measurement model to assess the suitability of the proposed measurement model (Figure 7), as recommended by Mueller and Hancock (2010). If the measurement model provided a good fit to the data, then the second phase, assessment of the structural model (Figure 6), could commence. However, initial fit was poor, so respecification of the measurement model occurred, which is discussed in Chapter 4.

Possible respecifications included addressing multidimensionality of proposed parcels and addition of potentially confounding variables, including gender and years of

experience as per theoretical considerations and prior research (Mueller & Hancock, 2010). Additionally, Lagrange multiplier tests, although a posteriori process for finding adequate models (Chou & Huh, 2012), may be used to specify a more appropriate measurement model (Mueller & Hancock, 2010). The measurement model was tested within the confirmatory factor analysis framework, which assumed normal distribution, correct specification of the sample variance-covariance matrix, and residual independence (Bovaird & Koziol, 2012). If these assumptions were met and sample size was adequate, maximum likelihood estimation would be appropriate and would provide interpretable parameter estimates and accurate standard errors, as indicated by Bovaird and Koziol (2012). Aligning with current recommendations specified by Byrne (2016), Kline (2011), and Mueller and Hancock (2010), I assessed model fit using multiple fit indices, including the χ^2 test, RMSEA, demonstrating acceptable fit below .05, and the comparative fit index (CFI), demonstrating acceptable fit with a value at or greater than .95; reliability of the factors was assessed using squared multiple correlation (SMC). Data to be reported included the model χ^2 statistic, degrees of freedom, *p* value, matrices of correlation residuals, RMSEA, CFI, and possible areas of model misspecification. After achieving a satisfactory measurement model, the structural phase was initiated. Revisions to the hypothesized model occurring as a result of measurement model respecification are discussed.

Main Analysis: Structural Model

The main analysis addressed the research question: To what extent does a model of the transactional theory of stress and coping fit the data in a sample of telecommunicators?

The research question was addressed by examining the covariance structure specified in a structural model, as discussed by Kline (2011). Statistical analysis using SEM involves specification, identification, operationalization, estimation, respecification when appropriate, and reporting (Kline, 2011). Each of these steps are discussed here; however, the process is iterative, and issues often arise before, during, and after data collection and analysis (Kline, 2011; Mueller & Hancock, 2010). Methods for addressing these issues are briefly addressed, and as issues arose during analysis, steps taken to address those issues are discussed as recommended by Mueller and Hancock (2010).

Specification. Specification involves the development of a testable model of hypotheses and theory (Kline, 2011). The model may be depicted in either graphical or equation forms (Kline, 2011). Figure 6 represents the preliminary structural form of the model. This process highlights the relationships between variables as well as hypothesized directions of effect and defines specific parameters to be estimated during statistical analysis (Kline, 2011). Model specification is theory-driven; however, few models demonstrate good fit with collected data, requiring a researcher to consider alternate theoretically-supported relationships prior to data collection in case respecification must occur at a later step (Kline, 2011). In specification, latent variables must be scaled (Kline, 2011). Scaling must occur with error terms and with factors (Kline, 2011). Scales are assigned to disturbances and measurement errors using unit loading identification constraints and generally default to the constant 1 (Kline, 2011). Unit loading identification constraints can also be used with factors by constraining the unstandardized coefficient of a direct effect of an indicator on a factor to a constant (Kline, 2011). The indicator with the constraint is called the reference or marker variable

(Kline, 2011). The reference or marker variable can be assigned to any of the indicators, but Kline (2011) recommended that in the case of indicators with lower reliability, the constraint should be placed on the indicator with the highest reliability. The reference variable may be altered following reliability estimates in the preliminary analyses.

Identification. Identification concerns the practical issue of whether or not a statistical estimate can be achieved by a computer tool (Kline, 2011). Estimation can occur when every free parameter has a unique equation available (Kline, 2011). Identification can be problematic in non-recursive models that feature feedback loops or correlated disturbances and in formative measurement models in which indicators do not reflectively measure latent variables but compose latent variables (Kline, 2011). For a recursive model to be identified, two conditions must be met: the measurement model must be identified, and the structural model must be identified (Kline, 2011). The measurement model is identified if the model has two or more factors with two or more indicators per factor and is a standard model with unidimensional measurement with no correlation of measure error (Kline, 2011). The structural model is identified if it is recursive (Kline, 2011).

Operationalization. This step concerns the selection of reliable and valid measures. The selected measures and their reliability estimates, along with limits to reliability, are discussed above. The preliminary analysis provided evidence of the reliability within this population and appropriateness of indicators and factors. Measures, which provided scores to be used as parcels for indicators, were examined for reliability through the use of Cronbach's alpha and by examining explained variance through the use of SMC (Kline, 2011). Discussion of reliability and validity of the latent factors

follows. To determine validity of factors, factor loadings should be consistent with hypothesized effects, which can be assessed by examining explained variance (Kline, 2011; Mueller & Hancock, 2010). In addition, Mueller and Hancock (2010) recommended reporting maximal reliability for factors, which addresses the reflective nature of latent variables, whereas Cronbach's α would be appropriate for composite latent variables.

Estimation and hypothesis testing. Estimation involves conducting the analysis of the model with the aid of a computer tool. According to Kline (2011), three actions occur during estimation. The first action is evaluation of model fit in which the degree to which the model explains the data is examined (Kline, 2011). If the model does not fit the data, Kline recommended proceeding to respecification without further analysis of the model. If the model fits the data, the second step involves interpretation of parameter estimates in which specific effects within the model are explored and explained (Kline, 2011). Finally, Kline recommended as the third step consideration of alternate models as multiple models would provide similar, acceptable, or even better, fit to the data as the preferred model.

Respecification. Respecification occurs when a model fails to fit the data (Kline, 2011). Changes to models should be theoretically-driven and explicable rather than statistically driven. Following respecification, identification must again be addressed, and estimation and interpretation follows (Kline, 2011).

Reporting. Reporting involves summarizing the analysis. The report includes a figure of the best-fit model with path coefficients and tables containing intercorrelations of variables and the means and standard deviations of the variables, as recommended by

Nicol and Pexman (2010). In addition to these minimum reporting standards, recommendations by Kline (2011) and Mueller and Hancock (2010) were also followed. The estimation process outcomes were specified, including if the original estimation process converged and was admissible or if any complications arose, including attempts to address complications. I provided the model χ^2 and *p* value for the preferred model and alternates. Additional model fit statistics were also reported, including RMSEA and CFI. I also provided the matrix of correlation residuals and discussed possible sources of misspecification. As necessary, theoretically plausible alternative models were discussed as well (Kline, 2011). Parameter estimates were interpreted causally and discussed in terms of significance and theoretical relevance (Mueller & Hancock, 2010).

Threats to Validity

Validity is an essential component of any study and design and refers to the idea that a research design and survey tools measure what is intended to be measured, allowing valid conclusions to be drawn from the information obtained (Frankfort-Nachmias & Nachmias, 2008; Marczyk et al., 2005). Threats to validity arise in research design, questionnaire development and implementation, and generalization of results, and although efforts to minimize threats to validity were undertaken, threats do occur and must be acknowledged.

Internal validity refers to the strength of the conclusions drawn by the researcher about the nature of relationships between variables, and threats to internal validity include outside, uncontrolled influences that may contribute to the results and lead to spurious relationships (Marczyk et al., 2005). Common threats to internal validity

relevant to this study include history, instrumentation, and selection biases (Marczyk et al., 2005).

History refers to events or incidents that affect multiple participants and can have unintended consequences for participants (Marczyk et al., 2005). History as a threat is minimized due to the cross-sectional nature of this study; however, because entire centers are open for recruitment, events that influence entire centers may have an effect on those respondents. For example, an officer-involved shooting, line-of-duty death, or natural disaster that occurs between participant recruitment and data collection may have an unintended consequence on the results of the study as the recent or ongoing trauma may influence responses or response rates. These events are uncontrollable; however, recruiting participants from communication centers across the United States may mitigate potential history effects of one center or a group of centers in one geographic location.

Instrumentation effects refer to the administration and scoring of survey tools and the psychometric properties of the survey tools (Marczyk et al., 2005). Instrumentation effects related to administration and scoring were minimized through the use of standardized instruments; however, wording and scoring changes to published tools threatened validity and reliability, and some tools did not have published reliability or validity information. The pilot study partially addressed this deficit by requesting feedback and an instrument review by participants. Testing of assumptions, described above, was conducted to ensure statistical validity, and reliability was assessed during the main study using Cronbach's alpha and SMC to ensure that internal consistency was acceptable for this study and similar to earlier uses of tools with published results. Selection bias as a threat to internal validity refers to participation and representativeness

of the sample (Marczyk et al., 2005). Because sampling was not random and participation was voluntary, telecommunicators who elected to participate in the study may have differed from those who did not.

In addition to threats to internal validity, threats to external validity must also be examined. Threats to external validity refer to the generalizability of the results and conclusions of the study (Marczyk et al., 2005). This study is limited to telecommunicators, and, as such, the results cannot be generalized to non-telecommunicator first responders or other individuals exposed to potentially traumatic events. Furthermore, though satisfactory model fit was achieved and causal interpretations were inferred, those inferences must remain rooted within the proposed theory, the current sample, and the explicit acknowledgement of alternative explanations (Mueller & Hancock, 2010). Knowledge of participation in a study and the study's intent could also threaten external validity if participants responded, intentionally or unintentionally, with the aims of the study in mind (Marczyk et al., 2005). As the survey tool was self-report, there was an assumption that participants responded accurately and honestly, but there was no control to ensure that responses were accurate or honest. Anonymity may have helped address reactivity, and no identifying information from participants was collected.

Ethical Procedures

Scientific research must be conducted respectfully and ethically. To ensure adherence to ethical standards, this study was submitted to Walden's IRB for review and approval prior to participant recruitment and data collection. A study proposal accompanied the IRB application, and the IRB approval number is included herein: 09-

26-16-0305258. Ethical concerns relate to two broad areas, including treatment of participants and treatment of data. I completed ethical training from the National Institutes of Health.

Participant concerns include recruitment procedures and data collection. Ethical recruitment must be non-coercive. I recruited participants via agency representatives. I did inquire with agency representatives the number of potential participants available at a location to estimate response rates, but no individual information was obtained. An email was sent to each agency representative for distribution to telecommunicators that contained my contact information, study information, and abbreviated informed consent information highlighting the voluntary nature of the study and the right to withdraw at any time with no consequences (see Appendix C). The recruitment email contained a link to the study website hosted by SurveyMonkey where individuals interested in participating found the informed consent document. Informed consent was implied based upon completion of the survey. Participants were advised that there were no incentives to participate. Participation was voluntary and anonymous as no individually identifying information was collected in conjunction with the survey. After reading informed consent, participants were directed to the survey questionnaire. SurveyMonkey was selected because survey construction options allowed survey makers to build anonymous surveys in which no personally identifying technical information, including IP addresses, was collected. A summary of results was offered to agency representatives. Predictable risk for this study included discomfort and anxiety in recalling potentially traumatic calls and self-report of PTSS. The purpose of this study was not to screen or clinically diagnose PTSD; however, it was possible that participants would experience distress in

responding. Participants were reminded of the voluntary nature of the study and the right to withdraw at any point. Participants were provided with a 24-hour toll-free crisis intervention telephone number and live chat web link in the recruitment email, informed consent page, and at the beginning and conclusion of the survey.

Ethical treatment of data concerns maintenance of anonymity and protections of data. The data were collected through electronic surveys completed by participants who responded to recruitment. No individually identifying personal information were collected in the survey, and data are presented in aggregate. Individual data are only accessible by me and my dissertation committee. Electronic data will be maintained on my password-protected personal computer for 5 years.

Summary

In this chapter, I discussed the methodology for the proposed study examining the transactional theory of stress and coping in PTSS in telecommunicators. For this study, I used a quantitative approach to test a model predicting the endogenous latent variable of PTSS in telecommunicators from exogenous latent variables of traumatic occupational antecedents, chronic occupational antecedents, and WFC and the mediating endogenous latent variables of negative appraising and coping. Data collection was contingent upon IRB approval, following a review of the procedures and ethicality of the treatment of participants and data. I conducted a pilot study with a convenience sample of telecommunicators from one communications center to ensure clarity of the questionnaire. For the main study, participant recruitment occurred at the agency level, following contact with agency representatives for willingness to distribute a recruitment email that contained introductory information, informed consent information, and a link

to the survey website. The survey contained questions to determine eligibility, a measure of trauma exposure from the Potentially Traumatic Events Questionnaire, occupational stressors from the Telecommunicator Sources of Stress Scale, WFC from the WFC Scale, primary appraising from the Primary Threat and Harm Appraisal Measure, coping self-efficacy from the FFSCE Scale, coping from the Brief COPE, PTSS from the IES-R, and finally, demographic information for determining participant characteristics. Permission to use and, where necessary, modify the scales was obtained from the authors. I screened the data for assumption violations prior to conducting the final analyses and addressed issues with the data and assumption violations using the procedures outlined above. I conducted descriptive analyses of the demographic information and used maximum likelihood estimation in two phases to evaluate the goodness of fit for the proposed measurement and structural model. Parameter estimates and goodness of fit indices were used to address the hypotheses under consideration. Results from the analyses are discussed in Chapter 4, and implications of the study are discussed in Chapter 5.

Chapter 4: Results

In this quantitative study, I examined the degree to which the transactional theory of stress and coping predicted PTSS in telecommunicators by examining the effects of traumatic occupational antecedents, chronic occupational antecedents, and WFC, mediated by appraisal and coping, on PTSS. The research question that guided the study was as follows:

RQ: To what extent does the Figure 8 model of the transactional theory of stress and coping fit the data in a sample of telecommunicators? Figure 8 depicts the set of hypotheses addressed in the study, as per Jaccard and Jacoby's (2010) recommendation.

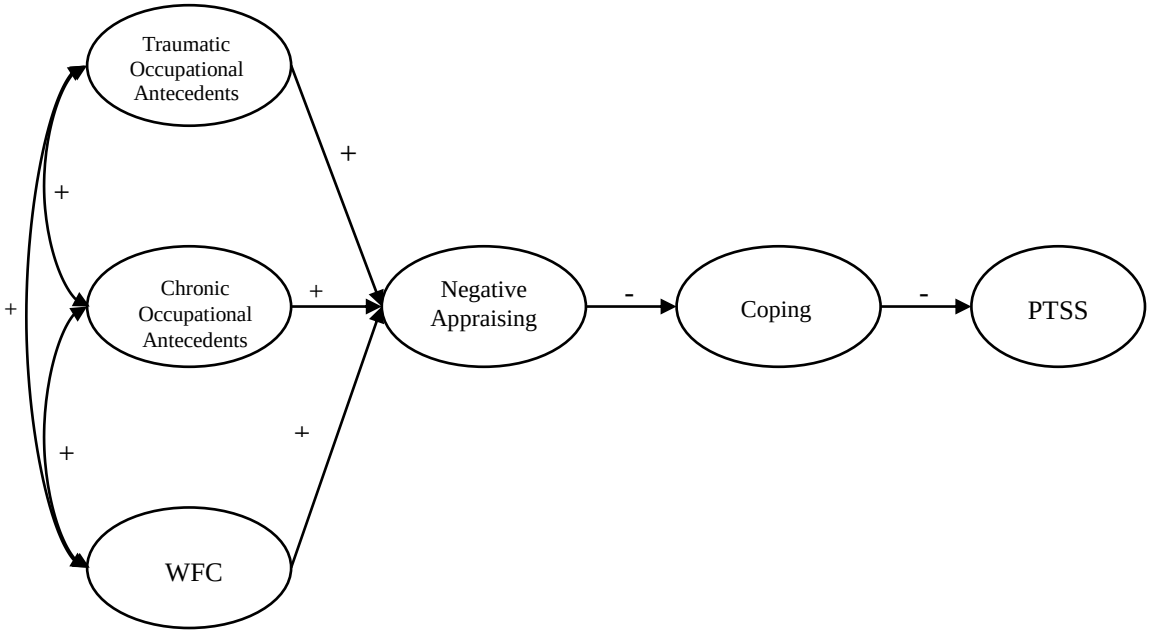

Figure 8. Proposed model and hypotheses of the transactional theory of stress and coping in posttraumatic stress symptom expression in telecommunicators. WFC, work-family conflict; PTSS, posttraumatic stress symptoms.

Analysis of the data followed a two-stage SEM process. For preliminary analyses, following data screening and cleaning, assumption testing, and analysis of descriptive

statistics, I assessed Cronbach's alpha to assist in describing reliability of published scales used with this population. To assess the fit of the proposed measurement model in the first stage of SEM, I employed maximum likelihood estimation in confirmatory factor analysis. In the second stage, I used maximum likelihood estimation to determine if the model provided a good fit to the data and to assess the relationships between latent constructs.

In this chapter, I provide a summary of the pilot study, as well as the preliminary data analyses, including steps undertaken to clean data, demographics, and properties and reliability of individual scales. A discussion of the results of the confirmatory factor analysis follows, including a discussion of theory and logic used to respecify the measurement model for better fit to the data. Finally, I provide results of the main analysis of the structural model and parameter estimates for specific effects within the model.

Pilot Study Results

Following Walden University's IRB approval (Approval number 09-26-16-0305258) and a subsequent approval for change of procedure due to an error with the listing of the study website, I offered a pilot version of the survey instrument to a convenience sample of four agencies located in northern Illinois. Of the four agencies with which I attempted contact, one agency head consented to assist with pilot study recruitment. The agency head forwarded an email on my behalf to the 20 telecommunicators employed in the center. In addition to the survey instrument to be used in the main study, the pilot survey included two additional questions inquiring on length of time to complete the survey and requesting feedback for clarity of items. Six of

the 20 telecommunicators participated in the pilot; however, one survey was incomplete, yielding a 25% response rate. Although in the study proposal I indicated that demographic data of the pilot study participants would be provided in the results, due to the small number of participants, these data will not be provided to protect participant anonymity. Respondents to the pilot study indicated that completion varied between 15 minutes and two hours, with an average completion time of 58 minutes, which was consistent with the estimated time for completion. Two respondents indicated that no changes were needed to the survey, and two respondents did not provide any feedback comments. One respondent provided a response to the feedback question: Were there any items that were unclear or confusing? If so, which items, and how could they be improved?

> The respondent indicated the following:
>
> I don't think so, I think you probably didn't have much exposure to the subject matter when you wrote this, so I don't fault you for it. I would be curious to know how you decided which calls to ask about in that introductory portion. Calls like domestics and mob action aren't typically things dispatchers struggle with. What's most difficult for us is when we are drawn into someones mind during its most volatile times. Its the intimacy that'll get you. I'm hiding under the stairs, I am having trouble breathing, my baby is not breathing, my son has drowned. Do I cut my teenage son down. That kinda thing.

Although respondents did not indicate a need to change any items for clarity, the feedback provided in the previous response demonstrated the intensity of the job and therefore the continued need to find suitable methods of connecting with this population.

As no specific questions were identified as problematic, I did not alter the survey questionnaire except to remove the pilot specific questions of completion time and feedback.

Data Collection

Data collection for the main study occurred from March 2017 through May 2018. This required an extension from IRB (Approval number 09-26-16-0305258). Recruitment proceeded as outlined in Chapter 3; however, agencies failed or were slow to respond, resulting in a smaller-than-desired sample size. The original data collection window of 6 weeks was insufficient to obtain a suitable sample size, so recruitment efforts continued in 2-week waves until I achieved the minimum sample size.

In total, I initiated contact with 194 agencies across the United States. Of these initial contacts, 171 agencies failed to respond to the invitation. Two agencies declined to participate, while an additional agency expressed interest requiring additional levels of approval; however, the request failed to be processed in time for the survey window. Of the remaining 20 agencies, one agency expressed interest in participating if more information could be provided; however, attempts to contact for follow-up remained unanswered. Three agency contacts indicated they would forward information to the correct department, but I received no follow-up from those departments, and efforts to contact remained unanswered. A total of 16 agencies (9.35%) agreed to distribute the study invitation to 486 eligible participants. Troxell (2010) also reported difficulty in accessing the population; however, in her study, 79 of 236 contacted agencies in Illinois (33.5%) consented to post flyers and distribute paper survey packets. From the pool of potential participants, 141 individuals responded to the survey; however, one participant

was disqualified due to eligibility criteria, leaving 140 respondents, with a response rate of 29%. The response rate should be interpreted cautiously, though, as I am unaware if agencies or individuals forwarded the invitation to other parties.

While federal research guidelines often require and achieve response rates that are 70% or higher, this is rarely feasible in academic settings (Office of Information and Regulatory Affairs, Office of Management and Budget, 2006; Office of Management and Budget, 2006). In contrast, the current study's response rate is similar to the 20–40% response rate expected for mail questionnaires in social sciences research (Frankfort-Nachmias & Nachmias, 2008). This response rate is substantially lower than that achieved by Troxell (2008), whose response rate was 50.97% (*N*=497), and Shakespeare-Finch et al. (2015), who reported a 50% response rate (*N*=60); however, Sotebeer (2010) received an 18% response rate (*N*=227) to his online survey of dispatchers and call-takers in Washington, Oregon, and California. Differences in response rates are problematic in research with dispatchers and calltakers and may reflect differences within the population or differences arising from survey methodology. For instance, Troxell, who achieved both the largest number of responses and response rate, used a paper survey that was distributed to dispatch centers in Illinois. Shakespeare-Finch et al. employed an online survey to one state-wide ambulance service in Queensland, Australia. Sotebeer's research was also conducted online but most closely resembled the current study through the use of an online survey distributed across multiple states in the United States.

Disqualifications and Initial Screening

Following screening of the data from the 141 participants, one participant was disqualified from analysis on the basis of the eligibility criteria. Of the remaining 140

participants, 37 participants were eliminated from further analysis due to incomplete surveys. Following initial screening for eligibility and incomplete surveys, the remaining 103 participants represent 73.05% of the original 141 participants. Figure 9 depicts the flow of participant loss through data screening. In these instances, participants did not provide enough information for missing data techniques to be used. In each of the cases, participants skipped all questions that comprise a composite score or did not provide enough valid data to use mean substitution or imputation, leaving a final sample size of 103. As discussed in Chapter 3, the desired sample size was 230 participants; however, a minimum of 104 participants was identified as acceptable. Discussion of implications of the small sample size follow in the analysis and in Chapter 5.

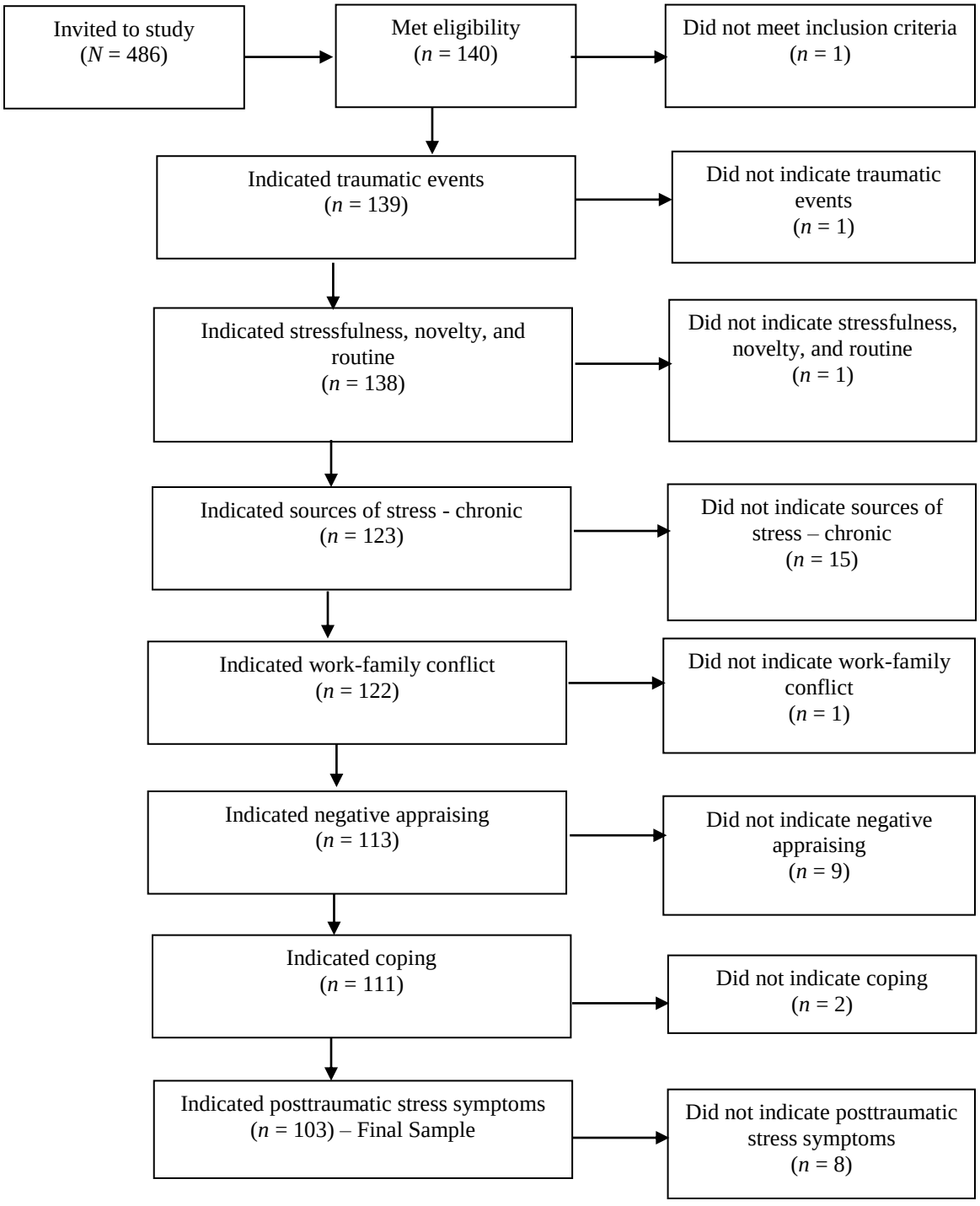

Figure 9. Flowchart of participant loss due to data screening.

Baseline Characteristics of the Sample

Table 4 shows demographic data for the remaining 103 participants, and Table 5 presents employment characteristics of the participants. Not all participants provided demographic details, but as these were not identified as necessary data for analysis, missing demographic data were not grounds for removal from analysis.

The majority of participants were women (69.9%, *n*=72) and ranged between the ages of 20 and 64, with an average age of 41.18 (*SD*=10.08). The sample consisted predominantly of individuals who identified as non-Hispanic or non-Latina/Latino (97.0%, *n*=98) and White (93.1%, *n*=95). These demographics mirror trends in other research with telecommunicators which show a majority of respondents who identify as female, non-Hispanic or non-Latina/Latino, and White (Deselms, 2016; Goold, 2009; Johns-Fiedler, 2014; Keating, 2001; Troxell, 2008). Although Sotebeer (2011) did not collect ethnicity or racial demographic data, his sample was predominantly female (77.3%), with most respondents aged between 31 and 50 (61%). Research conducted in specific cities in California showed more diversity in ethnicity but still demonstrated a majority of female respondents (Latter, 2003; Weber, 1986).

In the current study, most respondents indicated having had a high school diploma (17.6%, *n*=18), some college (37.3%, *n*=38), an associate's degree (14.7%, *n*=15), or a bachelor's degree (22.5%, *n*=23). This trend follows previous research, in which most participants indicated having had some college, followed by possessing either an associate's or bachelor's degree or completing high school (Barrett, 1985; Goold, 2009; Latter, 2003; Keating, 2001; Rasmussen, 2014; Troxell, 2008; Weber, 1986). In this

sample, 72.3% (*n*=73) indicated they were currently married or cohabitating. I had intended to ask if individuals who were married or cohabitating were partnered with a first responder; however, the question did not make it onto the electronic version of the survey. An almost equal number of respondents reported having some (48.1%, *n*=49) or no children (52.0%, *n*=53) in the house. For those with children, respondents reported having one to four children in the home.

Years employed as a telecommunicator ranged from 0 to 30, with an average of 11.74 years of service (*SD*=7.40). Years of employment were consistent with the Troxell (2008), whose respondents averaged 11.2 (*SD*=7.5) years of service, Sotebeer (2011), whose respondents averaged 10.5 years, and Pierce and Lilly (2012), whose respondents averaged 11.85 (*SD*=8.16) years of service. Other studies had samples with respondents reporting fewer years of service, including Barrett (1985), whose respondents indicated an average of 4.82 years of service, Latter (2003), whose participants averaged 6.0 (*SD*=5.92) years of service, while Rasmussen's (2014) respondents averaged over 14 years of service. In the current study, most respondents provided services for ambulance, fire, and police (80.6%, *n*=83) and served multiple police agencies (62.3%, *n*=64), crossing, municipal, county, state, federal, and tribal lines. The only other study reporting this demographic was Goold (2009), who indicated that of the Public Safety Answering Points responding to the invitation, the 381 participants represented police and sheriff departments (67%) and the California Highway Patrol (23%).

Table 4

Frequencies and Percentages of Demographic Characteristics of Participants

Characteristic	*n*	%
Gender (*N* = 103)		
Female	72	69.9
Male	30	29.1
Prefer not to answer	1	1.0
Age at time of survey (years) (*N* = 103)		
20–29	15	14.6
30–39	28	27.1
40–49	37	35.9
50–59	21	20.4
60–69	2	1.9
Race (*N* = 102)		
American Indian/Alaska Native	1	1.0
Asian	1	1.0
Black	1	1.0
Multiracial	4	3.9
White	95	93.1
Ethnicity (*N* = 101)		
Hispanic or Latina/Latino	3	3.0
Non-Hispanic or Non-Latina/Latino	98	97.0
Highest level of education (*N* = 102)		
High school	18	17.6
Trade school	4	3.9
Some college	38	37.3
Associate's degree	15	14.7
Bachelor's degree	23	22.5
Master's degree	4	3.9
Partner status (*N* = 101)		
Single	9	8.9
Long term relationship	9	8.9
Currently married or cohabitating	73	72.3
Separated	3	3.0
Divorced	7	6.9
Children in the house under 18 (*N* = 102)		
0	53	52.0
1	19	18.6
2	16	15.7
3	7	6.9
4	7	6.9

Note. Totals of percentages are not 100 for every characteristic because of rounding.

Table 5

Frequencies and Percentages of Employment Characteristics of Participants (N=103)

Characteristic	*n*	%
Years employed as dispatcher		
0–4	24	23.3
5–9	18	17.5
10–14	20	19.4
15–19	25	24.3
20–24	11	10.7
25–30	5	4.9
Types of agencies served		
Police	11	10.7
Police and Fire	1	1.0
Ambulance and Fire	8	7.8
Ambulance, Fire, and Police	83	80.6
Types of police agencies served		
No Police Agencies	8	7.8
Municipal	10	9.7
County	21	20.4
County and Municipal	29	28.2
State and Municipal	1	1.0
State and County	1	1.0
State, County, and Municipal	15	14.6
Federal, County, and Municipal	1	1.0
Federal, State, and Municipal	1	1.0
Federal, State, County, and Municipal	1	1.0
Tribal, County, and Municipal	6	5.8
Tribal, State, County, and Municipal	6	5.8
Tribal, Federal, State, County, and Municipal	3	2.9

Note. Totals of percentages are not 100 for every characteristic because of rounding.

Preliminary Results

Following initial screening of data for eligibility and incomplete surveys, I cleaned and screened the data. I addressed missing data points, calculated indicator variables from individual scores as discussed in Chapter 3, examined descriptive statistics

and frequencies of composite scores for extreme scores and outliers, tested assumptions for SEM, including screening for bi- and multivariate normality, following the recommendations of Graham (2012), Osborne (2013), and Tabachnick and Fidell (2007), and assessed scales for internal consistency reliability. Descriptive statistics for variables are presented in the sections that follow and Appendix D.

Treatment of Missing Data

No dataset is perfect, and issues with missing data were identified. Missing data presented in each of the scales, though some subscales were free of missing data, including the chronicity of organizational factors and physical conditions of the Sources of Stress measure, family-to-work interference on the WFC scale, the harm/threat appraisal items, and avoidance on the IES-R. In some cases, the missing data were interpreted as valid skips using the intended survey logic. For example, individuals who indicated not having experienced a stressor in the Sources of Stress Inventory and who skipped the perceived stressfulness were marked as "Not Applicable" and assigned a valid missing score for the purpose of summing the index score. This occurred with six participants. The "other" potentially traumatic event and perceived stressfulness presented many missing entry issues and were treated as qualitative items to describe how telecommunicators identify a potentially traumatic event. One participant skipped indicating that a type of potentially traumatic call had been handled but provided responses for appraisal of the call. The missing item was replaced to indicate the call type had been handled. The remaining missed items were addressed through simple case-specific mean composite substitution. This occurred at 23 data points: two cases in the novelty appraisal and one case of predictability in the Potentially Traumatic Events scale;

one case in job and task demand chronicity in the Sources of Stress Scale; one case in chronic stress perceptions in the Sources of Stress Scale; five cases of six missing data points in the FFCSE scale; two data points in problem-focused coping, three data points of emotion-focused coping, two data points of socially supported coping, and two data points of avoidance coping in the Brief COPE; and one data point of hyperarousal symptoms and one case of two missing data points of avoidance symptoms in the IES-R.

Assumption Testing

Extreme scores and uni- and multivariate outliers. Following addressing missing data, I calculated index and scale scores as discussed in Chapter 3. I examined these scores to ensure that they fell within the acceptable ranges and assessed the possibility of outliers by transforming the continuous indicator variables to *z* scores. Tabachnick and Fidell (2007) indicated that an absolute *z* score greater than 3.29 in a sample of 100 or more participants is likely a univariate outlier. In reviewing the *z* scores for the indicator variables, all but two fell within the acceptable range of ±3.29. The first case occurred in the lack of coping self-efficacy variable. Examination of the data showed no errors in data entry, though it was a case that had a missing data point substituted. The outlier was further evidenced in a visual inspection of the histogram. The second potential outlier was identified in the avoidance subscale of the IES-R and also evidenced in a visual inspection of the histogram. In looking at the specific case, it appears that the score is properly sampled – the subject appeared to be suffering substantially from a recent trauma, which may be reflected in this score, an issue discussed by Weiss (2009). I addressed these outliers by changing the outlying scores to a raw score that was one unit larger than the next highest score, as recommended by

Tabachnick and Fidell. For the avoidance subscale, one score of 32 was changed to 28, and for the lack of coping self-efficacy score, one score of 121.05 was changed to 95. To look for the possibility of multivariate outliers, I used the procedure outlined by Tabachnick and Fidell. Specifically, I calculated the Mahalanobis distance after regressing the 19 composite scales and indices on an arbitrary dependent variable, in this case an assigned ID number. From here, I calculated the probability of obtaining the Mahalanobis value in a χ^2 distribution with 19 degrees of freedom. Tabachnick and Fidell suggest a conservative probability cut-off estimate of $p < .001$. I did not identify any multivariate outliers using this technique. Likewise, changing the univariate outliers previously identified did not alter multivariate outliers as the Mahalanobis distances were checked before and after altering the scores, as recommended by Tabachnick and Fidell. Tabachnick and Fidell did note that concerns have been raised using Mahalanobis distance but that other methods can be just as challenging to compute and are not available in current statistical packages.

Normality. Table 6 shows **s**kew and kurtosis values for each of the composite scores. All composite scores fall between Osborne's (2013) accepted range of ±3. With the exception of the hyperarousal subscale of the IES-R, composite scores also fell within Osborne's acceptable range of ±0.80. The positive skew of the hyperarousal subscale suggests a floor effect, which, as Osborne discussed, is not unexpected in a non-clinical sample. Although the skew value is higher than Osborne's recommendation, George and Mallery (2016) indicated that in most applications, values of skew that fall between -2 and 2 are acceptable. Multivariate normality will be addressed in discussion of the results from analyses of the measurement and structural equation model.

Table 6

Skew and Kurtosis Values of Composite Scores

Indicator Variable	Skew	Kurtosis
Number of Call Types	-.319	-.291
Novelty	.170	.301
Unpredictability	.085	-.263
Chronicity of Job and Task Demands	.387	-.316
Chronicity of Organizational Factors	.383	-.734
Chronicity of Physical Conditions	.585	-.566
Work-to-family interference	-.448	-.413
Family-to-work interference	.099	-.090
Harm and threat appraisal	-.544	-.641
Trauma perceptions	-.094	-.305
Chronic sources of stress perceptions	.451	-.648
Lack of coping self-efficacy	.366	-.439
Problem-focused coping	.256	-.610
Emotion-focused coping	-.029	-.254
Socially supported coping	.488	-.161
Nonavoidance coping	-.668	-.255
Hyperarousal symptoms	1.170	.423
Intrusion symptoms	.593	-.714
Avoidance symptoms	.684	-.207

Psychometric Properties of Scales and Parcels

Table 7 shows the range of scores, means, standard deviations, and correlation coefficients for each parcel and Cronbach's alpha for relevant items on scales or subscales. To examine preliminary internal consistency measures of reliability of scales, Cronbach's alpha was assessed. Assumptions for reliability analysis include equivalency among items, unrelated errors in measurement between parts, and a reflection of the sum of an item's true and error scores: Assessing these assumptions is difficult and is understood to be violated to some extent in most analyses (Green & Salkind, 2010). Additionally, these scores do not reflect unidimensionality of subscales and are not intended to demonstrate that scales have been parceled into homogenous units (Green &

Salkind, 2010). Estimates for most subscales are acceptable and will be discussed further below; however, three subscales had estimates less than .80, indicating questionable reliability. Items on the family-to-work interference subscale, in which Cronbach's α = .74, showed negative correlations with one another, and the items with negative correlations all relate to specific behavior patterns and may suggest that these items reflect a separate construct, thus a separate subscale, for this population. This subscale may be an area of misspecification in the measurement model. Similarly, two of the subscales from the Brief COPE show lower reliability. As another source of possible misspecification, subscales of this measure may need to be revisited with Carver's (2007a) recommendation to conduct separate factor analysis to determine higher order factors for this population.

Table 7

*Properties of Scales and Parcels (*N*=103)*

Indicator Variable	Range	Mean (*SD*)	Number of Items	Cronbach's α
Number of call types	6-20	14.21 (3.36)		
Novelty	14-90	46.52 (14.36)		
Unpredictability	16-85	45.54 (15.35)		
Chronicity of job and task demands	2-60	26.85 (13.05)		
Chronicity of organizational factors	0-30	11.39 (7.30)		
Chronicity of physical conditions	0-10	3.67 (3.09)		
Work-to-family interference	11-44	30.07 (7.91)	9	.85
Family-to-work interference	9-32	17.96 (5.34)	9	.74
Harm and threat appraisal	6-30	20.24 (7.00)	6	.92
Trauma perceptions	1-97	48.54 (20.57)		
Chronic sources of stress perceptions	2-87	34.66 (20.93)		
Lack of coping self-efficacy	20-95	51.20 (18.81)	20	.93
Problem-focused coping	4-16	8.38 (3.05)	4	.81
Emotion-focused coping	10-34	21.42 (5.52)	10	.74
Socially supported coping	6-24	11.94 (4.20)	6	.84
Nonavoidance coping	17-32	27.40 (3.57)	8	.67
Hyperarousal symptoms	0-23	4.94 (5.78)	6	.89
Intrusion symptoms	0-29	9.89 (8.49)	8	.94
Avoidance symptoms	0-28	8.45 (6.93)	8	.87

Descriptive Statistics

Potentially traumatic events. Of the 20 named potentially traumatic events, telecommunicators averaged having handled 14.21 (*SD*=3.36) different types of calls in their careers, with a range of 6 to 20 different call types experienced. Only two other instances of this scale's use have been identified. In Troxell's (2008) dissertation, participants (*N*=496) indicated handling an average of 12.6 (*SD*=4.3) types of calls, with a range of 1 to 21 calls. Troxell's study included an additional other call type category, allowing participants to fill in additional potentially traumatizing events; however, the

decision to exclude the additionally distressing calls from further quantitative analyses in this study arose from issues with descriptions of the call types in which there was often either overlap or multiple calls presented. Troxell's discussion revealed similar issues with interpretation. I included an overview of these descriptions below with additional discussion in Chapter 5. In the second study, 171 telecommunicators indicated having handled an average of 15.32 (*SD*=3.50) of the 21 call types (Pierce & Lilly, 2012; Lilly & Pierce, 2013). Table 8 shows comparisons between the frequencies of call types in this study, Troxell, and Lilly and Pierce (2013). For this study, the sum of responses for the 20 types of calls served as the index for the observed number of events indicator variable for traumatic occupational antecedents.

Table 8

Comparison of Frequencies of Types of Calls Handled

	Current Study [a]		Troxell (2008) [b]		Lilly & Pierce (2013) [c]	
Call Type	*N*	%	*n*	%	*n*	%
Traffic accident with fatality	97	94.2	448	90.2		
Natural disaster/Severe weather	101	98.1	411	82.9		
Suicidal caller	101	98.1	422	85.1		
Homicide	63	61.2	242	48.8		
Line of duty death	27	26.2	74	14.9		32.3
Death of a child	91	88.3	302	60.9		
Officer, firefighter, EMT injury	86	83.5	332	66.9		
Pursuit	90	87.4	454	91.5		
Children with severe injury	90	87.4	386	77.8		
Armed robbery	72	69.9	334	67.3		>75%
Sexual assault of a child	76	73.8	295	59.5		
Calls involving family/friends	78	75.7	277	55.8		
Hostage situation	40	38.8	176	35.5		43.9
Domestic calls	101	98.1	484	97.6		>75%
Riot/Mob action	22	21.4	195	39.3		38.6
Plane crash	50	48.5	126	25.4		34.5
Shots fired	93	90.3	381	76.8		
Officer shot	20	19.4	91	18.3		31.6
Structure fire	99	96.1	457	92.1		>75%
Barricaded subject	67	65.0	280	56.5		

[a] *N*=103
[b] *N*=496
[c] *N*=171, only percentages provided and not all categories reported.

Table 9 displays frequencies of potentially traumatic calls as well as the mean perceived stressfulness, unpredictability, and novelty for each call type for this study. The most common reported call types included natural disaster/severe weather, suicidal caller, and domestic calls; each of which 101 participants indicated having handled. The least

common call types included officer shot (*n*=20), riot/mob action (*n*=22), and line of duty death (*n*=27). Telecommunicators indicated that the most stressful call types included officer shot (*M*=4.70, *SD*=0.73), line of duty death (*M*=4.67, *SD*=0.68), and death of a child (*M*=4.08, *SD*=1.15) calls and the least stressful call types were domestic calls (*M*=1.93, *SD*=1.41) followed by structure fire (*M*=2.45, *SD*=1.47), traffic accident with fatality (*M*=2.64, *SD*=1.30), and shots fired (*M*=2.74, *SD*=1.64) calls. Telecommunicators rated line of duty death (*M*=4.81, *SD*=0.48), officer shot (*M*=4.40, *SD*=1.31), and hostage situation (*M*=4.13, *SD*=1.02) incidents as the most unpredictable and domestic calls (*M*=2.10, *SD*=1.46), structure fire (*M*=2.31, *SD*=1.38), and traffic accident with fatality (*M*=2.65, *SD*=1.28) as the least unpredictable. In looking at how routine different call types are, telecommunicators indicated that the least routine calls they handle are line of duty death (*M*=5.00, *SD*=0.00), officer shot (*M*=4.55, *SD*=0.89), hostage situation (*M*=4.40, *SD*=0.87), and plane crash (*M*=4.26, *SD*=1.03) and that domestic calls (*M*=1.54, *SD*=1.45), structure fire (*M*=2.22, *SD*=1.47), and traffic accident with fatality (*M*=2.74, *SD*=1.28) are the most routine.

For this study, the sum of scores for unpredictability and novelty ratings for the 20 call types serve as indices for, respectively, unpredictability and novelty observed variables indicating traumatic occupational antecedents. In the current study, novelty index scores ranged from 14 to 90, with a mean of 46.52 (*SD*=14.36). Unpredictability ranged from 16 to 85, with a mean of 45.54 (*SD*=14.35). Novelty and unpredictability perceptions of the potentially traumatic events have not been previously assessed. However, previous investigators were looking at traumatic event exposure as it related to PTSD and included assessments of whether or not an event triggered fear, helplessness,

or horror to align with the previous diagnostic criterion of PTSD (APA, 2000). This was not assessed in the current study due to the removal of the criterion in the current edition of the APA's (2013) *DSM-5*.

Table 9

Types of Calls Handled and Perceived Stressfulness, Unpredictability, and Novelty

Call Type	*n (%)*	Stressfulness *M* (*SD*)	Unpredictability *M* (*SD*)	Novelty *M* (*SD*)
Traffic accident with fatality	97 (94.2%)	2.64 (1.30)	2.65 (1.28)	2.74 (1.28)
Natural disaster/Severe weather	101 (98.1%)	2.98 (1.46)	2.80 (1.45)	2.86 (1.46)
Suicidal caller	101 (98.1%)	2.90 (1.47)	3.05 (1.37)	2.92 (1.34)
Homicide	63 (61.2%)	3.19 (1.50)	3.70 (1.27)	3.68 (1.31)
Line of duty death	27 (26.2%)	4.67 (0.68)	4.81 (0.48)	5.00 (0.00)
Death of a child	91 (88.3%)	4.08 (1.15)	3.58 (1.29)	3.96 (1.17)
Officer, firefighter, EMT injury	86 (83.5%)	3.70 (1.44)	3.81 (1.11)	4.07 (1.13)
Pursuit	90 (87.4%)	3.19 (1.32)	3.04 (1.36)	2.93 (1.44)
Children with severe injury	90 (87.4%)	3.42 (1.41)	3.40 (1.14)	3.53 (1.13)
Armed robbery	72 (69.9%)	3.19 (1.23)	3.13 (1.23)	3.33 (1.34)
Sexual assault of a child	76 (73.8%)	2.88 (1.40)	3.28 (1.25)	3.46 (1.24)
Calls involving family/friends	78 (75.7%)	3.51 (1.42)	3.78 (1.26)	3.91 (1.33)
Hostage situation	40 (38.8%)	3.83 (1.06)	4.13 (1.02)	4.40 (0.87)
Domestic calls	101 (98.1%)	1.93 (1.41)	2.10 (1.46)	1.54 (1.45)
Riot/Mob action	22 (21.4%)	3.23 (1.34)	3.41 (1.50)	3.86 (1.49)
Plane crash	50 (48.5%)	3.14 (1.57)	3.80 (1.34)	4.26 (1.03)
Shots fired	93 (90.3%)	2.74 (1.64)	3.09 (1.54)	3.09 (1.68)
Officer shot	20 (19.4%)	4.70 (0.73)	4.40 (1.31)	4.55 (0.89)
Structure fire	99 (96.1%)	2.45 (1.47)	2.31 (1.38)	2.22 (1.47)
Barricaded subject	67 (65.0%)	2.99 (1.34)	3.43 (1.32)	3.67 (1.32)

Note. N=103; *M* based on *n* for each category

The sum of scores for perceived stressfulness ratings for the 20 named call types indexes the observed traumatic stress perceptions observed variable indicating one aspect of negative appraising. While Troxell (2008) assessed perceived stressfulness in her pilot study, she excluded this from the main study, and no other study has been identified looking at these antecedents and appraisals in this population. Stressfulness perceptions ranged from 1 to 97, with a mean of 48.54 (*SD*=20.57). In Troxell's pilot study, participants were asked to rate their own perceived stressfulness and that of a typical

telecommunicator for the 21 call types for calls handled within the last 30 days. Telecommunicators (*N*=16) indicated having handled 1 to 14 call types (*M*=5.87, *SD*=4.01) in the last 30 days and rated themselves at an average of 12.94 (*SD*=14.0), with a range of 0 to 55 and a median of 9; however, they rated a typical telecommunicator at an average of 17.62 (*SD*=17.55), with a range of 0 to 61 and a median of 11.5 (Troxell, 2008). These results are a contrast from the current study in which participants indicated much greater stress perceptions when looking at calls over the course of their career. Lilly and Pierce (2013) and Pierce and Lilly (2012) did not assess perceived stressfulness of potentially traumatizing events.

In addition to the 20 labeled call types, respondents could identify additional potentially disturbing calls. Response areas were provided for up to three additional call types and rating of stressfulness, unpredictability, and novelty. Of those responding, 69 (67.0%) individuals included one additional response; 30 (29.1%) indicated two additional types, and 15 (14.6%) indicated handling three additional call types. Although space was provided for descriptions of these calls, not all respondents described these incidents (*n*=12). However, the descriptions telecommunicators provided showed insight into perceptions about the complex and situational nature of calls received, the implications of which will be discussed further in Chapter 5.

Participants often highlighted multiple calls in their descriptions (*n*=5) or indicated that over the course of the career there were too many incidents to recall specifically but that the effects were still felt (*n*=5) or that incidents had faded over time unless they were specifically brought to mind (*n*=1). Many descriptions combined attributes of several call types, making them difficult to categorize. Examples included a

police officer who was shot and killed during a pursuit, a multi-fatality bus crash on a snowy mountainside with a non-English speaking caller, and a parent who set fire to a residence, killing three children. Although there was a diverse set of responses, a few call types did appear several times, including completed suicides (*n*=11), completed or attempted murder/suicides (*n*=8), structure fires with fatalities (*n*=6), kidnapping (*n*=5), incidents involving individuals being runover by vehicles (*n*=5), and other medical calls, generally requiring cardiopulmonary resuscitation (*n*=7).

Several of these call types share similarities with events provided in the measure; however, separate indication as a distinct potentially traumatizing call type suggests either ambiguity in the wording of the question or a qualitatively different cognitive appraisal of the call. Without follow-up questions, it is not possible to assess differences between endorsements, for example, of a suicidal caller, which on average is common, with 98.1% of the 103 respondents indicating having handled, and not particularly stressful (*M*=2.90, *SD*=1.47) or novel (*M*=2.92, *SD*=1.34), though slightly more unpredictable (*M*=3.05, *SD*=1.37) and endorsements for a completed suicide (*n*=11), which were identified as quite stressful (*M* =4.27, *SD*=.75), quite unpredictable (*M* =4.00, *SD*=1.48), and quite novel (*M* =4.36, *SD*=1.23).

In addition to specific types, telecommunicators also listed qualities of the call (such as losing a connection due to technical issues or reporting party death or danger, uncertainty, or emotional or child callers) (*n*=10) and qualities of the rescue (complex rescue as in drownings, calls requiring multiple resources, or involving difficult terrain) (*n*=11) as potentially traumatic. One telecommunicator also used this space to indicate concern over lack of understanding of the work and 9-1-1 process, similarly to what was

expressed in the pilot study, stating “homicide of child, suicide of subject. Though I think there might be limited understanding of the 911 process here, no call is routine. Even a citizen assist can turn deadly at a moment's notice.” This reinforces the assertion that it is not the type of event that is traumatizing but the specific qualities of the event and how they are appraised by the individual that leads to traumatization.

Chronic occupational antecedents and perceived stressfulness.

Telecommunicators (*N*=103) reported experiencing a range of 1 to 23 sources of stress in the last 30 days, with an average of 14.21 stressors (*SD*=4.99). On average, telecommunicators who experienced chronic stressors within the last 30 days rated them as somewhat stressful (*M*=2.35, *SD*=1.19). The most commonly experienced stressors included the public (*n*=95), poor communication among staff (*n*=90), and coworkers (*n*=89). On average, the most chronically encountered stressor was the public (*M*=3.71, *SD*=1.62). Table 10 presents the chronicity and perceived stressfulness of each source of stress. Each source of stress reflects a broader category of work stress, including job and task demands, organizational factors, and physical conditions. For additional analyses, the sum of chronicity of each category served as an index score that is an indicator for chronic occupational antecedents. The sum of perceived stressfulness of chronic sources of stress served as an indicator for negative appraising.

Table 10

Chronic Sources of Telecommunicator Stress – Chronicity and Perceived Stressfulness

Source of Stress	Chronicity		Stressfulness	
	n (%)	*M* (*SD*)	*n* (%)	*M* (*SD*)
Job Tasks and Demands				
Lack of training	51 (49.5%)	1.00 (1.34)	71 (68.9%)	1.77 (1.65)
Personal conflicts at work	72 (69.9%)	1.64 (1.57)	78 (75.7%)	2.27 (1.54)
Poor communication among staff	90 (87.4%)	2.50 (1.55)	96 (93.2%)	2.34 (1.53)
Lack of input on new hires	45 (43.7%)	1.02 (1.45)	66 (64.1%)	1.24 (1.38)
Sexual harassment	14 (13.6%)	0.20 (0.57)	35 (34.0%)	1.12 (1.77)
Lack of follow-up	57 (55.3%)	1.25 (1.46)	72 (69.9%)	2.11 (1.62)
Constantly changing policies	73 (70.9%)	1.65 (1.60)	84 (81.6%)	2.42 (1.82)
Coworkers	89 (86.4%)	2.49 (1.62)	95 (92.2%)	2.15 (1.36)
Treatment from others during stressful events	53 (51.5%)	1.21 (1.48)	73 (70.9%)	1.97 (1.76)
The public	95 (92.2%)	3.71 (1.62)	98 (95.1%)	2.42 (1.51)
The media	59 (57.3%)	1.49 (1.63)	72 (69.9%)	1.33 (1.39)
Call-monitoring practices	53 (51.5%)	2.23 (2.38)	72 (69.9%)	0.78 (1.22)
Lack of understanding what telecommunicators do	59 (57.3%)	2.14 (2.11)	69 (67.0%)	2.25 (1.67)
Lack of closure	78 (75.7%)	2.67 (1.97)	87 (84.5%)	2.14 (1.52)
Scheduling time-off	69 (67.0%)	1.66 (1.67)	78 (75.7%)	2.23 (1.73)
Organizational Factors				
Poor supervision	56 (54.4%)	1.63 (1.85)	80 (77.7%)	1.96 (1.70)
Lack of appreciation from management	72 (69.9%)	2.36 (2.05)	84 (81.6%)	2.11 (1.66)
Inadequate compensation	62 (60.2%)	2.34 (2.29)	74 (71.8%)	2.39 (1.67)
Management/administration	71 (68.9%)	2.07 (1.83)	86 (83.5%)	2.19 (1.68)
Scapegoating of the communications center	60 (58.3%)	1.65 (1.79)	74 (71.8%)	2.24 (1.88)
Performance evaluations	65 (63.1%)	1.34 (1.58)	79 (76.7%)	1.53 (1.51)
Physical Conditions				
Poor equipment	76 (78.3%)	2.26 (1.87)	84 (81.6%)	2.67 (1.65)
Ergonomics	46 (44.7%)	1.41 (1.88)	63 (61.2%)	1.65 (1.57)

Note. N=103; *M* based on *n* for each category

The specific frequencies of the chronicity of stressors, shown in Table D1, indicate that some stressors are more pervasive than others. For instance, of the 51 individuals who indicated lack of training as a source of stress, 23 participants (22.3%) indicated this occurred once in the last 30 days, and four participants (3.9%) indicated it was a daily occurrence. The public, identified as the most frequent and chronic source of stress, occurred once in the last 30 days for 3 participants (2.9%) and daily for 51

participants (49.5%). In reporting perceived stressfulness, several participants reported on the presence of a chronic stressor in the absence of it occurring within the last 30 days, often indicating perceptions that this source was *Not at all Stressful*. While the intent was to assess the perception of stressfulness of each source that had occurred within the last 30 days, the wording of the survey may have led to confusion, and it was not coded properly in SurveyMonkey to address this potential issue. This is most clearly illustrated in looking at the sexual harassment item. Only 14 participants indicated sexual harassment as a source of stress in the last 30 days. Of those 14, one indicated that a stressfulness perception was not applicable; however, the average perceived stressfulness for the remaining 13 was 2.69 (*SD*=1.89). An additional 21 participants indicated perceptions of the stressfulness of sexual harassment, rating it at an average 0.14 (*SD*=0.66). An independent-samples *t* test revealed a statistically significant difference between those who rated perceived stressfulness and experienced sexual harassment in the last 30 days (*n*=13) and those who rated perceived stressfulness and did not experience sexual harassment in the last 30 days (*n*=21), $t(13.81) = -4.70$, $p < .001$; however, caution is warranted in interpreting these results as the data for the group not experiencing sexual harassment in the last 30 days are positively skewed and leptokurtotic, violating the assumption of normality, discussed by Green and Salkind (2011). Violation of the assumption of equal population variances also occurred, so reporting reflects equal variances not assumed as recommended by Green and Salkind (2011). It may be that more recent occurrences of harassment are more easily recalled in terms of details and perceived stressfulness, affecting this rating. Alternatively, participants may have interpreted the survey item as how stressful they may perceive this

stressor to be if they were to experience it. This difference was only examined for one source of stress, but it is possible that these differences persist over each of the categories of stressors.

The only other identified use of this inventory was Troxell (2008). In her work, Troxell had telecommunicators indicate which of the 23 items were currently sources of stress. In comparing Troxell's and the current study's results, frequencies of experienced stressors increased as the recall timing changed: Number of individuals indicating stressors increased from those reporting an item as currently relevant (in Troxell's study), stressors having occurred in the last 30 days, and items perceived as ever having been a source of stress. These results are shown in Table 11. There are substantial differences between percentages in each of these categories, as well as some noteworthy differences in the most often indicated sources of stress.

Table 11

Chronic Sources of Stress – Frequencies and Percentages

	Ever perceived as source of stress [a]		Last 30 days [a]		Currently (Troxell, 2008) [b]	
Source of Stress	*N*	%	*n*	%	*n*	%
The public	98	95.1	95	92.2	240	48.7
Poor communication among staff	96	93.2	90	87.4	229	46.5
Coworkers	95	92.2	89	86.4	218	44.2
Lack of closure	87	84.5	78	75.7	124	25.2
Management/administration	86	83.5	71	68.9	209	42.4
Poor equipment	84	81.6	76	78.3	210	42.6
Constantly changing policies	84	81.6	73	70.9	204	41.4
Lack of appreciation from management	84	81.6	72	69.9	263	53.3
Poor supervision	80	77.7	56	54.4	149	30.2
Performance evaluations	79	76.7	65	63.1	127	25.8
Personal conflicts at work	79	76.7	72	69.9	227	46.0
Scheduling time-off	78	75.7	69	67.0	163	33.1
Inadequate compensation	74	71.8	62	60.2	158	32.0
Scapegoating of the communications center	74	71.8	60	58.3	216	43.8
Treatment from others during stressful events	73	70.9	53	51.5	128	26.0
The media	72	69.9	59	57.3	87	17.6
Lack of follow-up	72	69.9	57	55.3	231	46.9
Call-monitoring practices	72	69.9	53	51.5	59	12.0
Lack of training	71	68.9	51	49.5	107	21.7
Lack of understanding what telecommunicators do	69	67.0	59	57.3	238	48.3
Lack of input on new hires	66	64.1	45	43.7	139	28.2
Ergonomics	63	61.2	46	44.7	139	28.2
Sexual harassment	35	34.0	14	13.6	10	2.0

[a] *N*=103

[b] *N*=493

WFC. Telecommunicators reported differences in experiences of WFC. Table 12 provides means of the original subscales used in Carlson et al.'s (2000) validation study and those of the current study.

Table 12

Average Scores of WFC Subscales

	Current Study [a]	Carlson et al.'s (2000) study *M*	
Subscale	*M* (*SD*)	Males [b]	Females [c]
Time-Based WFI	3.95 (1.02)	2.91	2.82
Strain-Based WFI	3.35 (1.28)	2.45	2.81
Behavior-Based WFI	2.72 (1.18)	2.43	2.63
Time-Based FWI	1.64 (0.77)	1.77	2.01
Strain-Based FWI	1.61 (0.83)	1.71	1.93
Behavior-Based FWI	2.74 (1.10)	2.36	2.65

Note. WFI, work-to-family interference; FWI, family-to-work interference [a] *N*=103
[b] *N*=83
[c] *N*=142

In the current study, telecommunicators neither agreed nor disagreed that time- and strain-based work-to-family interference items served as a source of conflict, yet these areas of conflict were higher than in Carlson et al.'s work in which the 225 participants were employed in different organizations in a Midwestern city. Telecommunicators more strongly disagreed that time- and strain-based family-to-work interference items served as a source of conflict than those participants in Carlson et al.'s study. Interestingly, telecommunicators rated behavior-based items in both directions from family-to-work and work-to-family similarly, as did Carlson et al.'s sample, though telecommunicators rated the items higher than the men and women of Carlson et al.'s sample.

For this study, items related to work-to-family interference and items related to family-to-work interference were summed as indicators for WFC. In general,

telecommunicators rated items related to work-to-family interference (*M*=3.32, *SD*=0.88) higher than those examining family-to-work interference (*M*=2.00, *SD*=0.59). Table D2 displays telecommunicator evaluations of individual items of WFC.

Negative appraising.

Harm or loss. In appraising telecommunicator stress and work-family conflict, telecommunicators, on average (*M*=3.37, *SD*=1.17), did not agree or disagree that the stresses of their position and work-family conflict would influence them negatively. Means and standard deviations for individual items are available in Table D3. These items, though based off the work by Feldman et al. (2004) were constructed for this study and, therefore, do not have a basis for comparison in the current literature. For this study's model, the harm and threat appraisal items were summed and used as an indicator for negative appraising.

Lack of coping self-efficacy. Telecommunicators generally rated themselves as feeling quite capable or extremely capable of handling different aspects of their profession (*M*=1.55, *SD*=0.93). As shown in Table D4, those areas in which telecommunicators indicated less self-efficacy included not self-criticizing (*M*=2.78, *SD*=1.67), coping with the death of a child (*M*=2.61, *SD*=1.68), coping with feelings of guilt (*M*=2.26, *SD*=1.66), having dreams about difficult calls (*M*=2.25, *SD*=1.70), and discussing emotionally upsetting calls (*M*=2.08, *SD*=1.85). The sum of lack of coping self-efficacy items served as an indicator of negative appraising within the structural model.

Coping. I assessed coping through use of Carver's (1997) Brief COPE. For analysis, items related to avoidance coping, those of disengagement, denial, self-

distraction, and substance use, were reverse-scored to keep the direction of relationship consistent for the coping latent factor. However, after initial analysis, the decision to reverse-score avoidance items to align with adaptive forms of coping appeared ill-advised due to being the sole indicator variable to present a negative factor loading for the latent variable coping (B= -.52, SE_B=.13 [discussed further below]). For the remainder of analyses, I reverted avoidance coping items to the original score.

Telecommunicators indicated few of the ways of coping identified by Carver (1997) as being used more than a little. Means and standard deviations for Carver's initial 14 ways of coping subscales, with possible scores ranging from 2 to 8, are presented in Table 13, and mean responses for individual items are presented in Table D5.

Table 13

*Ways of Coping in Telecommunicators (*N=*103)*

Carver's (1997) Subscales	*M*	*SD*
Self-Distraction*	5.55	1.60
Active Coping	4.41	1.63
Denial*	7.60	0.92
Substance Use*	7.10	1.54
Emotional Support	4.17	1.80
Instrumental Support	3.83	1.76
Disengagement*	7.14	1.42
Venting	3.94	1.53
Positive Reframing	4.36	1.78
Planning	3.97	1.71
Humor	3.71	1.83
Acceptance	5.50	1.72
Religion	4.14	2.20
Self-Blaming	3.71	1.77

*Reverse-scored for initial analysis.

For the next step of analysis, four higher order scales, problem-focused, emotion-focused, nonavoidance, and socially supported, informed by Nahlen Bose et al. (2015),

were created. In the present study, emotion-focused (*M*=2.15, *SD*=0.55), problem-focused (*M*=2.10, *SD*=0.76), and socially supported (*M*=2.00, *SD*=0.70) items scored higher than avoidance items (*M*=1.58, *SD*=0.45). Sums of these second-order scales served as indicators for coping in the measurement and structural models.

PTSS. On average, telecommunicators indicated experiencing symptoms of intrusion (*M*=1.24, *SD*=1.06) and avoidance (*M*=1.05, *SD*=0.86) more often than those of hyperarousal (*M*=0.82, *SD*=0.96); however, most telecommunicators experienced relatively low symptoms (i.e., *not at all* to *a little bit*) in relation to their self-identified traumatic event. The importance of identifying the referent event in looking at symptom expression is paramount in the Impact of Event Scale-Revised (IES-R), particularly because it contextualizes symptoms in alignment with Criterion A of the diagnostic criteria of the *DSM-IV-TR* (APA, 2000; Weiss, 2004); however, this again presents difficulties when exposure to multiple trauma events is likely or possible.

In the current study, telecommunicators were asked to provide a brief description of a reference event and when it occurred. However, not all participants provided descriptions (*n* = 9), or descriptions referenced multiple events (*n* =4), and timing of these events varied considerably, from days ago (“Tuesday”; “about a week ago”) to years ago (“over 10 years ago”; “a couple years ago”) and from vague to very specific. While a single defining event is not a criterion in the *DSM-5* (APA, 2013), timing continues to affect diagnosis of PTSD versus Acute Stress Disorder. This is beyond the scope of this study, though examining differences in timing and symptom severity is a necessary continuation of trauma research in general (Weiss, 2004; Weiss & Marmar, 1997) and for this population specifically.

In scoring the IES-R, Weiss (2004) and Weiss and Marmar (1997) cautioned against using cut-off scores for diagnosing PTSD as this scoring neglects to take into account important considerations in traumatology, including time since the referent event and likely differences in the normal course of trauma adaptation for any individual as well as for trajectory in different demographics. Additionally, the scoring of the IES-R is intended to measure current symptom expression of the three diagnostic criteria of the *DSM-IV-TR* (APA, 2000) and is not intended to provide a sum score of overall PTSD symptoms; specifically, scoring instructions for the IES-R indicate to use the means of the subscales to assess current trauma symptom expression and compare with other validated measures of PTSD symptoms; however, issues arise again in identifying normative data due to the type of trauma experienced and time elapsed since exposure, making these comparisons difficult (Weiss, 2004; Weiss & Marmar, 1997). In order to present a discussion of symptom expression, frequencies of severity of symptom expression based on the categories of item responses are provided in Table 14.

Table 14

*Frequencies of Means of Symptoms Experienced in Past Seven Day (*N*=103)*

	Mean Categories							
	0.00-0.99		1.00-1.99		2.00-2.99		3.00-3.99	
Symptom Subscale	*n*	%	*n*	%	*n*	%	*n*	%
Intrusion	49	47.6	25	24.3	22	21.4	7	6.8
Avoidance	53	51.5	33	32.0	15	14.6	2	1.9
Hyperarousal	69	67.0	16	15.5	14	13.6	4	3.9

Additional means and standard deviations for individual items are presented in Table D6. The sums of items comprising three symptom clusters, hyperarousal, intrusion, and avoidance, served as indicators for the latent variable of PTSS.

Results of Stage One: Measurement Model Analysis

Following the recommendations of Mueller and Hancock (2010), a two-stage modeling approach commenced. In the first phase of analysis, confirmatory factor analysis was employed to evaluate the adequacy of the indicator variables and their performance on their proposed latent variables. I used AMOS (version 25; Arbuckle, 2006) for computation of both the measurement and structural models and estimated parameters using maximum likelihood. Maximum likelihood is appropriate when data demonstrate normality, though it can overestimate χ^2 in small sample sizes, which also can affect standard error estimates (Bandalos & Gagné, 2012; West, Finch, & Curran, 1995). The first loading for each indicator was set to 1.0 as a reference variable, as recommended by Kline (2011). Review of the multivariate kurtosis critical ratio indicated multivariate normality (1.01, where values greater than 5 suggest deviations from normal distribution as noted by Byrne [2016]). Initial results of the proposed measurement model (Figure 10) demonstrated poor fit on multiple indices, which are reported in Table 15 along with results for respecifications.

Model respecification resulted in two possible alternatives with the final measurement model occurring through rationalized application of theory and post hoc analysis of modification indices (MIs).

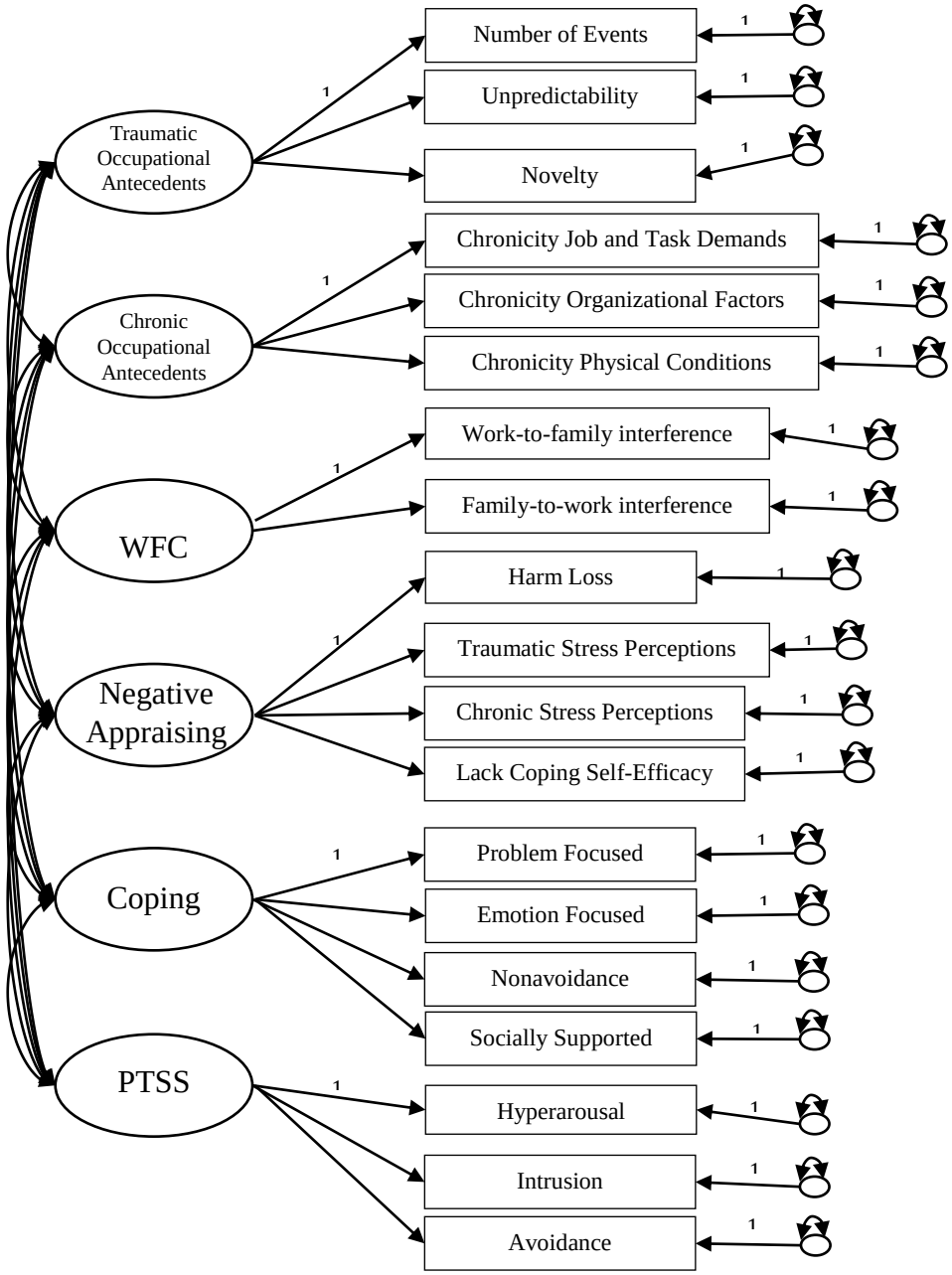

Figure 10. Measurement model of latent variables and indicators.

Table 15

Measurement Model Results

Model	χ^2	*Df*	*p*	CFI	RMSEA	90% CI	p_{close}
Initial Model	370.50	137	<.01	.81	.13	[.11–.15]	<.01
Respecification 1	213.43	131	<.01	.93	.08	[.06–.10]	.01
Final Model	96.50	75	.05	.97	.05	[.01–.08]	.42

Notes. CFI, Comparative Fit Index; RMSEA, Root Mean Square Error of Approximation; CI, Confidence Interval

Review of fit of the measurement models followed Byrne's (2016) recommendations of examining parameter estimates for appropriate size and sign, standard errors for precision in measurement, statistical significance of parameter estimates, and overall model fit. Areas of misspecification may be identified through review of parameter estimates as well as examination of MIs. The first issue identified occurred because of an inappropriate sign of a parameter estimate. The nonavoidance indicator loaded negatively onto coping (B= -.52, SE_B=.13), while each of the other coping indicators loaded positively. Initially, the avoidance items were reverse-scored to deflect maladaptive coping strategies that were theoretically presumed to detract from coping efforts. However, it appears that any type of coping, even potentially maladaptive forms, represent the underlying construct of coping as managing a perceived threat, and it should not have been reverse-scored. These eight avoidance coping items were reverted to their original scores and labeled as avoidance coping.

First Respecification

For Respecification 1, I examined MIs for possible sources of misspecification that merited considerations from a theoretical perspective or due to possible systematic

measurement errors. Byrne (2016) recommended examining MIs >10 as possible sources of model misspecification. In the initial measurement model, possible covariance occurred between the error variances of work-to-family interference and Harm Threat, with an MI of 31.45 and estimated parameter change (EPC) of 20.05. This covariance likely occurred due to systematic measurement error as three items of the harm threat indicator specifically assess the evaluation of work-to-family interference. Factors that influence reporting of work-to-family interference likely also affect reporting of appraisal of those items. These items were allowed to covary. Although the MI was 9.01 with an EPC of 12.61, I allowed the error variance of number of call types and trauma perceptions to covary as it is likely that systematic measurement errors occurred as the underlying appraised items on these scales were the same.

Several indicators also showed evidence of potential cross-loading with other latent variables, although, as noted by Byrne (2016), this condition is less than ideal. The traumatic perceptions indicator taps into the construct of traumatic antecedents, evidenced by an MI of 24.13 and EPC of 3.71. Because the traumatic perceptions indicator assesses specific appraisals of items used to also assess traumatic antecedents, it is likely that this indicator does double load. Using a similar rationalization, even though the MI was not included in AMOS output, chronic perceptions likely cross loads on chronic antecedents. The avoidance coping indicator showed evidence of cross-loading on multiple constructs: WFC (MI=12.32, EPC=.21), PTSS (MI=18.19, EPC=.18), and negative appraising (MI=11.59, EPC=.29). From a theoretical perspective and in looking at the items of both measures, substantive rationale for allowing avoidance coping to cross-load on WFC is not apparent. Content overlap does exist between the IES-R, used

to measure PTSS, and the avoidance coping subscales of the Brief COPE. For example, one item on the IES-R is “I felt as if it hadn’t happened or wasn’t real” (Weiss & Marmar, 1997), while one item on the Brief COPE is “I’ve been saying to myself ‘this isn’t real’” (Carver, 1997). Likewise, some of the items of the Brief COPE appear to assess appraisal of stressors, such as “…refusing to believe that it has happened” (Carver, 1997). These indicators were allowed to cross load. The first respecification demonstrated better fit than the initial measurement model as shown in Table 14; however, fit remained relatively poor.

Final Model

While it is possible that continued use of MIs to respecify the model may have resulted in better fit, SEM is intended to be a theory-driven process rather than a data-driven process. Its function is confirmatory rather than exploratory, and it seemed antithetical to the confirmatory, theory-driven purpose of SEM to continue using data to drive respecifications. Instead, the second round of respecification necessitated returning to the theory that shaped development of the research. Specifically worth noting is Lazarus and Folkman’s (1989) assertion that acute sources of stress, even major acute sources, do not factor into stress-related illnesses without considering the individual appraisals and responses of these events. Lazarus and Folkman (1989) specifically noted this to counter the premise of theorists such as Dohrenwend and Dohrenwend (1974), who focused on major life events and changes. Stehle Werner, Hanson Frost, Macnee, McCabe, and Hill Rice (2012) succinctly summarized this by noting of Lazarus and Folkman’s work "that it is not the major life events and changes that weigh on people's minds and *cause them stress and illness* but rather the day-to-day chronic buildup of

minor life demands or hassles" (p. 139, emphasis added). While a premise in building the original model was that parameter estimates for traumatic events would not add significant contributions to predicting PTSS, a theoretically plausible approach to looking at these data was to remove all trauma indicators and the latent variable of trauma antecedents. The previous modifications from the first respecification were left in place. Additionally, the error variances between the indicators of avoidance coping and avoidance PTSS were allowed to covary due to the likelihood of systematic measurement error on the highly similar items. The final model showed good fit, χ^2 (75, N = 103) = 96.50, p = .05; CFI = .97; SRMR = .05; RMSEA=.05 (90% CI [.01, .08], $p_{closefit}$=.42). Although the probability of chi square supports rejection of the null hypothesis that the data are a good fit to the model, this statistic is criticized for being too restrictive in SEM applications and for its sensitivity to sample size, though its reporting is standard practice (Byrne, 2016; Mueller & Hancock, 2010). Hu and Bentler (1995, 1999) initially supported a lower bound CFI value of .90 to demonstrate fit, as CFI performed consistently in maximum likelihood in small sample sizes (N < 250) when latent variance is independent, but revised this suggestion to .95 or greater to demonstrate fit. Additionally, Hu and Bentler (1999) recommended a standardized root mean residual (SRMR) cutoff value close to .08 to evaluate model fit. Ranges of fit using root mean square error of approximation (RMSEA) specify less than .05 as good fit, .05 to .08 as reasonable fit, .08 to .10 as mediocre fit, and .10 and greater as poor fit (Byrne, 2016). This model, shown in Figure 11 with standardized factor loadings, correlations between latent constructs and selected error terms, and squared multiple correlations (SMCs), demonstrated reasonable fit and was accepted as the final measurement model.

Correlations between observed factors are presented in Table 16 and correlation residuals in Table 17. Unstandardized factor loadings and standard errors, standardized factor loadings, critical ratios, SMCs, and probabilities for each indicator are presented in Table 18.

In summary, the confirmatory factor analysis results demonstrate adequate factor quality with some caveats. Although factor loadings for chronic stress perceptions on negative appraising and avoidant coping are problematic, all unstandardized path coefficients were significant at $p > .05$. The proportion of variance explained through examination of SMCs demonstrates that the observed variables are reliable predictors of their constructs, as discussed by Schreiber, Stage, King, Nora, and Barlow (2006), although five observed variables do fall below Mueller and Hancock's (2010) recommendation of .50. These included lack of coping self-efficacy (.38), physical conditions (.40), avoidance coping (.45), emotion-focused coping (.48), and family-to-work interference (.49). The remaining SMCs ranged from .55 (work-to-family interference and socially-supported coping) to .90 (hyperarousal symptoms). In interpreting the least reliable measure, for example, the construct negative appraising accounts for 38% of variance in lack of coping self-efficacy; conversely, PTSS accounts for 90% of the variance in hyperarousal symptoms. As a final assessment of model adequacy, correlation residuals were examined in accordance with Kline (2011) to determine if the sample correlations (Table 15) corresponded with model-implied correlations. Kline (2011) noted that the general rule of thumb is that correlation residuals should not have an absolute value of greater than 0.10. When this occurs, the model may not adequately explain the correlations observed in the sample. As seen in Table 17, 12

correlation residuals surpass this threshold, with many problem residuals appearing with socially-supported coping. In looking at standardized residuals generated by AMOS, none of these scores surpass an absolute value of 2, which, according to Kline, indicates that there potentially continue to be errors in specification in the model, that sample size is too small in relation to power to detect effects, or a combination of these. With evidence that the model has acceptable fit and that parameter estimates are significant and despite some concerns with residuals, the final measurement model was retained for evaluation of the structural model. Analysis of the structural model follows.

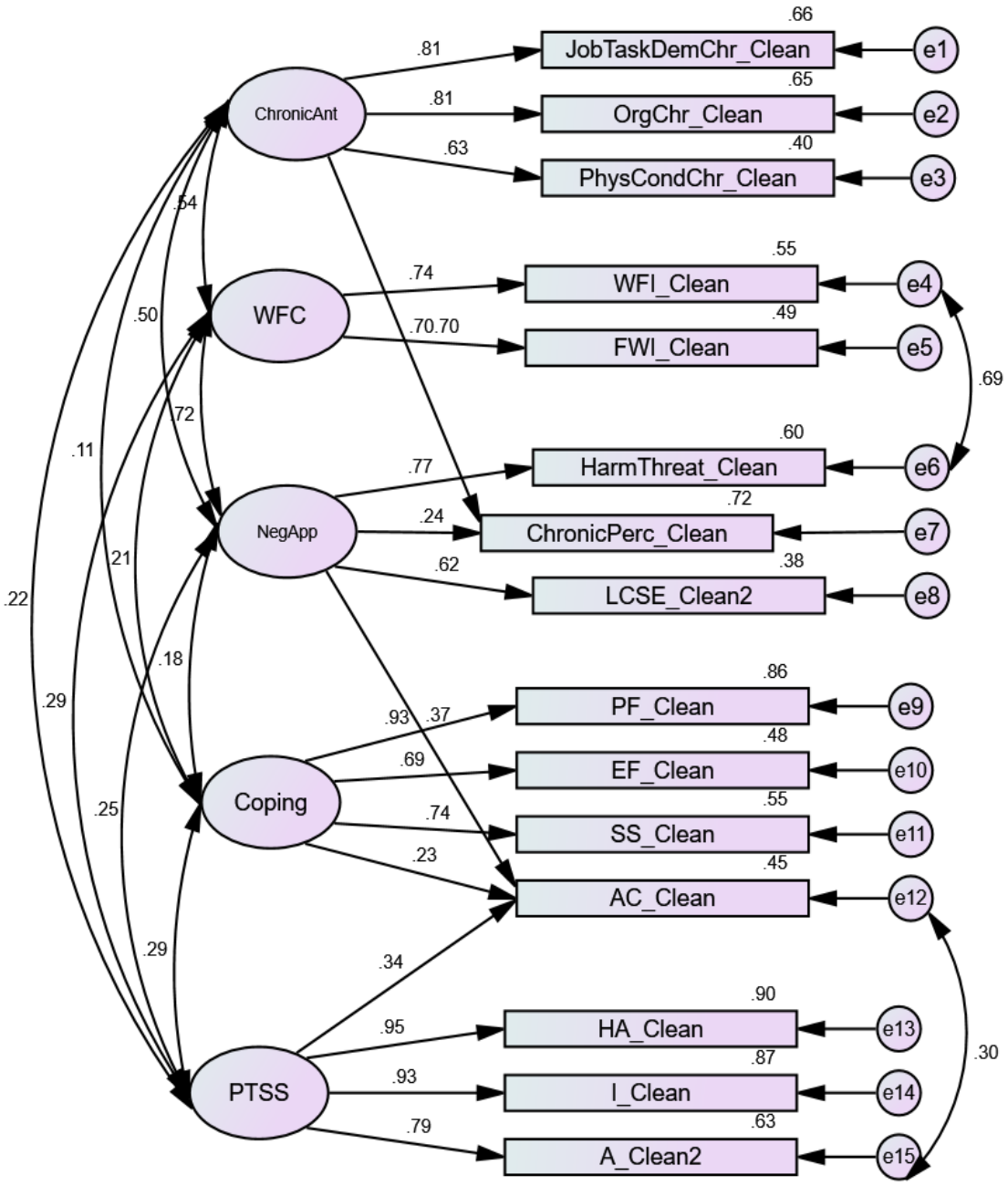

Figure 11. Final measurement model with standardized estimates.

Table 16

Sample Correlations of Observed Variables for CFA and SEM Analyses

Observed Variable		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Avoidance Symptoms	*r*	1.00	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	p															
2. Intrusion	*r*	**0.73****	1.00	---	---	---	---	---	---	---	---	---	---	---	---	---
	p	<.01														
3. Hyperarousal	*r*	**0.75****	**0.88****	1.00	---	---	---	---	---	---	---	---	---	---	---	---
	p	<.01	<.01													
4. Avoidance Coping	*r*	**0.53****	**0.47****	**0.48****	1.00	---	---	---	---	---	---	---	---	---	---	---
	p	<.01	<.01	<.01												
5. Socially Supported	*r*	0.11	**0.22***	**0.21***	**0.24***	1.00	---	---	---	---	---	---	---	---	---	---
	p	.27	.03	.03	.02											
6. Emotion-Focused	*r*	0.10	0.18	0.07	**0.22***	**0.54****	1.00	---	---	---	---	---	---	---	---	---
	p	.31	.07	.52	.03	<.01										
7. Problem-Focused	*r*	0.19	**0.29****	**0.26****	**0.37****	**0.68****	**0.64****	1.00	---	---	---	---	---	---	---	---
	p	.06	<.01	<.01	<.01	<.01	<.01									
8. LCSE	*r*	0.09	0.04	0.13	**0.34****	-0.03	0.06	0.10	1.00	---	---	---	---	---	---	---
	p	.38	.70	.19	<.01	.75	.52	.34								
9. Chronic Stress Perceptions	*r*	**0.27****	**0.25***	0.19	**0.33****	0.04	0.15	0.18	**0.40****	1.00	---	---	---	---	---	---
	p	<.01	.01	.06	<.01	.70	.13	.06	<.01							
10. Harm/Threat	*r*	0.16	**0.21***	**0.22***	**0.37****	0.00	0.11	0.11	**0.47****	**0.46****	1.00	---	---	---	---	---
	p	.11	.03	.02	<.01	.98	.26	.29	<.01	<.01						
11. FWI	*r*	0.12	**0.21***	0.13	**0.30****	**0.20***	0.19	0.18	**0.29****	**0.33****	**0.43****	1.00	---	---	---	---
	p	.23	.04	.17	<.01	.045	.06	.07	<.01	<.01	<.01					

(Table cont.)

12. WFI	*r*	**0.19***	**0.22***	**0.25***	**0.28****	-0.01	0.12	0.11	**0.33****	**0.36****	**0.71****	**0.54****	1.00	---	---	---
	p	.049	.02	.01	<.01	.90	.22	.27	<.01	<.01	<.01	<.01				
13. Phys.	*r*	0.08	0.11	0.14	0.04	0.11	0.17	**0.19***	0.16	**0.55****	**0.34****	0.19	**0.39****	1.00	---	---
Cond.	*p*	.40	.28	.17	.71	.26	.10	.05	.11	<.01	<.01	.051	<.01			
14. Org	*r*	0.14	0.18	0.12	**0.24***	-0.08	0.05	0.06	0.17	**0.66****	**0.35****	**0.27****	**0.32****	**0.50****	1.00	---
Factors	*p*	.15	.07	.22	.02	.42	.59	.58	.09	<.01	<.01	<.01	<.01	<.01		
15. Job/Task	*r*	**0.23***	0.18	0.14	**0.23***	-0.04	0.07	0.03	**0.31****	**0.66****	**0.33****	**0.36****	**0.39****	**0.48****	**0.66****	1.00
Demands	*p*	.02	.07	.16	.02	.69	.46	.75	<.01	<.01	<.01	<.01	<.01	<.01	<.01	

Notes. Items in bold are statistically significant. LCSE, Lack of coping self-efficacy; FWI, Family-to-work interference; WFI, Work-to-family interference; Phys. Cond., Physical Conditions; Org. Factors, Organizational factors.

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed)

Table 17

Correlation Residuals between Model-Implied and Sample Correlations of Observed Variables

Observed Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Avoidance Symptoms	0.00														
2. Intrusion	-0.01	0.00													
3. Hyperarousal	0.00	0.00	0.00												
4. Avoidance Coping	-0.01	0.00	0.00	0.00											
5. Socially Supported	-0.06	0.02	0.01	-0.05	0.00										
6. Emotion-Focused	-0.06	-0.01	**-0.12**	-0.06	0.03	0.00									
7. Problem-Focused	-0.02	0.04	0.00	0.00	-0.01	-0.01	0.00								
8. LCSE	-0.03	**-0.10**	-0.02	0.03	**-0.11**	-0.02	-0.01	0.00							
9. Chronic Stress Perc.	**0.10**	0.05	-0.01	0.01	-0.05	0.06	0.07	0.03	0.00						
10. Harm/Threat	0.01	0.03	0.04	-0.02	**-0.11**	0.01	-0.02	-0.01	0.00	0.00					
11. FWI	-0.04	0.02	-0.07	0.01	0.09	0.09	0.04	-0.02	-0.05	0.04	0.00				
12. WFI	0.02	0.02	0.04	-0.03	**-0.13**	0.01	-0.04	0.00	-0.05	0.00	0.02	0.00			
13. Physical Conditions	-0.03	-0.02	0.01	**-0.14**	0.06	**0.12**	**0.12**	-0.04	0.03	0.09	-0.05	**0.14**	0.00		
14. Organizational Factors	0.00	0.01	-0.05	0.01	**-0.15**	-0.01	-0.02	-0.08	0.00	0.03	-0.03	0.00	-0.01	0.00	
15. Job and Task Demands	0.09	0.01	-0.03	-0.01	**-0.11**	0.01	-0.05	0.06	-0.01	0.01	0.06	0.07	-0.03	0.01	0.00

Notes. Values in bold surpass the absolute value threshold of 0.10 recommended by Kline (2011). LCSE, Lack of coping self-efficacy; Perc., Perceptions; FWI, Family-to-work interference; WFI, Work-to-family interference

Table 18

Final Measurement Model Results

Latent Construct	Observed Variable	*B*	SE_B	*CR*	β	*SMC*	*p*
Chronic Antecedents	Job and Task Demand Chronicity	1.00			0.81	0.66	
	Organizational Factors Chronicity	0.56	0.07	8.44	0.81	0.65	< .01
	Physical Conditions Chronicity	0.18	0.03	6.38	0.63	0.40	< .01
	Chronic Perceptions	1.39	0.20	6.82	0.70	0.72	< .01
Work Family Conflict	Work-to-Family Interference	1.00			0.74	0.55	
	Family-to-Work Interference	0.64	0.13	4.89	0.70	0.49	< .01
Negative Appraising	Harm Threat	1.00			0.77	0.60	
	Chronic Perceptions	0.91	0.38	2.42	0.24	0.72	.02
	LCSE	2.06	0.42	4.95	0.62	0.38	< .01
	Avoidance Coping	0.25	0.07	3.74	0.37	0.45	< .01
Coping	Problem-Focused	1.00			0.93	0.86	
	Emotion-Focused	1.35	0.19	7.11	0.70	0.48	< .01
	Socially Supported	1.10	0.15	7.54	0.74	0.55	< .01
	Avoidance Coping	0.29	0.11	2.68	0.23	0.45	.01
Posttraumatic Stress Symptoms	Hyperarousal	1.00			0.95	0.90	
	Intrusion	1.44	0.09	15.64	0.93	0.87	< .01
	Avoidance	0.98	0.09	11.18	0.79	0.63	< .01
	Avoidance Coping	0.22	0.06	3.90	0.34	0.45	< .01

Notes. SE, Standard error; CR, Critical ratio; SMC, Squared multiple correlation; LCSE, Lack of coping self-efficacy

Results of Stage Two: Structural Model Analysis

The second phase of analysis examines fit of the a priori specified structural model to the data. However, as demonstrated in the measurement model phase, SEM analysis is iterative, requiring evaluation and reflection to address the numerous issues that tend to arise during the process (Byrne, 2016; Kline, 2011), and, even when issues are addressed, this does not ensure that a better fit "…means closer to truth in SEM" (Kline, 2012, p. 124). To align with the respecification of the measurement model, the structural model was modified prior to estimation. The original model, presented earlier in Figure 8, included the latent construct traumatic antecedents and the observed variable

traumatic stress perceptions. The modified path model, presented below in Figure 12, addressed the change from the measurement model due to reconsidering the transactional theory of stress and coping that justifies exclusion of acute stress and trauma.

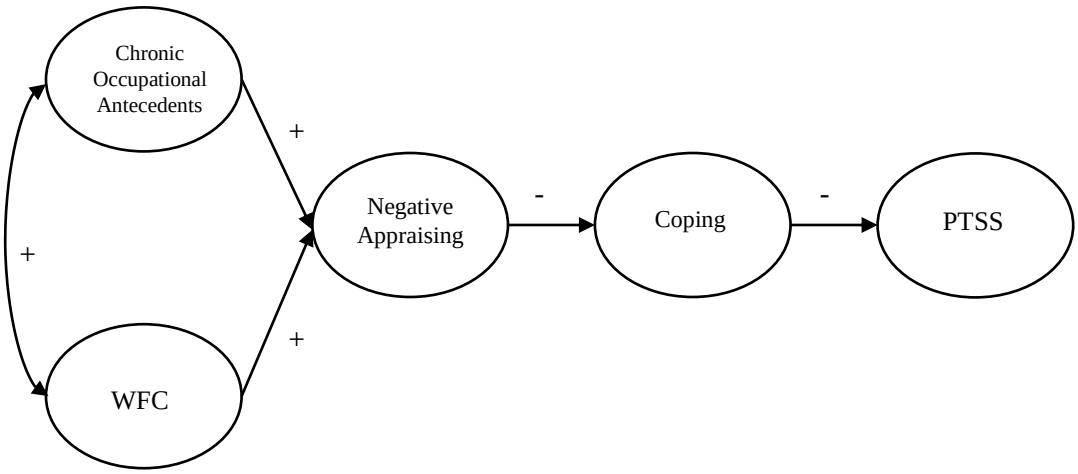

Figure 12. Modified path model of the transactional theory of stress and coping in posttraumatic stress symptom expression in telecommunicators with hypotheses for paths indicated. WFC, work-family conflict; PTSS, posttraumatic stress symptoms.

In addition to the change to latent constructs, specified error covariations and cross-loadings were retained in the structural model. I used maximum likelihood to estimate parameters, which converged on a solution. The modified model appeared to be an acceptable fit to the data: χ^2 (80, N=103) = 102.81, p = .04, CFI = .97, SRMR = .08, RMSEA = .05 (90% CI [.01, .08], $p_{closefit}$ = .42). Although the chi square estimate was significant, additional fit statistics demonstrated adequate model fit. No additional modifications were made. Figure 13 provides the results for the structural equation model.

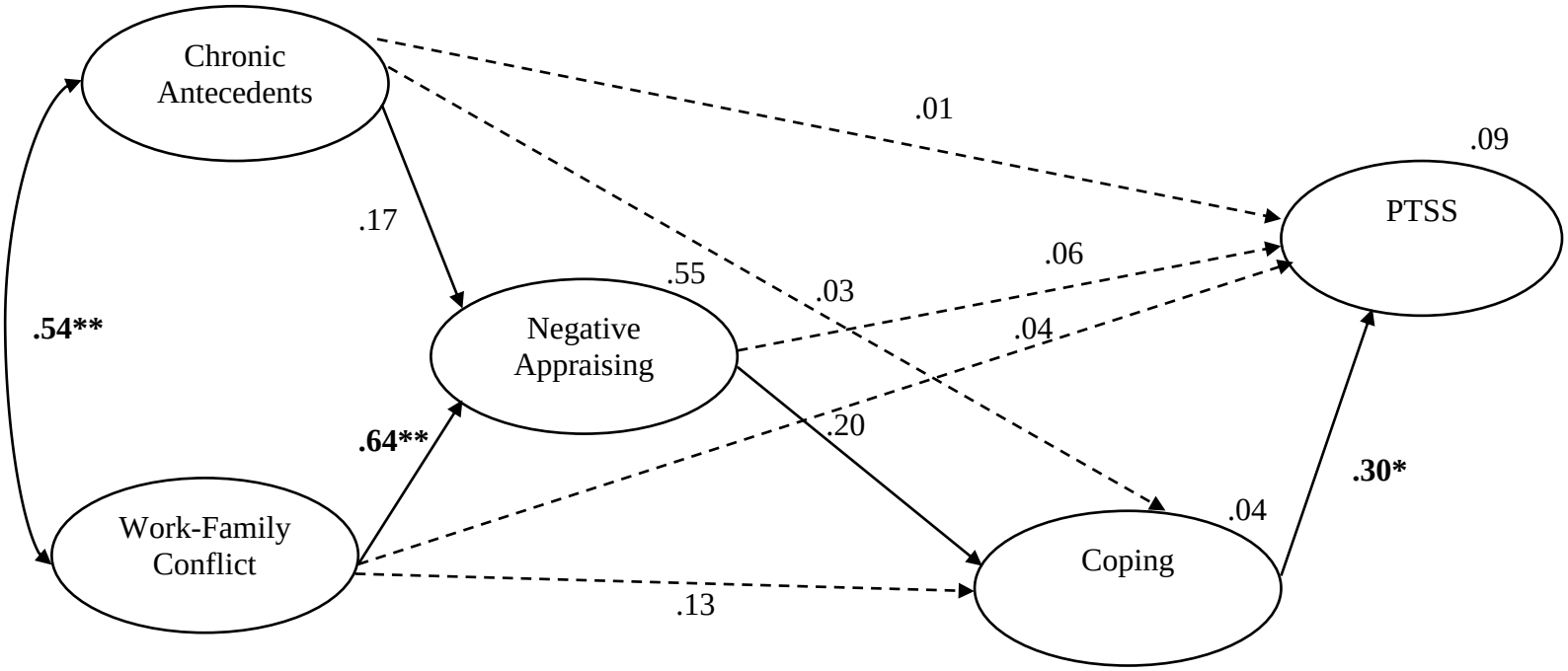

Figure 13. Indirect and direct effects in the transactional theory of stress and coping. Results of structural equation model estimation: χ^2 (80, *N*=103) = 102.81, *p* = .04, CFI = .97, SRMR = .08, RMSEA = .05 (90% CI [.01, .08], $p_{closefit}$ = .42). Statistically significant effects are in bold. Solid lines reflect direct effects; dotted lines represent indirect effects. Squared multiple correlations presented next to latent constructs. Standardized estimates are shown. * = *p*=.01; ** = *p* < .001. PTSS, posttraumatic stress symptoms.

Parameter Estimates and Hypotheses Testing

The remainder of the analysis will focus on the results of structural equation model as estimates for observed variables were presented previously in Table 16. Initial review of unstandardized and standardized estimates of path coefficients (Table 19) showed no Heywood cases (no negative variance estimates or estimated correlations greater than an absolute value of 1 [Kline, 2011]). Two paths in the structural model did not achieve statistical significance: Chronic Antecedents → Negative Appraising (p = .20) and Negative Appraising → Coping (p =.10). In looking at Negative Appraising, it shared a strong positive relationship with WFC (β = .64, p < .01). WFC also shared a strong positive correlation with Chronic Antecedents (r = .54, p < .01), showing 28.62% common variance. In total, these two predictors explained 55% of the proportion of variance in Negative Appraising, suggesting that very little unique variance was left to be explained by Chronic Antecedents. The Negative Appraising → Coping path may have failed to reach statistical significance due to the small sample size of the study and the effects this can have on parameter estimates and standard errors. The remaining paths were statistically significant and positive, which is contrary to some of the hypotheses, and will be discussed further below and in Chapter 5.

Table 19

Structural Model Results

Construct	Relation	Construct	*B*	SE_B	*CR*	β	*p*
Chronic Antecedents	↔	WFC	32.49	9.25	3.51	0.54	<.01
Chronic Antecedents	→	Negative App.	0.08	0.07	1.30	0.17	.20
WFC	→	Negative App.	0.59	0.14	4.10	0.64	<.01
Negative App.	→	Coping	0.11	0.06	1.65	0.20	.10
Coping	→	PTSS	0.57	0.21	2.77	0.30	.01

Notes. Negative App., Negative appraising.

SMCs provide estimations of the proportion of the variance explained by the latent constructs. The structural model explained 54.7% of the variance of negative appraising, 4% of the variance of coping, and 9% of the variance in posttraumatic stress symptoms.

SEM provided the opportunity to evaluate a priori hypotheses and to infer causal statements rooted in the underlying theory. The alternative hypotheses for direct effects and their results appear in Table 20.

Table 20

Alternative Hypotheses for Direct Effects and Results

Hypotheses	*β*	*p*	Conclusion
$H1_a$: There is a positive and statistically significant relationship between chronic occupational antecedents to WFC.	0.54	<.01	Retain
$H2_a$: There is a positive and statistically significant path from chronic occupational antecedents to negative appraising.	0.17	.20	Reject
$H3_a$: There is a positive and statistically significant path from WFC to negative appraising.	0.64	<.01	Retain
$H4_a$: There is a negative and statistically significant path from negative appraising to coping.	0.20	.10	Reject
$H5_a$: There is a negative and statistically significant path from coping to posttraumatic stress symptoms.	0.30	.01	Partially Reject

A statistically significant, positive relationship exists between chronic occupational antecedents and WFC ($\beta = .54$, $p < .01$). These two constructs show 28.62% shared variance and indicate that as telecommunicators report more chronic sources of stress they also report more conflict between family and work roles. The path coefficient from WFC to negative appraising is statistically significant and positive ($\beta = .64$, $p < .01$). Negative appraising had a positive effect on coping, which was contrary to the predicted direction; however, the path coefficient did not reach significance as discussed previously. Coping had a statistically significant effect on PTSS ($\beta = .30$, $p = .01$); however, the direction was positive, which was unexpected. In looking at the unstandardized loadings, this means that for every unit increase in a telecommunicator's coping score, an expected 0.57 increase in PTSS score would occur. The implications of this will be discussed further in Chapter 5 as it has bearing on recommendations for stress management and debriefing as well as implications for changes in policy at local, state, and national levels.

Indirect effects, shown in Table 21 and Figure 13, were also examined. Indirect effects are the products of path coefficients that do not pass directly from one construct to another, such as the indirect path from chronic antecedents to PTSS, and are interpreted as path coefficients. Bootstrapping techniques can be used to estimate significance of indirect effects (Kline, 2011). With 500 bootstrap samples and 95% bias-corrected confidence level, none of the indirect paths demonstrated statistically significant effects. Additional mediational analysis was not conducted as direct paths from chronic antecedents and WFC to coping or PTSS or from negative appraising were not defined as

free parameters; however, the lack of significance of indirect effects may demonstrate a true lack of effect in this population or may be a remnant of the issues with reliability of some measures and sample size, as discussed by Hoyle (2011).

Table 21

Indirect Effects and Statistical Significance

Construct	Relation	Construct	*B*	β	*p*
Chronic Antecedents	→	Coping	.01	.03	.18
Chronic Antecedents	→	PTSS	.01	.01	.12
WFC	→	Coping	.06	.13	.16
WFC	→	PTSS	.04	.04	.11
Negative App.	→	PTSS	.06	.06	.11

Notes. Negative App., Negative appraising.

Summary

The purpose of this study was to examine the degree to which the transactional theory of stress and coping predicts PTSS in telecommunicators by examining the effects of traumatic occupational antecedents, chronic occupational antecedents, and WFC, mediated by appraisal and coping, on PTSS. SEM served as the quantitative framework for the analysis of data and model fit. Using SEM principles, a theory-driven model was specified and then tested in two stages against data collected from a nationwide sample of telecommunicators. This chapter provided a discussion of data collection, descriptive statistics, preliminary analyses of the measures, and the results of the confirmatory factor analysis and SEM analyses.

The measurement model did not demonstrate good fit and required respecification. The first respecification was derived largely from modifications suggested by statistics, leading to a data-driven respecification that was less informed by

theory and was no longer confirmatory but exploratory. The first respecification did not demonstrate good fit either, and further attempts to respecify using data were abandoned. Instead, the third model resulted from a review of the theory and examination of the included latent constructs and observed variables. From this review, I decided to remove the traumatic occupational antecedents and the observed traumatic stress perceptions from the model. Additional error covariances and factor cross-loadings were retained from the second model respecification out of consideration for likely systematic measurement error and content overlap. This model demonstrated acceptable fit and was retained as the measurement model used in the structural model analysis phase. The initially specified structural model was altered as a result of the measurement model. The measurement aspects of this change were discussed, but the modifications affected the path model as well, specifically with the traumatic occupational antecedents removed as a covariate with chronic occupational antecedents and WFC and as a predictor for negative appraising. The structural model demonstrated acceptable fit, allowing for evaluation of parameter estimates and further hypothesis testing.

From the original model, three hypotheses were removed, including the hypothesized relationship between traumatic occupational antecedents and chronic occupational antecedents, traumatic occupational antecedents and WFC, and traumatic occupational antecedents and negative appraising. Results indicated significant positive relationships for all but two paths. The path from chronic occupational antecedents to negative appraising was positive but did not reach significance as did the path from negative appraising to coping. The first path likely did not reach significance due to

shared variance with WFC and the large proportion of variance in negative appraising explained by WFC. The path from negative appraising to coping likely did not reach significance due to the small sample size of the study and being underpowered. This path also showed a positive relationship, though I had predicted that the relationship would be negative. The implications will be discussed in Chapter 5, but it suggests that when threat and harm appraisals occur, a telecommunicator employs more techniques to cope with those appraisals. The path from WFC to negative appraising was predicted to show a positive relationship, which was supported. Telecommunicators who experience more conflict in their social roles evaluate their situation more negatively than those who experience less conflict. The path from coping to PTSS was hypothesized to show a negative relationship. The results indicated a significant relationship; however, it was positive. This means that telecommunicators who are employing more coping are more likely to experience symptoms of posttraumatic stress, which runs contrary to theoretical implications of the importance of using coping to deal with stressors in acute stress situations. In SEM, it is important to acknowledge that just because the data fit one model does not mean that the data may not fit another model just as well, potentially providing support for a competing theory or conflicting interpretations. Although alternative models were not tested, several other theories, including COR, may not just adequately fit the data but may provide a better fit. However, when interpreted within the causal foundations of SEM, the current study cannot reject the plausibility of the transactional theory of stress and coping in predicting PTSS in telecommunicators. I continue the discussion of these issues in Chapter 5 by providing limitations and additional

interpretation of the findings, including recommendations and implications for social change.

Chapter 5: Discussion

The purpose of this study was to address the research question assessing the degree to which the transactional theory of stress and coping predicts PTSS in telecommunicators by examining the effects of occupational antecedents and WFC on PTSS via a path through negative appraisal and coping.

Research exploring the effects of acute stress on posttraumatic outcomes is common in the traumatic stress literature and has enhanced understanding of factors leading to traumatization. Previous research has demonstrated risk following exposure to potentially traumatic events in telecommunications; however, very few studies have examined the occupational experiences of telecommunicators. While previous studies have examined relationships between potentially traumatic events, personality factors such as worldview, and coping mechanisms on trauma outcomes in this population, none have specifically addressed the concept of appraising. Similarly, much research has focused on the buffering effects of family and social support in the development and treatment of PTSD in diverse populations; however, this relationship has not been explored in telecommunicators, and the current study addressed this through examination of the effect that WFC exerts on symptoms of traumatization. Additionally, research generally focuses on clinical impairment through the diagnosis of PTSD, yet this leaves vulnerable those members of the population who may be suffering adverse effects of traumatic exposure but who do not meet clinical thresholds of posttraumatic distress. Finally, through the use of SEM, I sought to frame occupational PTSS in telecommunicators through the lens of the transactional theory of stress and coping to

assess if this was a plausible model for identifying and predicting risk and to expand the contemporary literature, thus providing support for driving the development and implementation of social change programs and initiatives to promote and protect telecommunicator health.

To achieve these desired goals, I sent invitations to participate in a study to 194 agency heads across the United States, of which 16 agreed to forward the information. This recruitment led to an initial recruitment pool of 486 telecommunicators, and 141 participants recorded responses. Following eligibility screening and data screening and cleaning, a sample of 103 telecommunicators provided complete surveys used in analysis. As described in detail in Chapter 4, I employed two-phase SEM to analyze the fit of the model to the data. Initial results indicated that the measurement model demonstrated poor fit, leading to respecification. Respecification led to the removal of traumatic occupational antecedents and appraisals, consistent with Lazarus's (1999, 2012) initial conceptualization of the importance of daily hassles over major life events in stress outcomes, as well as adjustments to cross-loadings of observed variables to latent variables and covariance among error terms. Respecification led to a model with acceptable fit, which was used for the structural model analysis. The structural model demonstrated acceptable fit to the data and was used for additional interpretation. Overall, findings showed a significant positive relationship between chronic occupational antecedents and WFC and significantly supported the direct effect that WFC has on negative appraising and that coping has on PTSS. The model explained 9% of the variance observed in PTSS in telecommunicators. The remainder of this chapter will

provide limitations of the study, which frame and drive additional interpretation of the findings, recommendations for future research, and implications for social change.

Limitations of the Study

As a plausible model for predicting PTSS in telecommunicators, the generalizability of the results necessarily becomes a function of the methodology employed, the population under investigation, and the theorems inherent in the model. Namely, Lazarus's (2012) theorems allowed the following causal inferential statements: that antecedents are significantly related to one another, that more WFC leads to more negative appraising, and that more coping efforts lead to more PTSS in this population. The nonsignificant paths between chronic occupational antecedents and negative appraising and between negative appraising and coping are a limitation of this research as they may represent a true effect in the population or may be an artifact of methodological issues arising from the scales and measures used or the small sample size. As with any research in the social sciences, additional limitations arose from the methodology employed and with regard to the population, sample, and sample size.

Methodological Limitations

A key concern in this research involved the measures selected for use. Research in telecommunicators is limited, and few of the scales and measures used in this research have been identified as used exclusively with this population, which means that reliability comparisons are limited. Cronbach's alpha provided initial support for some measures but confirmed previously documented issues with others. For example, examination of the results from the Brief COPE show that parcels of items based on Carver's (1997)

original two-item subscales likely influenced the results with some items showing unexpected negative correlations, which also occurred with items on the WFC scale. Parceling remains a controversial approach in SEM, although it is widely used (Bovaird & Koziol, 2012). Parceling assists in making ordinal variables more closely approximate interval levels of measurement; however, the procedure can mask issues with multidimensionality and model specification, affecting goodness-of-fit and parameter estimates (Bandalos, 2002; Bovaird & Koziol, 2012).

The results of the FFCSE revealed issues with reliability as well. Although Cronbach's alpha was high (.93), the SMC was the lowest in the model at .38. The high Cronbach's alpha may be an indicator of reliability in assessing internal consistency but also may reflect the large number of items on the scale and the limitation of the procedure to account for multidimensionality and possibly correlated error terms, as discussed by Green and Salkind (2010) and Raykov (2012). Along these lines, it is possible that the measures, which were selected for cost-effectiveness and ease of use, were not appropriate for use in this population or for this purpose. The Brief COPE, for example, was developed for assessing how people coped with facing the diagnosis of an illness (Carver, 1997, 2007a). Altering the instructions to bring to mind the most stressful occupational incident, though supported by Carver (2007a), may not accurately capture appropriate coping strategies for work-related stressors. Finally, it is likely that retrospective bias, as discussed by Groves et al. (2009), may have emerged in evaluating perceived stressfulness of events that may have occurred at an earlier point in their career , as appears to have happened with acute and chronic sources of stress. As time passes

from a recall event, respondents may fill in memory blanks with guesses about how they would have acted or behaved based on how they view the question presently. For example, individuals who have not experienced sexual harassment, a chronic antecedent event, recently may believe that this source of stress would not affect them that negatively if it were current or ongoing, which is contrary to the appraisals made by telecommunicators who experienced sexual harassment as a current and regular source of stress.

Future studies should employ a larger sample pilot study to validate factor structure and demonstrate reliability and early indices of convergent and discriminant validity of measures. If this is not possible due to population access or time or money constraints, researchers should endeavor to obtain a large enough sample size to conduct preliminary factor analyses to validate factor structures of proposed parcels prior to analysis of the measurement model. One potential recommendation may be that two-phase SEM should more appropriately consist of three stages, with the first phase consisting of confirmatory factor analysis to validate individual subscales and parcels, the second phase consisting of confirmatory factor analysis of the measurement model, and the third phase consisting of analysis of the structural model.

Population, Sample, and Sample Size

Access to this population continues to be problematic, and this contributed to a limitation of this study. No directory of telecommunicators exists, and although national organizations are dedicated to telecommunicators, membership is voluntary, and members may not accurately represent the population as a whole. Social media groups for

telecommunicators also exist; however, many of these groups are open, and membership in these groups is not well-defined. To attempt to control for this, I used a national law enforcement directory to select agencies across the United States randomly. This introduced additional limitations, specifically that the sample, though voluntary, is a non-randomized convenience sample, affecting external validity (Frankfort-Nachmias & Nachmias, 2008), that likely violated the statistical assumption of independence. Several participants demonstrated this violation in identifying as a worst call the same incident. Future research would benefit from using multi-level analysis to examine and address the effect this may have on results.

An interesting addition to differences within this population emerged during analysis of occupational demographics that may merit additional exploration in future research. In the current study, I requested the types of agencies for which telecommunicators dispatched. In this study, 83 participants (80.6%) provided services for police, ambulance, and fire, and 64 participants (62.3%) dispatched services for a combination of tribal, federal, state, county, and municipal police agencies. With each additional agency served, a telecommunicator must know the policies and procedures of that department, which affects call-processing and handling. Furthermore, although there are some similarities between most call centers, each center is arranged very differently in terms of physical layout, access to management, ability to interact with others during calls, staffing needs, and other characteristics dictated by policy and agency. For example, Rothstein (2012) described her call center as consisting of several pods where calltakers, police dispatchers, and fire/ambulance dispatchers worked separately.

Interactions between pods was possible during breaks, but face-to-face inter-pod communication needed to be deliberate and intentional. From personal experience, the layout of a call center that has since been consolidated to a regional center consisted of two dispatch consoles where telecommunicators would sit with their backs to one another when working together, which hindered communication during emergent events; however, staffing was so limited that telecommunicators often worked with only one person on a shift. While Rothstein's agency was a primary public service answering point, the other agency was not, which means it was not equipped with 9-1-1 location and service provider resources. It is likely that the processing of emergent and emergency calls differs substantially between larger and smaller departments, the types of agencies dispatched, the equipment and training available, and other organizational factors.

These differences are likely a limitation to this research as demographic information was not included in the model, and it is unknown the degree to which the respondents in this study characterize telecommunicators in general. Looking at these differences may provide additional information on the organizational factors influencing appraising and coping in telecommunicators. An addendum to this limitation of omission of demographics is acknowledging that gender and years of experience were not included in model respecification, as previous research has indicated both are possible confounders in trauma research and in telecommunicators (e.g., Martin, 2016). These variables were not included due to identification of an acceptable model. Unknown comparisons between the sample and the population represent a possible threat to external validity and the ability to generalize results (Frankfort-Nachmias & Nachmias, 2008), while omission

of key variables from the model, a left-out-variable-error, discussed by Kline (2011), presents threats to internal validity and the ability to replicate results.

Another limitation meriting acknowledgement is that those who responded to the invitation to participate may differ from those who did not participate, representing a threat to internal validity (Frankfort-Nachmias & Nachmias, 2008). This issue may have particular bearing on two observed variables of avoidance coping and avoidance PTSS: Individuals using avoidance techniques or experiencing avoidance symptoms may show more absenteeism as a way of managing distress associated with the workplace as trauma exposure corresponds with employment outcomes (e.g., Martin, 2016; Maskin, Iverson, Vogt, & Smith, 2018; Sliter et al., 2013). Future research would benefit from employing objective measures to assess avoidance in the workplace as it relates to occupational PTSS and PTSD.

Similarly, although the anonymous design of the survey helps ensure confidentiality, participants may have guessed the purpose of the study and, consciously or otherwise, answered in a socially-desirable manner or in a way that may be believed to influence the outcome of the study. Questions about alcohol and drug use, for example, may result in underreporting (Groves et al., 2009). Furthermore, the order of questions and length of survey may have contributed to response effects, an issue noted by Groves et al. (2009). Both of these conditions, if they occurred, would have an effect on internal validity (Frankfort-Nachmias & Nachmias, 2008).

As most researchers and statisticians agree that SEM is a large sample methodology, the final 103 completed surveys did not meet the minimum acceptable

sample size of 104 respondents, which was a concession to the larger desired sample size of 230 participants. In addition, the removal of variables and changes to degrees of freedom altered the power analysis, leading to a recommended minimum of 160 participants and a final power of .56, according to Preacher and Coffman's (2006) power analysis software. In SEM, small sample size introduces bias and error in parameter estimates, which in turn affects model fit and the accuracy of inferences from those parameters (Kline, 2011). The failure to reach statistical significance in the path from negative appraising to coping likely reflects the study being underpowered. Alternatively, a small sample in a model with a large number of free parameters and few observed variables may provide unreliable results due to what Lee et al. (2012) cited as the "…capitalization on chance (MacCallum, 1986; MacCallum, Roznowski, & Necowitz, 1992)" (p. 191). Because the sample size was small, Kline's (2011) recommendation to cross-validate analyses was not possible, further limiting the ability to assess and ensure reliability and validity of results (Camstra & Boomsma, 1992).

Recommendations for Future Studies in Relation to Methodological Limitations

In addition to recommendations provided above, future studies would benefit from inclusion of non-self-report observations and in making use of confirmatory or exploratory factor analysis to identify appropriate factor structure of measures used. Additionally, researchers could consider validating the APA's (2013) four-factor symptom structure of PTSD in telecommunicators. To be discussed further below, it is possible that avoidance symptoms look different in this population where avoidance behaviors may not be possible but avoidance thoughts may emerge as a significant

impairment in functioning. As PTSS are not the only likely response to potentially traumatic events (Forman-Hoffman et al., 2018), I also strongly recommend future researchers consider looking at other physical, emotional, social, and cognitive sequelae resulting from exposure to potentially traumatic events, which could incorporate assessment of physiological measures of stress. Lastly, future researchers would do well to design and evaluate scales and measures that more appropriately capture the experiences of telecommunicators if engaging in survey research. While the results of this study revealed much, the study would be stronger if the measures could have captured what was intended without retrospective biases, response effects and social desirability, and concerns with validity and reliability.

Despite the limitations that emerged during the study, the fit of the model provides important information about the relationships between occupational stressors, appraising, coping, and PTSS in telecommunicators and highlights the relevance of the transactional theory of stress and coping in predicting PTSS in this population. In addition, these findings identified key areas that are amenable to change within organizational structures that may assist in reducing risk for traumatic distress and traumatization in the event of a potentially traumatic event, which are discussed next. Finally, the limitations themselves offer opportunities for furthering research in the field of traumatology, with telecommunicators, and within the SEM framework.

Interpretation of the Findings

Implications of Trauma Exposure

Although the model did not support the inclusion of traumatic occupational antecedents, aspects of these experiences merit additional interpretation due to potential implications and to frame the work within the larger body of trauma research. Traumatic antecedents and traumatic stress perceptions significantly correlated to chronic antecedents, chronic stress perceptions, and intrusion and avoidance, but not hyperarousal, symptoms. These relationships further support the assertion that chronically stressed dispatchers are at increased risk of traumatization following exposure to an acute stressor.

Additionally, as a self-report questionnaire employing mostly Likert-type scale responses, the research questionnaire did not lend itself to in-depth exploration of telecommunicator perceptions and lived experiences; however, some respondents used fill-in blanks to elaborate concerns, express thoughts, or share their experiences. Some used this space to identify issues with traumatic occupational research focusing on specific incident types as noted in Chapter 4, whereas others noted that their lived experiences likely affect how they interpret and react to potentially traumatic events. These responses further support the recommendations that follow.

From these responses and the results of the Potentially Traumatic Events Scale and as noted by Troxell (2008), Lilly and Pierce (2013), and Pierce and Lilly (2012), telecommunicators routinely handle many types of calls throughout their careers that place them at risk for traumatization, but it is not well understood what contributes to

individual appraisals of a traumatizing event. In self-reported calls, telecommunicators would identify features of calls rather than the type of call as being a primary component of the traumatizing nature of the call. For example, some respondents reported traumatizing and potentially traumatizing calls shared features with events that occurred in their personal lives or that the inability to act led to the potentially traumatizing nature of the call. As a possible act of omission or an act of inaction, these events may be particularly traumatizing (Williams & Berenbaum, 2018). Troxell (2008) noted this in her analysis of telecommunicators as well: Telecommunicators' ability to relate to the circumstances of a call, their relationship with the caller or first responder, and the qualities of the call that affect their ability to process information efficiently appear to contribute more significantly to feeling traumatized than the call itself. Rothstein (2012) eluded to this when she noted in her work examining storytelling in telecommunicators that questions like "What is the worst call you have ever handled?" are problematic for dispatchers and calltakers because the worst call is either too horrific to recount or does not lend itself to understanding by those outside of the profession as to what would make the call rank as the worst of a telecommunicator's career. In looking at the IES-R, the request to identify and reflect on a specific incident may have triggered these concerns in participants or as one respondent noted, may have been a difficult request to process because there were too many terrible incidents to select just one that would lead to traumatization. Another participant commented that many of the incidents blend together and fade over time and are difficult to recall without specific questions or reminders. This astute observation corresponds with current literature in traumatic stress that emphasizes

altered memory circuits in the processing, storage, and retrieval of traumatic events (Lipov, Kelzenberg, Rothfeld, & Abdi, 2012). Alterations in memory processes may be related to biochemical and neuroimmunological functions occurring through the course of traumatizing events (Kimble, Sripad, Fowler, Sobolewski, & Fleming, 2018; Lipov et al., 2012) and may be of particular relevance for future studies due to the dynamic nature of significant and emerging events in first responder situations.

Several respondents indicated that features of the calls that complicated rescue and response contributed to the traumatic nature of the event. Examples included the inability to identify a caller's location, to break through a language barrier, to intervene in time with appropriate responses, or to save a life. An area of future research with this population would be to explore the role of shame and guilt in traumatization and PTSS. The APA (2013) introduced negative changes to thoughts, including blame and shame, to the *DSM-5*, and contemporary research (e.g., Babcock Fenerci & DePrince, 2018; DeCou, Mahoney, Kaplan, & Lynch, 2018; Held et al., 2018; Lancaster, 2018) supports the strong relationship between cognitive-affective appraisals and negative posttrauma outcomes.

Recommendations for future studies in relation to trauma exposure in telecommunicators. Although traumatic antecedents and perceptions were omitted from the final model in this study, additional exploration of the nature of traumatization in this population is warranted. Furthermore, because exposure to trauma is a diagnostic criterion for clinical PTSD (APA, 2013) and remains a critical component of much contemporary research (e.g., Forman-Hoffman et al., 2018; Frost et al., 2018; Keshet,

Foa, & Gilboa-Schechtman, 2018; Liu & Kia-Keating, 2018; Williams & Berenbaum, 2018), understanding exposure to potentially traumatic events and telecommunicator views of potentially traumatizing events remain an appropriate and necessary, though under-explored and misunderstood, avenue of research. In reviewing the traumatic stress literature catalogued by PTSDpubs (the renamed PILOTS database maintained by the United States Department of Veterans Affairs), of the 971 articles catalogued for 2018, only one article specifically mentioned dispatchers in the title (Klimley, Van Hasselt, & Stripling, 2018). Not all abstracts were reviewed, nor were duplicates omitted from this initial list, but this suggests a continued dearth of research on the experiences of telecommunicators. Additionally, it may be worth further exploring differences between what researchers or clinicians identify as potentially traumatizing events and what telecommunicators identify as traumatizing. This distinction shares similarities with contemporary research exploring types or categories of trauma in relation to symptom expression in other populations (Frost et al., 2018; Kaufman, Allbaugh, & O'Dougherty Wright, 2018; Keshet et al., 2018). Telecommunicators identify several types of research-defined potentially traumatizing events as routine. Therefore, these types of calls may serve as a possible chronic source of stress rather than as an acute stressor. This may contribute to traumatization when a routine, or recurrent, call becomes emergent or may be reflected in the significant relationships between chronic and traumatic sources of stress and appraisals. In this study, telecommunicators recognized that domestic calls, indicated as having been handled by 98.1% of respondents (n=101), were only a little stressful (M=1.93, SD=1.41), somewhat unpredictable (M=2.10, SD=1.46), and a little

novel (*M*=1.54, *SD*-1.45). However, this should be looked at in context. In 2017, the FBI (2018a, 2018b) summarized circumstances surrounding the deaths of 39 of the 46 law enforcements officers who were feloniously killed on duty. Six of these deaths followed what began as domestic incidents (FBI, 2018b). Telecommunicators in the current study indicated that line of duty deaths, though rarer having been handled by 26.2% of respondents (*n*=27), were quite stressful (*M*=4.67, *SD*=0.68), quite unpredictable (*M*=4.81, *SD*=0.48), and extremely novel (*M*=5.00, *SD*=0.00), and 10 respondents noted line of duty deaths as the most stressful call they handled in their career. Better understanding is needed of the path to traumatization that occurs when a common or routine call type or chronic caller evolves into a differently appraised event and how this intersects with personality, temperament, and experience features salient to personal antecedents. This idea mimics the sentiments shared by the telecommunicators themselves who took the opportunity to explain that call types themselves are not a good method of understanding the telecommunicators' lived work experiences because traumatizing calls tend to be dynamic and evolving and include many features besides the nature of the call itself. Additional phenomenological research may provide telecommunicators a better opportunity to understand and share the lived experiences of their work.

Social change implications. Direct recommendations for initiatives or programs for social change related to exposure to potentially traumatizing events for telecommunicators is beyond the scope of this study. However, this study does emphasize the need for continued methodologically rigorous research examining trauma

experiences, appraisals, and resolution in telecommunicators. Rothstein (2012) noted that storytelling serves a therapeutic purpose for telecommunicators in reconciling traumatic events, which is consistent with work demonstrating the pathways for trauma resolution through journaling (Vrana, Bono, Konig, & Scalzo, 2018), and a possible social change implication would be to expand on these works and initiate programs that evaluate trauma experiences and resolution in telecommunicators.

Implications of the Transactional Theory of Stress and Coping in Telecommunicators

The literature review revealed that previous research with telecommunicators had identified increased risk for negative sequelae from exposure to potentially traumatic events but that they did not distinguish between antecedents and appraisals within the framework of the transactional model of stress and coping nor have they developed predictive models for assessing risk looking at chronic occupational antecedents and WFC, negative appraising, and coping in PTSS. By framing the work within the transactional model of stress and coping, I attempted to address this gap by incorporating into the predictive model the sequential and cognitive components described by Lazarus (1999, 2007, 2012): characteristics of antecedents, harm/threat and loss appraisals, and long term outcomes.

The current study supported previous assertions (i.e., Bandura & Benight, 2004; Carver et al., 1989) that appraisals and coping influence adaptation to perceived stress. Like Latter's (2003) work with dispatchers, the current study supported the statistically positive effect that coping has on occupational outcomes. However, Latter focused on

negative coping strategies and their effect on vicarious trauma and burnout. In contrast to Latter's work, the current study supported Carver and Scheier's (1994) results in which coping styles, regardless of their designation of adaptive or maladaptive, did little to reduce long term negative distress for those who experienced more antecedents and more negative appraising. Carver and Scheier's work not only supports the current findings but also helps to explain the positive, though nonsignificant, relationship between negative appraising and coping. Regardless of coping styles employed, telecommunicators who anticipate negative consequences from their work, who evaluate their chronic stressors and WFC as personally taxing, and who question their ability to cope engage in more coping efforts that are unsuccessful in relieving distress, resulting in more PTSS. When facing chronic stressors that cannot be managed effectively through individual efforts, telecommunicators may anticipate future harm and threat, triggering additional coping demands. In the face of increasing coping demands without successful resolution of stressors, as evidenced, for example, in the chronicity of some occupational stressors, telecommunicators may suffer the negative psychological consequences of traumatization observed in increased PTSS. Future research would benefit from including a feedback loop in a non-recursive model, looking at the amount of variance explained by coping efforts on negative appraising and in looking at other long term physical and mental outcomes, such as cardiovascular health, obesity and metabolic syndrome, cancer diagnoses, reproductive health, and depression.

Relationship between chronic occupational antecedents and WFC. In the current study, data provided by telecommunicators demonstrated a strong significant

relationship between chronic occupational antecedents and WFC. While telecommunicators do not strongly endorse that family life contributes to conflict at work, work life exerts a strong impact on perception of family involvement. Specifically, time-based work demands require missing out on family activities. As work stressors become more chronic and more frequent, they likely exert a stronger effect on family life and involvement. For example, telecommunicators who indicate difficulty in scheduling time-off likely feel time-based work conflict in engaging with family and friends. Developing strategies and policies to ensure that telecommunicators receive adequate time off and time away from the job may reduce WFC and downstream negative appraisals of the stressfulness of the job and its negative impact on the telecommunicator. Family supportive practices appear to create positive occupational perceptions through increased resources, which have demonstrated stress buffering effects in other populations (Matthews & Toumbeva, 2015).

Additionally, as noted by Rothstein (2012), telecommunicators may not feel as though their work experiences translate into information that can be shared with friends and family who are separate from first responder culture. Work stories often contain elements that can be distressing (Rothstein, 2012) or that can incorporate humor (McLaughlin, 2012). Because emotional support includes being able to share and release perceptions of stress with those who care (Schwarzer, Cone, Li, & Bowler, 2016) that perceived lack of understanding may prevent using family as a source of support to reduce stress, making sources of stress at work compounded when work life and work behaviors must be kept separate from home life. Even without examination of personal

variables and beliefs that may influence appraising, such as world assumptions (Lilly & Pierce, 2013), situational and person-environment interactions contribute significantly to negative appraising in this population.

Increased WFC leads to more negative appraising. As chronic sources of stress and WFC increase, appraising of the job become more negative, including reduced efficacy in individual agency in handling stressors associated with the job, increased perceived stressfulness of chronic antecedents, and the likelihood of long term harm and threat due to being a telecommunicator and from conflict between work and family. This finding is consistent with previous research that avers that a chronically stressed body becomes dysregulated and more susceptible to adverse acute and long term stress reactions (Wirtz et al., 2013). Susceptibility occurs as telecommunicators increasingly feel that the demands from work placed upon them erode self-efficacy and increase harm, threat, and stress appraisals of the position. Lack of coping self-efficacy, for example, shared significant, positive relationships with family-to-work interference, work-to-family interference, and job and task demands; chronic stress perceptions, unsurprisingly, correlated strongly with chronic occupational antecedents but also to a medium effect with both work-to-family interference and family-to-work interference. Harm and threat appraisals correlated strongly with work-to-family interference and to a medium effect with family-to-work interference and to the chronic occupational antecedents.

Particularly interesting in these relationships is the role of coping self-efficacy. Telecommunicators did not strongly indicate feeling incapable of handling the stresses associated with their job; however, as their job and task demands increase, so to did a

more negative view of their ability to cope with the work emerge. Lack of coping self-efficacy correlated significantly with avoidance coping but not with any symptoms of trauma exposure, which is inconsistent with previous research including Bosmans, Benight, van der Knaap, Winkel, and van der Velden (2013), Cieslak, Benight, Luszczynska, and Laudenslager (2011), and Lambert et al. (2012). In the current research, this finding suggests that it is not simply that coping self-efficacy is protective of long term health but that damaging work environments may erode self-perceptions, which corresponds with employing strategies to avoid an acute stressor or reminders of that stressor. The current results support Bandura's (1992) assertion that coping self-efficacy has less of an effect on events that are perceived as uncontrollable or outcomes that are believed to be unachievable. The results also support the assertion that threats to self-efficacy in the form of unmanageable chronic occupational stressors and WFC are particularly damaging.

The current study did not support the theoretical proposition that negative appraising predicts coping. Methodological reasons have been explored above; however, theoretical implications merit consideration as well. Colwell (2005) identified that in police officers cognitive appraising of traumatic events, including event centrality (the relationship the event had to one's personal life and appraisal of harm or threat), had a larger influence on personal distress than any coping strategies employed or the severity event. This is consistent with contemporary research examining event centrality (Wamser-Nanny, Howell, Schwartz, & Hasselle, 2018) and exposure patterns (Liu & Kia-Keating, 2018). However, these works focus on the appraising of traumatic events in

long term distress at the expense of understanding the demands placed on the individual in the face of chronic, recurring daily hassles. From the current research, it is evident that chronic antecedents influence negative appraising, and negative appraising does exert a small, but again nonsignificant, indirect effect through coping on PTSS. This is consistent with prior research, such as that of Cerdá et al. (2013), who identified the effect of chronic and ongoing stressors on PTSS and functional impairment independent of a traumatizing event. Furthermore, significant, positive relationships with small to medium effects occurred between elements of negative appraising and elements of coping. Notably, avoidance coping shared positive relationships with lack of coping self-efficacy, chronic stress perceptions, and harm and threat evaluations of the telecommunicator experience. Perhaps a model incorporating only avoidance coping would have yielded the predicted significant relationships between negative appraising and coping, but doing so may have further capitalized on chance and would have eliminated the unexpected finding that more positively viewed coping strategies also contribute to posttrauma distress.

It is possible that this nonsignificant path demonstrates the true relationship in this population or is a proposition in need of modification or rejection in the theory, that this reflects methodological issues with sample size, model specification, and measure reliability and multidimensionality, or that, perhaps, appraising consists of multiple components, primary appraising, secondary appraising, and reappraising, as theorized by Lazarus (2012; Smith & Lazarus, 1993) but omitted from this work. Lack of coping self-efficacy may need to be explored in addition to accountability and future expectancy as

dimensions of secondary appraising. As discussed previously, shame and guilt have been shown to be strong predictors of PTSS in other populations, which could and should be incorporated into future work in this population. All of these possibilities represent opportunities for future research.

Increased coping leads to increased PTSS. The current study confirms that telecommunicators who are attempting to cope are at risk for experiencing symptoms of traumatization. The model explained 9% of the variance observed in PTSS in this population. Weiss and Marmar's (1997) IES-R provided a means for assessing a snapshot of current symptoms within the population with the understanding that the tool does not provide a means for diagnosis of disorder as it is not a substitute for a clinical assessment tool. The IES-R captures trauma symptoms in relation to a self-identified reference event across the three diagnostic criteria for posttraumatic stress of the *DSM-IV-TR* of hyperarousal, intrusion, and avoidance (APA, 2000). Additional work with telecommunicators should employ measures that address the four-factor model of the *DSM-5* (APA, 2013); however, results from the IES-R, as well as from avoidance coping questions from Carver's (1997) Brief COPE, provide insight into how telecommunicators experience occupational trauma symptoms. Telecommunicators revealed that even identification of a "most stressful" reference event was a complex process of evaluation. Telecommunicators revealed that a worst call was not a specific type of incident but a process involving elements of control and ability to respond effectively, the relationship to the caller and responding units, and personal factors. Recall and description of specific elements of the event varied considerably from great detail and specificity in timing to

very vague descriptions to an inability to describe what or when a call happened entirely. While telecommunicators, on average, did not indicate high levels of current PTSS, relationships between different class of symptoms did present, and implications of those symptoms bear consideration. Intrusion symptoms were the most strongly experienced and occurred with the most severity in this population. Telecommunicators experienced avoidance symptoms more strongly at lower levels and indicated hyperarousal symptoms with the least severity and frequency. These results suggest that telecommunicators respond differently to the processing of traumatic events and in ways that would not present consistently with clinical criteria. For example, telecommunicators may not be able to avoid reminders of their reference event. The first responder environment requires documentation of events that may require substantial cognitive investment and replay of the event. As noted by Rothstein (2012), storytelling is a key feature of the telecommunicator work environment, and these traumatic events may be central to those stories. Avoiding the scene of traumatization would involve missing work, and that may not be a feasible strategy for those who are traumatized at work but may contribute to the intrusive reminders that emerge as symptoms of posttraumatic distress. Additionally, those who are experiencing high levels of avoidance symptoms may give up the career entirely, and this study would not have been able to capture the experiences of those who may be experiencing higher levels of traumatization. While symptoms themselves did not manifest at high levels for most telecommunicators, the expression of symptoms, particularly for avoidance and intrusion symptoms shared significant relationships with many elements in the model that merit consideration for future studies.

Additional Recommendations for Future Studies

While the study revealed significant results as a predictive model for PTSS in telecommunicators using the transactional theory of stress and coping, future research would benefit from replication of these results, looking at alternate models and theoretical approaches, such as Hobfoll's (1989) conservation of resources theory, and incorporating additional elements of Lazarus's (2012) transactional model of stress and coping. Specifically, Lazarus (2007, 2012) noted that separating stress emotions from the appraisal process is a serious oversight in many transactional research studies, and this study is no exception. Contemporary research, as discussed above, has identified the significant roles that stress emotion reactions, including guilt, shame, blame, and moral injury, have on the development and presentation of posttrauma outcomes. These elements should be explored in this population. The limitation of including only currently-employed telecommunicators is one that also merits revisiting. Turnover rates and turnover intentions are high in call centers, but it is unknown the degree to which traumatization plays in those rates. Avoidance, as a coping strategy and symptom of traumatization, may contribute to job separation, and it is possible that prior telecommunicators may experience and appraise the job differently than those who remain in the career.

Social Change Implications

The results of the model provide impetus for immediate and long term change at local, state, and national levels. A primary concern arising from these results are on a contemporary focus in first responder communities to emphasize potentially traumatic

events that, although they may occur rarely, particularly for rural agencies, do not contribute significantly to symptoms of traumatization. This focus occurs at the expense of initiatives to address more chronic sources of stress and WFC. For example, agencies may employ critical incident stress debriefing (CISD), a specific technique designed for high risk occupations, including traditional first responders, or broader elements of critical incident stress management (CISM) that may include CISD, despite evidence that these tactics may be of limited efficacy and can be damaging if not used in accordance with set standards (Pack, 2013). Likewise, although crime initiatives and timely weather updates are important, crime and natural events will continue to occur that place first responders at risk for traumatization. Instead of focusing solely on reacting to traumatic events, agencies need to address the more chronic occupational sources of stress that are consistent with more WFC, leading to more negative appraising of the occupational experience. Downstream initiatives, such as CISM and CISD, may only be effective if considered to be a healthy function of an organization believed to support and care for its frontline employees (Pack, 2013). In light of this, agencies must develop employee-focused strategies that address telecommunicator needs and sources of stress. Some of the most frequent and most stressful antecedents involve interpersonal communications, including interactions with the public, with the media, with coworkers, and with management. While interactions with the public may not be easily managed as it is a function of the job, media relations can, and perhaps should, be handled by supervisors or sworn personnel. Supervisors should be trained on managing interpersonal relationships in the complex and dynamic system that emerges in a call center and in developing fair

and equitable practices in distributing work load and work hours. In addition, communication with staff should be respectful and should include information on why policies change. Where possible, telecommunicators should be encouraged to provide input on current practices and policies to allow ownership and a sense of control over their work environment. While these practices are recommended following from the results of this study, the practices should be carefully monitored and evaluated to ensure that they contribute to telecommunicator wellbeing.

Conclusion

In conclusion, though often the first point of communication in any emergency situation, telecommunicators rarely receive credit or attention within the first responder or research communities-that is, unless a call goes poorly. However, lack of attention does not mean that telecommunicators do not experience traumatization as a result of their exposure to the suffering of strangers, family, and friends in the course of their career. Telecommunicators are at risk of suffering negative consequences from this exposure, and limited research focuses on the occupational experiences, appraising, coping, and posttraumatic outcomes of this population.

The purpose of this study was to examine the degree to which the transactional theory of stress and coping could predict PTSS in telecommunicators. Results of a two-phase SEM analysis demonstrated that WFC significantly predicts negative appraising and that coping significantly predicts PTSS. As a causal framework rooted within the theory, these findings indicate that (a) higher levels of WFC trigger more negative appraising, which include perceptions of harm and threat related to the job, stress

perceptions of chronic occupational antecedents, and a lack of coping self-efficacy and (b) as coping efforts increase, regardless of the specific technique used, so does risk for PTSS. Telecommunicators tax and potentially exhaust coping reserves, resulting in symptoms of traumatization. Knowing these relationships empowers agencies and organizations to evaluate, address, and resolve organizational factors that represent threats and confer cognitive, emotional, and motivational burdens to telecommunicators, which may in turn reassure telecommunicators that agencies and agency heads care about them and the effect the job has on their personal lives. Addressing these burdens may allow telecommunicators to continue to appraise their work as positive, which may help conserve coping resources for potentially traumatic events and protect against adverse posttraumatic stress outcomes.

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Appendix A: Pilot Study Survey Questionnaire

Thank you for offering your time by participating! If you are feeling overwhelmed or in distress, you may stop the survey at any time. The National Suicide Prevention Lifeline is available by telephone at 1-800-273-8255 24 hours a day or by web chat at http://www.suicidepreventionlifeline.org/gethelp/lifelinechat.aspx **if you would like to speak with someone.**
These services are confidential.
These first questions help identify the scope of services that you provide in your position, which will help determine eligibility for the study.
For which types of agencies do you provide services? (Please select all that apply.)

- ☐ Fire
- ☐ Police
    - Municipal
    - County
    - State
    - Federal
    - Tribal
- ☐ Ambulance

Does your position involve answering emergency or non-emergency calls for service or dispatching units in response to calls for service?

- ☐ Yes
- ☐ No

What is your job title?_____

1. The following is a list of types of calls often taken by telecommunicators. In the far left column, check the box if you have ever handled that type of call. For the calls that you have checked, you will be asked to indicate how stressful the call was, how predictable you feel the calls you have handled are, and how routine you feel the calls you have handled are by selecting the corresponding numbers with each question.

Base the stress levels on the following scale:

0……1……2……..…3……..……4……5

Not Stressful at All	A Little Stressful	Somewhat Stressful	Moderately Stressful	Quite Stressful	Extremely Stressful

Base predictability on the following scale:

0…..……1……2……..…3……..……4……5

Not at all Predictable	A Little Predictable	Somewhat Predictable	Moderately Predictable	Quite Predictable	Extremely Predictable

Base the routineness of the calls on the following scale:

0…..……1……2……..…3……..……4……5

Not Routine at All	A Little Routine	Somewhat Routine	Moderately Routine	Quite Routine	Extremely Routine

Check the box if handled by you ever.	
a. □	Traffic accidents with fatalities
b. □	Natural disasters/severe weather
c. □	Suicidal caller
d. □	Homicide
e. □	Line of duty death
f. □	Death of a child
g. □	Officer, firefighter, EMT injured
h. □	Pursuits
i. □	Calls involving children with severe injury
j. □	Armed robbery
k. □	Sexual assault of a child
l. □	Calls involving your family/friends
m. □	Hostage situation
n. □	Domestics
o. □	Riots/mob action
p. □	Plane crash
q. □	Shots fired
r. □	Officer shot
s. □	Structure fire

t. □ Barricaded subject (police stand-off with suspect)
u. □ Other highly disturbing call:
Please specify:

	Indicate the stress level for you
a. Traffic accidents with fatalities	0…..1..…2..…3…..4..…5
b. Natural disasters/severe weather	0…..1..…2..…3…..4..…5
c. Suicidal caller	0…..1..…2..…3…..4..…5
d. Homicide	0…..1..…2..…3…..4..…5
e. Line of duty death	0…..1..…2..…3…..4..…5
f. Death of a child	0…..1..…2..…3…..4..…5
g. Officer, firefighter, EMT injured	0…..1..…2..…3…..4..…5
h. Pursuits	0…..1..…2..…3…..4..…5
i. Calls involving children with severe injury	0…..1..…2..…3…..4..…5
j. Armed robbery	0…..1..…2..…3…..4..…5
k. Sexual assault of a child	0…..1..…2..…3…..4..…5
l. Calls involving your family/friends	0…..1..…2..…3…..4..…5
m Hostage situation	0…..1..…2..…3…..4..…5
n. Domestics	0…..1..…2..…3…..4..…5
o. Riots/mob action	0…..1..…2..…3…..4..…5
p. Plane crash	0…..1..…2..…3…..4..…5
q. Shots fired	0…..1..…2..…3…..4..…5
r. Officer shot	0…..1..…2..…3…..4..…5
s. Structure fire	0…..1..…2..…3…..4..…5
t. Barricaded subject (police stand-off with suspect)	0…..1..…2..…3…..4..…5
u. Other highly disturbing call: Please specify:	0…..1..…2..…3…..4..…5

	Indicate how predictable the call was for you
a. Traffic accidents with fatalities	0…..1..…2..…3…..4..…5
b. Natural disasters/severe weather	0…..1..…2..…3…..4..…5
c. Suicidal caller	0…..1..…2..…3…..4..…5
d. Homicide	0…..1..…2..…3…..4..…5
e. Line of duty death	0…..1..…2..…3…..4..…5
f. Death of a child	0…..1..…2..…3…..4..…5
g. Officer, firefighter, EMT injured	0…..1..…2..…3…..4..…5
h. Pursuits	0…..1..…2..…3…..4..…5
i. Calls involving children with severe injury	0…..1..…2..…3…..4..…5
j. Armed robbery	0…..1..…2..…3…..4..…5
k. Sexual assault of a child	0…..1..…2..…3…..4..…5
l. Calls involving your family/friends	0…..1..…2..…3…..4..…5
m. Hostage situation	0…..1..…2..…3…..4..…5
n. Domestics	0…..1..…2..…3…..4..…5
o. Riots/mob action	0…..1..…2..…3…..4..…5
p. Plane crash	0…..1..…2..…3…..4..…5
q. Shots fired	0…..1..…2..…3…..4..…5
r. Officer shot	0…..1..…2..…3…..4..…5
s. Structure fire	0…..1..…2..…3…..4..…5
t. Barricaded subject (police stand-off with suspect)	0…..1..…2..…3…..4..…5
u. Other highly disturbing call: Please specify:	0…..1..…2..…3…..4..…5

	Indicate how routine the type of call is for you
a. Traffic accidents with fatalities	0…..1..…2..…3…..4..…5
b. Natural disasters/severe weather	0…..1..…2..…3…..4..…5
c. Suicidal caller	0…..1..…2..…3…..4..…5
d. Homicide	0…..1..…2..…3…..4..…5
e. Line of duty death	0…..1..…2..…3…..4..…5
f. Death of a child	0…..1..…2..…3…..4..…5
g. Officer, firefighter, EMT injured	0…..1..…2..…3…..4..…5
h. Pursuits	0…..1..…2..…3…..4..…5
i. Calls involving children with severe injury	0…..1..…2..…3…..4..…5
j. Armed robbery	0…..1..…2..…3…..4..…5
k. Sexual assault of a child	0…..1..…2..…3…..4..…5
l. Calls involving your family/friends	0…..1..…2..…3…..4..…5
m. Hostage situation	0…..1..…2..…3…..4..…5
n. Domestics	0…..1..…2..…3…..4..…5
o. Riots/mob action	0…..1..…2..…3…..4..…5
p. Plane crash	0…..1..…2..…3…..4..…5
q. Shots fired	0…..1..…2..…3…..4..…5
r. Officer shot	0…..1..…2..…3…..4..…5
s. Structure fire	0…..1..…2..…3…..4..…5
t. Barricaded subject (police stand-off with suspect)	0…..1..…2..…3…..4..…5
u. Other highly disturbing call: Please specify:	0…..1..…2..…3…..4..…5

2. The following list describes some of the sources of stress for telecommunicators. Please indicate how often in the last 30 days you have experienced each source of stress and how stressful each of these items are for you.

		0……1……2……..…3……..……4……5
		Never Once Two to Four times a month Once a week Two to four times a week Daily
a.	Lack of training	0…..1..…2..…3…..4..…5
b.	Poor supervision	0…..1..…2..…3…..4..…5
c.	Personal conflicts at work	0…..1..…2..…3…..4..…5
d.	Lack of appreciation from management	0…..1..…2..…3…..4..…5
e.	Inadequate compensation	0…..1..…2..…3…..4..…5
f.	Poor communication among the staff	0…..1..…2..…3…..4..…5
g.	Poor equipment	0…..1..…2..…3…..4..…5
h.	Lack of input on new hires	0…..1..…2..…3…..4..…5
i.	Management/administration	0…..1..…2..…3…..4..…5
j.	Sexual harassment	0…..1..…2..…3…..4..…5
k.	Lack of follow-up/regard for us after a stressful incident	0…..1..…2..…3…..4..…5
l.	Constantly changing policies	0…..1..…2..…3…..4..…5
m.	Scapegoating of the communications center	0…..1..…2..…3…..4..…5
n.	Ergonomics (physical lay-out & physical working conditions)	0…..1..…2..…3…..4..…5
o.	Co-workers	0…..1..…2..…3…..4..…5
p.	Treatment from others during stressful events	0…..1..…2..…3…..4..…5
q.	The public	0…..1..…2..…3…..4..…5
r.	The media	0…..1..…2..…3…..4..…5
s.	Call-monitoring practices (recording all calls)	0…..1..…2..…3…..4..…5
t.	Performance evaluations (giving/receiving)	0…..1..…2..…3…..4..…5
u.	Lack of understanding what telecommunicators do	0…..1..…2..…3…..4..…5
v.	Lack of closure	0…..1..…2..…3…..4..…5
w.	Scheduling time off	0…..1..…2..…3…..4..…5

Base your rating of stress on the following scale:

0……1……2……..…3……..……4……5

Not Stressful at All	A Little Stressful	Somewhat Stressful	Moderately Stressful	Quite Stressful	Extremely Stressful

a.	Lack of training	0…..1..…2..…3…..4..…5
b.	Poor supervision	0…..1..…2..…3…..4..…5
c.	Personal conflicts at work	0…..1..…2..…3…..4..…5
d.	Lack of appreciation from management	0…..1..…2..…3…..4..…5
e.	Inadequate compensation	0…..1..…2..…3…..4..…5
f.	Poor communication among the staff	0…..1..…2..…3…..4..…5
g.	Poor equipment	0…..1..…2..…3…..4..…5
h.	Lack of input on new hires	0…..1..…2..…3…..4..…5
i.	Management/administration	0…..1..…2..…3…..4..…5
j.	Sexual harassment	0…..1..…2..…3…..4..…5
k.	Lack of follow-up/regard for us after a stressful incident	0…..1..…2..…3…..4..…5
l.	Constantly changing policies	0…..1..…2..…3…..4..…5
m.	Scapegoating of the communications center	0…..1..…2..…3…..4..…5
n.	Ergonomics (physical lay-out & physical working conditions)	0…..1..…2..…3…..4..…5
o.	Co-workers	0…..1..…2..…3…..4..…5
p.	Treatment from others during stressful events	0…..1..…2..…3…..4..…5
q.	The public	0…..1..…2..…3…..4..…5
r.	The media	0…..1..…2..…3…..4..…5
s.	Call-monitoring practices (recording all calls)	0…..1..…2..…3…..4..…5
t.	Performance evaluations (giving/receiving)	0…..1..…2..…3…..4..…5
u.	Lack of understanding what telecommunicators do	0…..1..…2..…3…..4..…5
v.	Lack of closure	0…..1..…2..…3…..4..…5
w.	Scheduling time off	0…..1..…2..…3…..4..…5

3. When thinking about these sources of the stress, how much do you agree or disagree with the following statements?

1……2……..…3……..……4……5

		Strongly Disagree	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Strongly Agree
a.	I feel that the stress of being a telecommunicator may be a negative experience for me.	1	2	3	4	5
b.	I feel that the stress of being a telecommunicator may result in negative outcomes.	1	2	3	4	5
c.	I feel that the stress of being a telecommunicator may have a negative impact on me.	1	2	3	4	5

4. In addition to work-related stressors, sometimes conflict between work and family arises. Please indicate to what degree you disagree or agree with the following statements. Base your rating on the following scale:

1……2……..…3…….……4……5

Strongly Disagree	Disagree a Little	Neither Agree nor Disagree	Agree a Little	Strongly Agree

a.	My work keeps me from my family activities more than I would like.	1..…2..…3…..4..…5
b.	The time I devote to my job keeps me from participating equally in household responsibilities and activities.	1..…2..…3…..4..…5
c.	I have to miss family activities due to the amount of time I must spend on work responsibilities.	1..…2..…3…..4..…5
d.	The time I spend on family responsibilities often interfere with my work responsibilities.	1..…2..…3…..4..…5
e.	The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career.	1..…2..…3…..4..…5
f.	I have to miss work activities due to the amount of time I must spend on family responsibilities.	1..…2..…3…..4..…5
g.	When I get home from work I am often too frazzled to participate in family activities/responsibilities.	1..…2..…3…..4..…5
h.	I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.	1..…2..…3…..4..…5
i.	Due to all the pressures at work, sometimes when I come home I am too stressed to do the things I enjoy.	1..…2..…3…..4..…5
j.	Due to stress at home, I am often preoccupied with family matters at work.	1..…2..…3…..4..…5
k.	Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.	1..…2..…3…..4..…5
l.	Tension and anxiety from my family life often weakens my ability to do my job.	1..…2..…3…..4..…5
m.	The problem-solving behaviors I use in my job are not effective in resolving problems at home.	1..…2..…3…..4..…5
n.	Behavior that is effective and necessary for me at work would be counterproductive at home.	1..…2..…3…..4..…5
o.	The behaviors I perform that make me effective at work do not help me to be a better parent and spouse.	1..…2..…3…..4..…5
p.	The behaviors that work for me at home do not seem to be effective at work.	1..…2..…3…..4..…5

q. Behavior that is effective and necessary for me at home would be counterproductive at work. 1..…2..…3…..4..…5

r. The problem-solving behavior that works for me at home does not seem to be as useful at work. 1..…2..…3…..4..…5

5. When thinking about work and family conflict, how much do you agree or disagree with the following statements?

1……2……..…3…….……4……5

Strongly Disagree | Disagree a Little | Neither Agree nor Disagree | Agree a Little | Strongly Agree

a. I feel that conflict between work and family life may be a negative experience for me. 1..…2..…3…..4..…5

b. I feel that conflict between work and family life may result in negative outcomes. 1..…2..…3…..4..…5

c. I feel that conflict between work and family life may have a negative impact on me. 1..…2..…3…..4..…5

6. For each situation described below, please rate how capable you are in successfully dealing with it. Base your rating off the following scale:

1……2…….……3……...…4……...……5……6……7

Not at all Capable | A little Capable | Somewhat Capable | Moderately Capable | Quite Capable | Extremely Capable | Totally Capable

a. Dealing with combative or hostile people. 1…..2..…3..…4…..5..…6…..7

b. Dealing with injured children. 1…..2..…3..…4…..5..…6…..7

c. Dealing with descriptions of human dismemberment (loss of limbs, etc.). 1…..2..…3..…4…..5..…6…..7

d. Dealing with descriptions of blood, vomit, or other bodily fluids. 1…..2..…3..…4…..5..…6…..7

e. Dealing with the sounds of people retching as they vomit. 1…..2..…3..…4…..5..…6…..7

f. Handling the death of a patient or person I am responding to. 1…..2..…3..…4…..5..…6…..7

g. Coping with the death of a child. 1…..2..…3..…4…..5..…6…..7

h. Handling difficult environmental working conditions (e.g., darkness, weather). 1…..2..…3..…4…..5..…6…..7

i. Coping with reminders of difficult calls. 1…..2..…3..…4…..5..…6…..7

j. Having dreams about difficult calls. 1…..2..…3..…4…..5..…6…..7

k. Not to self-criticize my ability to handle calls. 1…..2..…3..…4…..5..…6…..7

l. Believing I am competent in all aspects of my work. 1…..2..…3..…4…..5..…6…..7

m. Managing physical demands of my work. 1…..2..…3..…4…..5..…6…..7

n.	Discussing with others the emotionally upsetting calls.	1…..2..…3..…4…..5..…6…..7
o.	Ability to multi-task when doing my job.	1…..2..…3..…4…..5..…6…..7
p.	Coping with feelings of guilt.	1…..2..…3..…4…..5..…6…..7
q.	Dealing with the meaninglessness of a call.	1…..2..…3..…4…..5..…6…..7
r.	Managing my anger.	1…..2..…3..…4…..5..…6…..7
s.	Processing what responding units might encounter enroute to a call.	1…..2..…3..…4…..5..…6…..7
t.	Handling the humor associated with my job.	1…..2..…3..…4…..5..…6…..7

7. For the following items, think about the most stressful incident you have handled in your career as a telecommunicator. The following items deal with ways you've been coping with the stress since handling that event. There are many ways to try to deal with problems. These items ask what you've been doing to cope with this one. Obviously, different people deal with things in different ways, but I'm interested in how you've tried to deal with it. Each item says something about a particular way of coping. I want to know to what extent you've been doing what the item says. How much or how frequently. Don't answer on the basis of whether it seems to be working or not—just whether or not you're doing it. Use these response choices:

I haven't been doing this at all. = 1	I've been doing this a little bit = 2	I've been doing this a medium amount = 3	I've been doing this a lot. = 4

Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you can.

a.	I've been turning to work or other activities to take my mind off things.	1…..2..…3..…4
b.	I've been concentrating my efforts on doing something about the situation I'm in.	1…..2..…3..…4
c.	I've been saying to myself "this isn't real."	1…..2..…3..…4
d.	I've been using alcohol or other drugs to make myself feel better.	1…..2..…3..…4
e.	I've been getting emotional support from others.	1…..2..…3..…4
f.	I've been giving up trying to deal with it.	1…..2..…3..…4
g.	I've been taking action to try to make the situation better.	1…..2..…3..…4
h.	I've been refusing to believe that it has happened.	1…..2..…3..…4
i.	I've been saying things to let my unpleasant feelings escape.	1…..2..…3..…4
j.	I've been getting help and advice from other people.	1…..2..…3..…4
k.	I've been using alcohol or other drugs to help me get through it.	1…..2..…3..…4
l.	I've been trying to see it in a different light, to make it seem	1…..2..…3..…4

more positive.

m.	I've been criticizing myself.	1…..2..…3..…4
n.	I've been trying to come up with a strategy about what to do.	1…..2..…3..…4
o.	I've been getting comfort and understanding from someone.	1…..2..…3..…4
p.	I've been giving up the attempt to cope.	1…..2..…3..…4
q.	I've been looking for something good in what is happening.	1…..2..…3..…4
r.	I've been making jokes about it.	1…..2..…3..…4
s.	I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	1…..2..…3..…4
t.	I've been accepting the reality of the fact that it has happened.	1…..2..…3..…4
u.	I've been expressing my negative feelings.	1…..2..…3..…4
v.	I've been trying to find comfort in my religion or spiritual beliefs.	1…..2..…3..…4
x.	I've been trying to get advice or help from other people about what to do.	1…..2..…3..…4
y.	I've been learning to live with it.	1…..2..…3..…4
z.	I've been thinking hard about what steps to take.	1…..2..…3..…4
aa.	I've been blaming myself for things that happened.	1…..2..…3..…4
bb.	I've been praying or meditating.	1…..2..…3..…4
cc.	I've been making fun of the situation.	1…..2..…3..…4

8. Next, I will ask you to identify the most stressful call you have handled in your career. Below is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you DURING THE PAST SEVEN DAYS with respect to _____, which occurred on _____. How much were you distressed or bothered by these difficulties?

Not at all = 0	A little bit = 1	Moderately = 2	Quite a bit = 3	Extremely = 4

a.	Any reminder brought back feelings about it.	0..…1..…2…..3..…4
b.	I had trouble staying asleep.	0..…1..…2…..3..…4
c.	Other things kept making me think about it.	0..…1..…2…..3..…4
d.	I felt irritable and angry.	0..…1..…2…..3..…4
e.	I avoided letting myself get upset when I thought about it or was reminded of it.	0..…1..…2…..3..…4
f.	I thought about it when I didn't mean to.	0..…1..…2…..3..…4
g.	I felt as if it hadn't happened or wasn't real.	0..…1..…2…..3..…4
h.	I stayed away from reminders of it.	0..…1..…2…..3..…4
i.	Pictures about it popped into my mind.	0..…1..…2…..3..…4

j.	I was jumpy and easily startled.	0..…1..…2…..3..…4
k.	I tried not to think about it.	0..…1..…2…..3..…4
l.	I was aware that I still had a lot of feelings about it, but I didn't deal with them.	0..…1..…2…..3..…4
m.	My feelings about it were kind of numb.	0..…1..…2…..3..…4
n.	I found myself acting or feeling like I was back at that time.	0..…1..…2…..3..…4
o.	I had trouble falling asleep.	0..…1..…2…..3..…4
p.	I had waves of strong feelings about it.	0..…1..…2…..3..…4
q.	I tried to remove it from my memory.	0..…1..…2…..3..…4
r.	I had trouble concentrating.	0..…1..…2…..3..…4
s.	Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	0..…1..…2…..3..…4
t.	I had dreams about it.	0..…1..…2…..3..…4
u.	I felt watchful and on-guard.	0..…1..…2…..3..…4
v.	I tried not to talk about it.	0..…1..…2…..3..…4

9. The following questions about your background will be used to describe telecommunicators as a group who responded to this survey. It will not be used to personally identify any one person.

a. Please indicate your gender:

1. Female
2. Male

b. What is your age?

1. _____ years old.

c. How many years have you been employed as a telecommunicator?

1. _____ years.

d. What is the highest level of education you have completed?

1. High School
2. Trade School
3. Some College
4. Associate's Degree
5. Bachelor's Degree
6. Master's Degree
7. Doctoral Degree

e. Which of the following best applies to your current partner status?

1. Single

2. In a long-term relationship
3. Currently married or living with a partner
4. Separated
5. Divorced
6. Widowed

f. If in a relationship, is your current partner a first responder?

1. Yes, in the jurisdiction I work.
2. Yes, in a different jurisdiction.
3. No, my partner is not a first responder.
4. I am not currently in a relationship.

g. Do you have any children in your home under the age of 18?

1. No.
2. Yes.
    i. If yes, how many children do you provide care for? _____

h. Which of the following describes your race? Circle all that apply.

1. American Indian/Alaska Native
2. Asian
3. Black or African-American
4. Native Hawaiian or Pacific Islander
5. White or Caucasian
6. Other
    i. Please specify:_____

i. Which of the following describes your ethnicity?

1. Hispanic or Latina/Latino
2. Non-Hispanic or Non-Latina/Latino

j. Approximately how long did it take for you to complete this survey?

_____ minutes.

k. Were there any items that were unclear or confusing? If so, which items, and how could they be improved?

_____
_____
_____
_____
_____

_____
_____
_____

If you are feeling overwhelmed or in distress at any time, you may contact the National Suicide Prevention Lifeline by telephone at 1-800-273-8255 or by web chat at http://www.suicidepreventionlifeline.org/gethelp/lifelinechat.aspx
These services are confidential.

Thank you for your participation.

Appendix B: Telecommunicator Employment and Violent Crime Reporting

Table B1

Telecommunicator Employment and Violent Crime Reporting by State

State	Estimated Employment[1]	Percentage	Number Reported[9]	Percentage
Alabama	2500	2.58	20210	1.74
Alaska	370	0.38	4430	0.38
Arizona	2040	2.10	26892	2.31
Arkansas	1360	1.40	13191	1.13
California	6900	7.11	151879	13.06
Colorado	1840	1.90	15342	1.32
Connecticut	1450	1.49	9153	0.79
Delaware	230	0.24	4435	0.38
Florida	6010	6.19	89948	7.73
Georgia	3360	3.46	35943	3.09
Hawaii	280	0.29	3444	0.30
Idaho	500	0.52	3300	0.28
Illinois	3880	4.00	47987	4.13
Indiana[2]	2049	2.11	22991	1.98
Iowa	860	0.89	8062	0.69
Kansas[3]	1265	1.30	9478	0.81
Kentucky	1430	1.47	8737	0.75
Louisiana	1520	1.57	23609	2.03
Maine	600	0.62	1615	0.14
Maryland	1150	1.18	27734	2.38
Massachusetts	2850	2.94	27038	2.32
Michigan[4]	2010	2.07	42536	3.66
Minnesota	1740	1.79	12100	1.04
Mississippi	960	0.99	7999	0.69
Missouri[5]	2989	3.08	25509	2.19
Montana	380	0.39	2444	0.21
Nebraska	700	0.72	4712	0.41
Nevada	610	0.63	16496	1.42
New Hampshire	690	0.71	2642	0.23
New Jersey	3710	3.82	25415	2.19

(table continued)

State	Estimated Employment[1]	Percentage	Number Reported[9]	Percentage
New Mexico	720	0.74	12443	1.07
North Carolina[6]	3603	3.71	33152	2.85
Oregon	1020	1.05	9546	0.82
Pennsylvania	3030	3.12	41713	3.59
Rhode Island	380	0.39	2572	0.22
South Carolina	1360	1.40	23625	2.03
South Dakota	320	0.33	2524	0.22
Tennessee	2980	3.07	37655	3.24
Texas	7600	7.83	105736	9.09
Utah	750	0.77	6070	0.52
Vermont	300	0.31	720	0.06
Virginia	2980	3.07	15524	1.33
Washington[7]	2086	2.15	19377	1.67
Washington, D.C.	110	0.11	8287	0.71
West Virginia[8]	895	0.92	5371	0.46
Wisconsin	1320	1.36	15570	1.34
Wyoming	260	0.27	1152	0.10
Total	97077	100.00	1163146	100.00

[1]Unless otherwise indicated, retrieved from http://www.projectionscentral.com/Projections/AboutST, data year 2014

[2] Employment estimate retrieved from http://www.hoosierdata.in.gov/dpage.asp?id=51&page_path=Occupational%20Data&path_id=23&menu_level=smenu4&panel_number=2, data year 2010

[3] Employment estimate retrieved from https://klic.dol.ks.gov/gsipub/index.asp?docid=442, data year 2010

[4] Employment estimate retrieved from http://milmi.org/admin/uploadedPublications/719_occ_g43.htm, data year 2010

[5] Employment estimate retrieved from http://www.missourieconomy.org/occupations/occ_proj.stm, data year 2013

[6] Employment estimate retrieved from http://www.nccommerce.com/lead/data-tools/occupations/projections/statewide, data year 2012

[7] Employment estimate retrieved from https://fortress.wa.gov/esd/employmentdata/reports-publications/industry-reports/employment-projections, data year 2014

[8] Employment estimate retrieved from http://www.workforcewv.org/lmi/occproj/ShortTermProjMenu.html, data year 2011

[9] Information retrieved from http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2013/crime-in-the-u.s.-2013/tables/4tabledatadecoverviewpdf/table_4_crime_in_the_united_states_by_region_geographic_division_and_state_2012-2013.xls, data year 2013. Violent crimes reported include offenses of murder, rape, robbery, and aggravated assault.

Table B2

Telecommunicator Employment and Crime Reporting by FBI-Defined Regions

FBI-defined Regions	**Estimated Employment**	**Percentage**	**Number Reported**	**Percentage**
Northeast[1]	18410	18.96	187464	16.12
Midwest[2]	21453	22.1	225227	19.36
South[3]	39458	40.65	477640	41.06
West[4]	17756	18.29	272815	23.45
Total	97077	100.00	1163146	100.00

[1] Includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont

[2] Includes Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin

[3] Includes Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington, D.C., and West Virginia

[4] Includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming

Table B3

Telecommunicator Employment and Crime Reporting by FBI-Defined Subregions

FBI-defined Subregions	Estimated Employment	Percentage	Number Reported	Percentage
New England[1]	6270	6.46	43740	3.76
Middle Atlantic[2]	12140	12.51	143724	12.36
East North Central[3]	13379	13.78	160988	13.84
West North Central[4]	8074	8.32	64239	5.52
South Atlantic[5]	19698	20.29	244019	20.98
East South Central[6]	7870	8.11	74601	6.41
West South Central[7]	11890	12.25	159020	13.67
Mountain[8]	7100	7.31	84139	7.23
Pacific[9]	10656	10.98	188676	16.22
Total	97077	100.00	1163146	100.00

[1] Includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

[2] Includes New Jersey, New York, and Pennsylvania

[3] Includes Illinois, Indiana, Michigan, Ohio, and Wisconsin

[4] Includes Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota

[5] Includes Delaware, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, Washington, D.C., and West Virginia

[6] Includes Alabama, Kentucky, Mississippi, and Tennessee

[7] Includes Arkansas, Louisiana, Oklahoma, and Texas

[8] Includes Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming

[9] Includes Alaska, California, Hawaii, Oregon, and Washington

Appendix C: Recruitment Documentation

Recruitment E-Mail

Dear Dispatchers, Call-Takers, and Telecommunicators,

I am a doctoral student with Walden University, conducting research on telecommunicator stress that may contribute to posttraumatic stress symptoms. I am writing to ask for your participation in a research study of views of work and family stress and coping as predictors of posttraumatic stress symptoms. Your participation in this study is voluntary and anonymous. No identifying information will be collected in the survey, and individual data will not be shared with anyone, including agency heads or supervisors.

The benefit of participating in this study is that you will help provide valuable information needed to understand views of the stresses of your job and how those views affect health. There are no foreseen risks to participating in this study; however, if you find you are overwhelmed or in distress, you may contact the National Suicide Prevention Lifeline by telephone at 1-800-273-8255 or by web chat at http://www.suicidepreventionlifeline.org/gethelp/lifelinechat.aspx. These services are confidential. The link that follows will take you to a website where you will be provided with informed consent details and directed to the study questionnaire, is you decide to participate.

If you are interested in additional information or in taking part in the study, please visit this website: https://www.surveymonkey.com/r/telecommunicators

Thank you for your consideration, and if you have any questions, I may be reached via e-mail at or via telephone at.

Very respectfully,

CONSENT FORM

You are invited to take part in a research study about telecommunicator stress, coping, and posttraumatic stress symptoms. The researcher is inviting telecommunicators working in the United States to be in the study. I obtained the contact information for your agency from the 2015 National Directory of Law Enforcement Administrations and requested that your supervisor forward you an email with this website. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether or not to take part.

This study is being conducted by a researcher named Dana Dillard, who is a doctoral student at Walden University. You might already know me as a telecommunicator, but this study is separate from that role.

Background Information:

The purpose of this study is to look at how telecommunicators identify stress related to the job, how telecommunicators cope with stress, and how that stress affects daily living.

Procedures:

If you agree to be in this study, you will be asked to complete an electronic survey. No identifying electronic data will be collected by me or the web host; however, if you access the website from an agency computer, the researcher cannot guarantee that your agency will not collect usage information on the agency network. This anonymous survey will contain questions about your views of telecommunicator stress. The survey consists of approximately 200 questions and will take approximately 45-60 minutes to complete. Here are some sample questions:

- On a scale of 1 (*Strongly disagree*) to 5 (*Strongly agree*), indicate how much you agree or disagree with the following statement: I feel that the stress of being a telecommunicator is a negative experience for me.
- On a scale of 1 (*Strongly disagree*) to 5 (*Strongly agree*), indicate how much you agree or disagree with the following statement: When I get home from work I am often too frazzled to participate in family activities/responsibilities.
- On a scale of 1 (*Not at all capable*) to 7 (*Totally capable*), how capable do you rate yourself at dealing with combative or hostile people.

Surveys will be accepted until **<DATE>**. Two reminder emails will be sent to your supervisor during this time for distribution. If your supervisor forwards the reminder, you will receive it even if you have already completed the survey. A summary of the results will be provided to your center once I have concluded the research.

Voluntary Nature of the Study:

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one at Walden University or your employing agency will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time. No one will have the ability to identify whether or not you participated.

Risks and Benefits of Being in the Study:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress, or becoming upset. There are no foreseen or anticipated risks to your safety or wellbeing in participating in this study. However, if you find you are overwhelmed or in distress, you may contact the National Suicide Prevention Lifeline by telephone at 1-800-273-8255 or by web chat at http://www.suicidepreventionlifeline.org/gethelp/lifelinechat.aspx. These services are confidential.
The benefit of participating in the study is that you will help provide a better understanding of the stresses associated with being a telecommunicator. You will also assist by providing information about how telecommunicators cope with the stress of the job and how telecommunicators are affected by traumatic and chronic stress. This information may contribute to new training or interventions that can help improve mental health outcomes for telecommunicators facing or recovering from critical incidents.

Payment:
There is no compensation for participating.

Privacy:
Any information you provide will be kept anonymous. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by password protecting all computer data files on a password protected laptop. No electronic information or IP addresses will be collected by me or the web survey host, Survey Monkey. Data will be kept for a period of at least 5 years, as required by the university.

Contacts and Questions:
You may ask any questions you have now, or if you have questions later, you may contact the researcher via e-mail at dana.dillard@waldenu.edu or via telephone at XXX. If you want to talk privately about your rights as a participant, you can call Dr. XX. She is the Walden University representative who can discuss this with you. Her phone number is XXX. Walden University's approval number for this study is **IRB will enter approval number here** and it expires on **IRB will enter expiration date.**

Please print or save this consent form for your records.

Obtaining Your Consent

If you feel you understand the study well enough to make a decision about it, please indicate your consent by clicking the link below.

Appendix D: Tables of Results

Table D1

*Frequencies of Sources of Stress Experienced in the Last 30 Days (*N*=103)*

Source of Stress	Not in the last 30 days	Once	2-4 Times	Once per week	2-4 Times per Week	Daily
Lack of Training	52 (50.5%)	23 (22.3%)	15 (14.6%)	6 (5.8%)	3 (2.9%)	4 (3.9%)
Personal conflicts at work	32 (31.1%)	23 (22.3%)	25 (24.3%)	6 (5.8%)	9 (8.7%)	8 (7.8%)
Poor communication among staff	13 (12.6%)	9 (8.7%)	39 (37.9%)	13 (12.6%)	13 (12.6%)	16 (15.5%)
Lack of input on new hires	58 (56.3%)	13 (12.6%)	18 (17.5%)	6 (5.8%)	2 (1.9%)	6 (5.8%)
Sexual harassment	89 (86.4%)	8 (7.8%)	5 (4.9%)	1 (1.0%)	0 (0%)	0 (0%)
Lack of follow-up	46 (44.7%)	17 (16.5%)	24 (23.3%)	5 (4.9%)	6 (5.8%)	5 (4.9%)
Constantly changing policies	30 (29.1%)	24 (23.3%)	28 (27.2%)	7 (6.8%)	1 (1.0%)	13 (12.6%)
Coworkers	14 (13.6%)	12 (11.7%)	35 (34.0%)	13 (12.6%)	10 (9.7%)	19 (18.4%)
Treatment from others during stressful events	50 (48.5%)	14 (13.6%)	21 (20.4%)	8 (7.8%)	5 (4.9%)	5 (4.9%)
The public	8 (7.8%)	3 (2.9%)	15 (14.6%)	10 (9.7%)	16 (15.5%)	51 (49.5%)
The media	44 (42.7%)	11 (10.7%)	25 (24.3%)	9 (8.7%)	5 (4.9%)	9 (8.7%)
Call-monitoring practices	50 (48.5%)	4 (3.9%)	5 (4.9%)	1 (1.0%)	2 (1.9%)	41 (39.8%)
Lack of understanding what telecommunicators do	44 (42.7%)	3 (2.9%)	13 (12.6%)	6 (5.8%)	12 (11.7%)	25 (24.3%)
Lack of closure	25 (24.3%)	6 (5.8%)	21 (20.4%)	9 (8.7%)	10 (9.7%)	32 (31.1%)
Scheduling time-off	34 (33.0%)	22 (21.4%)	22 (21.4%)	7 (6.8%)	6 (5.8%)	12 (11.7%)
Poor supervision	47 (45.6%)	10 (9.7%)	16 (15.5%)	8 (7.8%)	8 (7.8%)	14 (13.6%)
Lack of appreciation from management	31 (30.1%)	12 (11.7%)	17 (16.5%)	4 (3.9%)	10 (9.7%)	29 (28.2%)
Inadequate compensation	41 (39.8%)	10 (9.7%)	8 (7.8%)	1 (1.0%)	3 (2.9%)	40 (38.8%)
Management/administration	32 (31.1%)	10 (9.7%)	24 (23.3%)	11 (10.7%)	8 (7.8%)	18 (17.5%)
Scapegoating of the communications center	43 (41.7%)	13 (12.6%)	16 (15.5%)	12 (11.7%)	6 (5.8%)	13 (12.6%)
Performance evaluations	38 (36.9%)	34 (33.0%)	14 (13.6%)	2 (1.9%)	5 (4.9%)	10 (9.7%)
Poor equipment	27 (26.2%)	14 (13.6%)	19 (18.4%)	13 (12.6%)	8 (7.8%)	22 (21.4%)
Ergonomics	57 (55.3%)	7 (6.8%)	13 (12.6%)	8 (7.8%)	2 (1.9%)	16 (15.5%)

Table D2

*Self-Reported Perceptions of Work-Family Conflict in Telecommunicators (*N*=103)*

Source of Conflict	*M* (*SD*)
Work-to-Family Interference	3.33 (0.87)
My work keeps me from my family activities more than I would like.	4.16 (1.03)
The time I devote to my job keeps me from participating equally in household responsibilities and activities.	3.57 (1.36)
I have to miss family activities due to the amount of time I must spend on work responsibilities.	4.11 (1.11)
When I get home from work I am often too frazzled to participate in family activities/responsibilities.	3.16 (1.37)
I am often so emotionally drained when I get home from work that it prevents me from contributing to my family.	3.34 (1.43)
Due to all the pressures at work, sometimes when I come home I am too stressed to do the things I enjoy.	3.56 (1.36)
The problem-solving behaviors I use in my job are not effective in resolving problems at home.	2.49 (1.31)
Behavior that is effective and necessary for me at work would be counterproductive at home.	2.84 (1.38)
The behaviors I perform that make me effective at work do not help me to be a better parent and spouse.	2.83 (1.34)
Family-to-Work Interference	2.00 (0.59)
The time I spend on family responsibilities often interfere with my work responsibilities.	1.82 (1.07)
The time I spend with my family often causes me not to spend time in activities at work that could be helpful to my career.	1.66 (1.01)
I have to miss work activities due to the amount of time I must spend on family responsibilities.	1.44 (0.76)
Due to stress at home, I am often preoccupied with family matters at work.	1.87 (1.12)
Because I am often stressed from family responsibilities, I have a hard time concentrating on my work.	1.55 (0.89)
Tension and anxiety from my family life often weakens my ability to do my job.	1.41 (0.77)
The behaviors that work for me at home do not seem to be effective at work.	2.83 (1.22)
Behavior that is effective and necessary for me at home would be counterproductive at work.	2.71 (1.20)
The problem-solving behavior that works for me at home does not seem to be as useful at work.	2.68 (1.21)

Table D3

*Self-Reported Threat Appraisals in Telecommunicators (*N=*103)*

Threat Appraisal	*M* (*SD*)
I feel that the stress of being a telecommunicator may…	
be a negative experience for me.	3.17 (1.53)
result in negative outcomes.	3.22 (1.44)
have a negative impact on me.	3.51 (1.38)
I feel that conflict between work and family life may…	
be a negative experience for me.	3.45 (1.31)
result in negative outcomes.	3.40 (1.31)
have a negative impact on me.	3.50 (1.29)

Table D4

*Self-Reported Perceptions of Coping Self-Efficacy in Telecommunicators (*N=*103)*

Potential Situations Requiring Self-Efficacy	*M* (*SD*)
Dealing with combative or hostile people	2.44 (1.14)
Dealing with injured children	2.43 (1.22)
Dealing with descriptions of human dismemberment	2.19 (1.31)
Dealing with descriptions of blood, vomit, or other bodily fluids	1.82 (1.26)
Dealing with the sounds of people retching as they vomit	2.42 (1.74)
Handling the death of a patient or person I am responding to	2.37 (1.41)
Coping with the death of a child	3.61 (1.68)
Handling difficult environmental working conditions	2.25 (1.27)
Coping with reminders of difficult calls	2.86 (1.51)
Having dreams about difficult calls	3.25 (1.70)
Not to self-criticize my ability to handle calls	3.78 (1.67)
Believing I am competent in all aspects of my work	2.68 (1.46)
Managing physical demands of my work	1.92 (1.20)
Discussing with others the emotionally upsetting calls	3.08 (1.85)
Ability to multi-task when doing my job	1.84 (0.99)
Coping with feelings of guilt	3.23 (1.65)
Dealing with the meaninglessness of a call	2.64 (1.49)
Managing my anger	2.77 (1.48)
Processing what responding units might encounter enroute to a call	2.12 (1.20)
Handling the humor associated with my job	1.50 (0.90)

Note. Items are reverse-scored.

Table D5

*Self-Reported Coping in Telecommunicators (*N=*103)*

Coping Items	*M* (*SD*)
I've been concentrating my efforts on doing something about the situation I'm in.	2.05 (0.90)
I've been taking action to try to make the situation better.	2.36 (0.99)
I've been trying to come up with a strategy about what to do.	2.00 (0.95)
I've been thinking hard about what steps to take.	1.97 (0.97)
I've been trying to see it in a different light, to make it seem more positive.	2.18 (0.99)
I've been criticizing myself.	2.13 (1.03)
I've been looking for something good in what is happening.	2.17 (0.94)
I've been making jokes about it.	2.02 (1.02)
I've been accepting the reality of the fact that it has happened.	2.76 (0.97)
I've been trying to find comfort in my religion or spiritual beliefs.	2.03 (1.13)
I've been learning to live with it.	2.74 (0.96)
I've been blaming myself for things that happened.	1.58 (0.92)
I've been praying or meditating.	2.11 (1.19)
I've been making fun of the situation.	1.69 (0.97)
I've been turning to work or other activities to take my mind off things.	2.17 (1.11)
I've been saying to myself "this isn't real."	1.19 (0.58)
I've been using alcohol or other drugs to make myself feel better.	1.47 (0.81)
I've been giving up trying to deal with it.	1.48 (0.82)
I've been refusing to believe that it has happened.	1.21 (0.51)
I've been using alcohol or other drugs to help me get through it.	1.44 (0.76)
I've been giving up the attempt to cope.	1.38 (0.77)
I've been doing something to think about it less.	2.28 (0.97)
I've been getting emotional support from others.	2.04 (0.96)
I've been saying things to let my unpleasant feelings escape.	1.83 (0.86)
I've been getting help and advice from other people.	2.00 (1.01)
I've been getting comfort and understanding from someone.	2.13 (0.98)
I've been expressing my negative feelings.	2.12 (0.94)
I've been trying to get advice or help from other people about what to do.	1.83 (0.88)

Table D6

*Telecommunicator Impact of Event Scale – Revised Item Characteristics (*N=*103)*

Sources of Distress	*M* (*SD*)
I felt irritable and angry.	1.30 (1.47)
I was jumpy and easily startled.	0.42 (0.92)
I had trouble falling asleep.	1.01 (1.33)
I had trouble concentrating.	0.79 (1.12)
Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	0.66 (1.13)
I felt watchful and on-guard.	0.77 (1.10)
Any reminder brought back feelings about it.	1.64 (1.36)
I had trouble staying asleep.	1.16 (1.36)
Other things kept making me think about it.	1.48 (1.29)
I thought about it when I didn't mean to.	1.42 (1.26)
Pictures about it popped into my mind.	1.32 (1.27)
I found myself acting or feeling like I was back at that time.	0.52 (0.91)
I had waves of strong feelings about it.	1.48 (1.35)
I had dreams about it.	0.88 (1.24)
I avoided letting myself get upset when I thought about it or was reminded of it.	1.25 (1.14)
I felt as if it hadn't happened or wasn't real.	0.56 (1.07)
I stayed away from reminders of it.	0.80 (1.04)
I tried not to think about it.	1.34 (1.33)
I was aware that I still had a lot of feelings about it, but I didn't deal with them.	1.14 (1.32)
My feelings about it were kind of numb.	1.20 (1.22)
I tried to remove it from my memory.	1.02 (1.28)
I tried not to talk about it.	1.15 (1.22)

Table D7

Correlations between Traumatic Antecedents, Traumatic Stress Perceptions, and Observed Variables

Observed Variable		Number of Call Types	Novelty	Unpredict.	Traumatic Stress Perceptions
Avoidance Symptoms	*r*	**0.23***	0.19	0.17	0.16
	p	.02	.06	.09	.11
Intrusion	*r*	**0.27****	**0.25***	0.19	**0.38****
	p	.01	.01	.06	<.01
Hyperarousal	*r*	0.18	0.13	.08	**0.26****
	p	.08	.18	.42	<.01
Avoidance Coping	*r*	0.19	0.03	0.001	0.39
	p	.05	.79	.99	<.01
Socially Supported	*r*	0.17	0.11	0.04	**0.21***
	p	.08	.27	.72	.03
Emotion-Focused	*r*	0.03	-0.01	-0.06	**0.25***
	p	.79	.90	.58	.01
Problem-Focused	*r*	0.12	0.07	0.01	**0.25***
	p	.24	.46	.93	.01
LCSE	*r*	-0.08	0.02	-0.01	0.16
	p	.42	.88	.95	.10
Chronic Stress Perceptions	*r*	**0.33****	**0.26****	**0.28***	**0.53****
	p	<.01	.01	<.01	<.01
Harm/Threat	*r*	0.15	0.19	0.19	0.31**
	p	.12	.05	.06	<.01
FWI	*r*	0.19	0.003	-0.02	0.15
	p	.06	.97	.85	.14
WFI	*r*	0.12	0.07	0.12	0.17
	p	.23	.47	.25	.09
Physical Conditions	*r*	**0.23***	**0.20***	**0.24***	**0.20***
	p	.02	.046	.01	.04
Organizational Factors	*r*	**0.31****	0.15	0.16	**0.30****
	p	<.01	.12	.11	<.01
Job/Task Demands	*r*	**0.32****	**0.28****	**0.26****	**0.33****
	p	<.01	<.01	.01	<.01
Unpredict.	*r*	**0.67****	**0.94****	1	**0.59****
	p	<.01	<.01	--	<.01
Novelty	*r*	**0.65****	1	--	**0.61****
	p	<.01	--	--	<.01
Number of Call Types	*r*	1	--	--	**0.68****
	p	--	--	--	<.01

Notes. Items in bold are statistically significant. Unpredict., Unpredictability; LCSE, Lack of coping self-efficacy; FWI, Family-to-work interference; WFI, Work-to-family interference

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).