

OCCUPATIONAL STRESS AMONG EMPLOYEES IN CRIMINAL-LEGAL SYSTEMS:
A META-ANALYSIS

By

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ABSTRACT

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Occupational stress is all too common, especially for employees in the criminal-legal system. Many sources of stress (i.e., stressors) have been shown to be associated with perceived occupational stress in the literature; yet, methodological variations and inconsistent findings across research articles obscure the empirical status of the effect of stressors on occupational stress among criminal-legal employees. To synthesize the research on this stressor-stress link, a meta-analysis was conducted. Based on 80 peer-reviewed articles representing 57 unique data sets that contained 1,993 effect size estimates, random-effects analyses using multilevel modeling techniques were used to establish the grand mean effect of stressors on occupational stress. Results showed a modest effect of stressors on occupational stress ($Mz = 0.15$, 95% CI = [0.13, 0.18]). Importantly, the findings indicate that the strength of the effect size differed by the type of stressor. Specifically, larger effect sizes were yielded if the type of stressor was operational, followed by organizational stressors. The predicted effect size was smaller if the stressor was an individual demographic. Also, certain methodological decisions and study quality indicators moderate this effect. Overall, researchers must continue to explore the dimensions of these stressors to better understand their impact on occupational stress in criminal-legal systems. Theoretical, methodological, and practical implications of the meta-analytic findings are discussed and several directions for future research are identified in an effort to bring synergy to a disjointed evidence base.

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This dissertation is dedicated to
Grandma Sparks (1941-2022) and Grandpa Kaiser (1939-2022).
Always loved.
Never forgotten.
Forever missed.

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CHAPTER 1: INTRODUCTION

Statement of the Problem

Occupational stress continues to be a prevalent and enduring aspect in the workplace of the 21st century. Indeed, the effect of stress on employees is estimated to cost USA companies \$300 billion per year (Fink, 2016), and 2 out of every 3 employed adults view their work as a significant source of stress (American Psychological Association, 2020). Work, however, experienced unprecedented changes across most job sectors in the past few years, adversely affecting employees' levels of stress. For example, the COVID-19 pandemic required many employees to work from home, which has been associated with higher levels of stress due to family issues and social isolation (Galanti et al., 2021). In short, stress is a highly pervasive phenomenon in the workplace that can vary between employees depending on a range of individual factors and the social environment.

Scholars draw on many theoretical frameworks to understand the stress phenomenon. Yet, it would be remiss not to mention the pioneering work of Hans Selye who introduced the first conceptualization of 'stress' in a medical context—a borrowed term already found in physics and engineering—with his concept of General Adaptation Syndrome (GAS; Selye, 1936, 1956). Briefly, Selye's concept of GAS asserts that non-specific physiological changes of the body from any form of environmental demands or noxious stimuli (i.e., a given stressor) unfold in three distinct phases (i.e., Alarm phase, Resistance phase, and Exhaustion phase). Selye's conception of stress and specific aspects of GAS—along with other stress scholars such as Claude Bernard, Sir William Osler, and Walter Cannon (Robinson, 2018)—paved the way for stress research across numerous academic disciplines. Extant research demonstrates stressors experienced by employees within corporate-type organizations contribute to adverse

consequences related to attitudes, behaviors, and physiology. For example, stress in the workplace has been linked to negative responses, including increased likelihood of absenteeism (Darr & Johns, 2008), low job satisfaction (Ahsan et al., 2009), and poor performance (Hon & Chan, 2013) as well as negative effects on physical and mental well-being (Chen et al., 2009; Gray-Stanley et al., 2010; Kivimäki et al., 2006; Li et al., 2014).

Similarly, occupational stress is universally experienced by professionals in the criminal-legal system (e.g., law enforcement, jails, courts, prison, community supervision). Indeed, exposure to a range of personal, operational, and organizational stressors is inherent to professions within these systems. Police officers commonly work extended hours in evolving environments. Judges witness graphic testimonies and gruesome evidence. Probation officers have high caseloads that involve monitoring special criminal-legal populations. As such, criminal-legal professionals are particularly at risk for experiencing occupational stress—arguably more so than employees in corporate-type settings. For example, research focusing on police officer stress suggests that officers who experience organizational and role-related stressors are more likely to experience psychological distress responses (Bishopp et al., 2019; Duxbury & Halinski, 2018; Frank et al., 2017). Moreover, occupational stress is associated experiencing adverse physical responses to stress among police officers (for a review, see Violanti et al., 2017).

The scientific community has accumulated a decent body of research evidence concerning the relationship between various stressors and stress responses among professionals in the criminal-legal system. While scholars, practitioners, and policymakers may agree that occupational stress is widespread in criminal-legal systems, the research has been guided by different definitions and theoretical perspectives of stress which have contributed to theoretical

indeterminacy in the literature. Indeed, there is no universally agreed upon conceptualization of stress. A read of the literature on stress will reveal a common statement made by authors over the past few decades:

Compounding and perpetuating this view of stress is the fact that stress remains a term without conceptualization and without definitional and operational agreement (Schuler, 1980, p. 187).

The word stress has been described as the most imprecise in the scientific dictionary (Ivancevich & Matteson, 1980, p. 5).

Occupational stress shares with other types of stress some problems arising from the fact that stress is a commonly used word among the public and researchers and workers in many professions. It has already been defined in many ways, both technical and popular, and it is too late to impose a single definition acceptable to all parties (Beehr, 1995, p. 8).

While research on stress has burgeoned, there remains no single accepted usage of the term 'stress' (Liberman et al., 2002, p. 422).

The starting point in this chapter should be to provide a clear, coherent and precise definition of occupational stress. Unfortunately, this is not straightforward. Despite the key words 'occupational stress,' 'work stress,' and 'job stress' being used in 2,768 scientific articles published during the 1990s, the scientific community has still not reached an agreed position on the meaning and definition of occupational stress (Hart & Cooper, 2002, p. 94).

Despite the widespread use of the word in both academic and nonacademic publications, there was a noticeable lack of consensus with regard to what actually constitutes stress. This situation evolved, in no small part, as a result of the various ways in which stress was operationalized (Dowden & Tellier, 2004, p. 32).

Stress is a creatively ambiguous word without a universally agreed scientific definition (C. L. Cooper & Quick, 2017, p. 2).

The discipline continues to be challenged with the problem of operationalizing the concept. The ways in which the term stress is used in research is almost as subjective as an individual's experience of a stress. Despite the term's definitional problems, almost every discipline in the biological and social sciences today has some sort of subdiscipline devoted to the study of stress, reflecting both its relevance and mystery (Robinson, 2018, p. 341).

There is no singular definition of job stress in the correctional literature (Mack & Rhineberger-Dunn, 2022, p. 20).

Given the ongoing academic and public discourse about defining occupational stress, it has been recommended (see, e.g., Beehr, 1995; Lazarus & Folkman, 1984) that the word ‘stress’ be referenced only as an umbrella construct for an area of interest and not used as a variable in empirical tests. Stress being defined in different ways may simply reflect empirical reality, and research can only come close to measuring one dimension of this construct at a time.

Complicating matters further, research on this topic is extremely broad and diverse. Stress in criminal-legal systems, specifically, has been examined on a variety of stressor categorizations, using disparate stress measurement approaches and theoretical perspectives, and across various article characteristics. For example, Morash, Lee, and colleagues (2006) synthesized common police stressor categorizations found in the scholarship: (1) policy, procedure, bureaucratic structure, reorganization, and promotion competition; (2) stressors intrinsic to police work itself; (3) interpersonal conflict; (4) criminal-legal system, media, and public; (5) individual’s goal, role conflict, job security; and (6) marital conflict and family problems. Yet, Finn and Tomz (1996) proposed four sources of police stress: (1) stressors related to the law enforcement organization; (2) stressors related to law enforcement work; (3) stressors related to the criminal-legal system and public; and (4) stressors related to the individual officer’s personal life. With a disjointed typology of stressor domains, it is difficult to know which stressors have the greatest effect in the literature.

At the same time, scholars employ different stress models in their research, and it is hard to know which stressors matter more when assessing their empirical status across disparate theoretical frameworks. The issue is compounded by the fact that some criminal-legal and psychology scholars who investigate stress are operating in empirical silos. For example, Robert Agnew’s general strain theory (GST; Agnew, 1992, 2001, 2003) of crime and delinquency has

been used by criminologists to explain the stress process in the workplace (see, e.g., Bishopp et al., 2016, 2019; Wu et al., 2017). While contemporary research offers support for general strain theory (see, e.g., Isom Scott & Grosholz, 2019; B. Moon et al., 2008; Turanovic & Pratt, 2013), the theory—which continues to be used by scholars to investigate work stress—is undermined by insufficient integration of stress lexicons and of theoretical frameworks on stress typically found in the field of psychology. In short, there appears to be a lack of interdisciplinary collaboration among scientific disciplines, resulting in a fragmented literature on stress. Criminologists continue to examine occupational stress among criminal-legal professionals with disparate approaches and adding empirical advances to an already disjointed scholarship. The discipline risks losing sight of the effect of certain stressors on stress if it neglects to synthesize the evidence relating to stressors and occupational stress across such variations. Given this complexity, scholars need to investigate which stressors matter the most and whether those effects vary under certain conditions.

Research Aims

Accordingly, the current study conducts a meta-analytic examination of literature on stressors and occupational stress among professionals in the criminal-legal system. The objectives of this study were two-fold: (1) to rank stressors included in articles according to their impact on occupational stress. By developing an empirically justified rank order of stressors, researchers will have a better understanding of the stressors that shape stress and can ensure salient predictors of stress are integrated in criminal-legal research in the future; and (2) to examine the degree to which the magnitude of the relationship between stressors and occupational stress was conditioned by methodological decisions and study quality indicators.

To unpack a somewhat chaotic state in the literature on occupational stress among criminal-legal employees, it is important to summarize, integrate, and interpret empirical research on this topic. Meta-analysis focuses on quantitative synthesis of research findings from a selected set of comparable articles. Meta-analytic techniques treat each included article as the unit of analysis. Each article is essentially ‘interviewed’ by the meta-analyst who carefully reviews the included articles and encodes their findings (i.e., effect size statistics) on a standardized scale, such that meta-analysts can meaningfully analyze and compare the values across articles (H. Cooper et al., 2019; Hall & Rosenthal, 1995; Lipsey & Wilson, 2001; Wolf, 1986). The body of research on stressors and occupational stress in a criminal-legal context was subjected to a meta-analysis to answer the broad research question: *What does the literature say is the average effect of stressors on occupational stress among criminal-legal employees?*

Study Outline

Moving forward, ‘Chapter 2: Theoretical Orientation of Occupational Stress’ consists of three sections. The first section – ‘What is Stress’ – offers an overview of the different conceptualizations of stress. With this foundation set, the second section – ‘Theoretical Models’ – reviews relevant models on occupational stress in the fields of psychology and criminology. The focus of this section is upon stress models in a workplace context. The final section – ‘Conclusion’ – summarizes the complexity of the topic and offers a solution to summarize and analyze a body of research.

‘Chapter 3: The Nature of Meta-Analysis’ consists of six sections. The first section – ‘History of Meta-Analysis’ – summarizes the modern era of meta-analysis, as well as key methodological and statistical underpinnings of meta-analysis. With this historical context set, the second section – ‘A Note on Terminology’ – provides a glossary of terms to offer definitions

of commonly used concepts when conducting reviews of empirical research. The third section – ‘The Concept of Effect Size Estimates’ – describes the index (i.e., dependent variable) used to represent empirical findings in meta-analysis: effect size statistics. The fourth section – ‘The Strengths of Meta-Analysis’ – discusses why a scholar should consider using meta-analysis to statistically summarize a body of research on a particular topic. The fifth section – ‘Methodological Debates in Meta-Analysis’ – highlights key concerns about meta-analysis relating to uses, applications, and methodological decisions and techniques. The final section – ‘Current Study’ – presents this study’s primary research questions.

‘Chapter 4: Project Design and Implementation’ consists of six sections. The first section – ‘Sample of Studies’ – describes the proposed study retrieval process with particular attention given to the article eligibility criteria. The second section – ‘Effect Size Estimate’ – describes the calculations to produce standardized effect size estimates and the process to adjust effect sizes for bias prior to statistical analysis. The third section – ‘Moderator Variables’ – describes the variables used to examine if methodological decisions impact the effect size estimate. In particular, it conceptualizes the types of stressors commonly found in the included articles. The fourth section – ‘Study Quality’ – outlines the process to incorporate study quality indicators into the meta-analysis. The fifth section – ‘Publication Bias’ – addresses issues regarding the “file drawer problem”, which is a concern among some meta-analysts. The final section – ‘Analytic Strategy’ – describes the study’s two-pronged approach to meta-analyze the data. One set of analyses will follow a traditional methodological paradigm while the other will challenge this dominant approach to meta-analysis by using a multilevel approach.

‘Chapter 5: Results’ consist of three sections, which summarize this study’s key research findings. The first section – ‘Introduction’ – reviews the analytic steps associated with each

paradigm of meta-analysis. The second section – ‘Multilevel Models’ – describes the meta-analytic results from a hierarchical data set using multilevel analyses, with particular attention given to the types of stressors that have the largest impact on occupational stress. The third section – ‘Random-Effects Inverse-Variance Weighted Models’ – focuses on findings from a traditional methodological paradigm to meta-analyze data, which creates an independent set of effect sizes. The study’s findings intervene on a major methodological debate among meta-analysts—addressing statistical dependence in meta-analytic data. While the current meta-analysis can contribute to the conversation on this issue, it cannot cast the deciding vote. Meta-analysts are likely to continue to debate these disparate methodological approaches to achieve statistical independence.

‘Chapter 6: Discussion & Conclusion’ consists of five sections. The first section – ‘Introduction’ – briefly reviews the situation relating to occupational stress among criminal-legal professionals and the heart of the problem with this literature, as well as the study’s research aims and design. The second section – ‘Summary of Findings’ – summarizes this study’s key research findings. Section three – ‘Implications’ – discuss the ways in which this study contributes to stress theory, research, and practice in the field of criminology. The fourth section – ‘Limitations and Future Research’ – help highlight what criminology still does not know on this topic and what needs to be examined moving forward. The final section – ‘Conclusion’ – underscores this study’s contribution to the science on occupational stress in the field of criminology and its utility to criminal-legal practitioners who aim to reduce stress in the workplace.

CHAPTER 2: THEORETICAL ORIENTATION OF OCCUPATIONAL STRESS

What is Stress?

Stress is a highly personal and subjective experience because an individual must interpret an event, situation, or comment as stressful. When faced with a stressful situation in the workplace, for example, Employee A may feel stress while Employee B may be able to successfully cope with the situation. Certain types of stress (i.e., eustress or ‘good stress’; Selye, 1976) can be beneficial to employees, but when stress becomes overwhelming, it can lead to adverse outcomes for both employees and organizations. Yet, the term ‘stress’ is used loosely when describing those unpleasant states. Employees may say they are stressed when they feel angry, anxious, frustrated, or overwhelmed. Despite the ubiquity of the term, stress is a vague concept. A read of the stress literature reveals that scholars have had a difficult time agreeing on an acceptable definition of stress. Some conceptualizations of stress are:

Response of the body to any demand, whether it is caused by, or results in, pleasant or unpleasant conditions (Selye, 1976, p. 74).

I have used the word [stress] in biology to indicate that state within a living creature which results from the interaction of the organism with noxious stimuli or circumstances, i.e., it is a dynamic state within the organism; it is not a stimulus, assault, load, symbol, burden, or any aspect of environmental, internal, external, social or otherwise (Wolff as cited in Hinkle, 1974, p. 339).

Any vigorous, extreme, or unusual stimulation which being a threat, causes some significant change in behavior (Miller as cited in Lazarus & Folkman, 1984, p. 15).

The subjective evaluation of the level of experienced stress associated with specific stressors, and job dissatisfaction, job search, and other negative work outcomes (Cavanaugh et al., 2000, p. 65).

Psychological stress, therefore, is a relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being (Lazarus & Folkman, 1984, p. 21).

...support for systematic associations between measures of chronic stress at work (in terms of high effort-low reward)... (Siegrist, 1996, p. 37).

...a particular individual's awareness or feeling of personal dysfunction as a result of perceived conditions or happenings in the work setting (Parker & DeCotiis, 1983, p. 161).

A working definition of stress that fits many human situations is a condition in which an individual is aroused and made anxious by an uncontrollable aversive challenge (Fink, 2016, p. 4).

In sum, despite extensive effort to agree on the meaning and process of stress, scholars across disciplines have yet to reach consensus. Appropriately, the research question(s) typically determines a researcher's choice of one definition over another. For example, a scholar who is interested in the emotional factors of stress among criminal-legal employees may focus on domains such as perceived frustration or anxiety. In contrast, a medical researcher who is investigating the physiological mechanisms of stress will be more concerned about the neuroendocrine, cellular, and molecular infrastructure involved in the stress response.

Perspectives of stress can roughly be divided into two categories: (1) stress as either a stimulus or response; or (2) stress as an individual/environmental interaction or transaction (Brough et al., 2009; C. L. Cooper & Quick, 2017; Cox & Griffiths, 2010; Lazarus & Folkman, 1984). Stimulus and response definitions represent early conceptualizations of stress. Stressful stimuli—which Selye terms 'stressors'—are events, situations, individuals, comments, or other internal or external factors that place demand on or impact an individual. Thus, a stimulus definition of stress assumes certain events are normatively stressful and portrays individuals as reactive to stimulus, ranging from major, cataclysmic events in the environment to noxious conditions to daily hassles. However, stimulus definitions do not allow for individual differences when appraising events. In contrast, stress is commonly defined in a medical and biology context using a response approach, as in the work of Hans Selye. When a definition of stress emphasizes

the response, it refers to a state of stress: the individual is reacting with stress, is under stress, or is being disrupted. Yet, a response definition offers no way to prospectively identify stressors. Indeed, an individual must experience the reaction to define the event as stressful. Furthermore, responses typically associated with stress may not necessarily indicate a state of stress. Pain, for example, will occur from getting a tattoo while the individual may still feel relaxed and at peace with hearing the rhythmic sound of the tattoo machine. A response cannot be consistently classified as stress without reference to the stimulus. In sum, stimulus-response definitions of stress have limited utility because they are circular. They make scholars ask: what is it about the stressor that engenders a given stress response, and what properties about the stress response that suggest a given stressor? What defines stress is neither the stressor nor stress response alone, but the bidirectional nature of the relationship between the two (Brough et al., 2009; C. L. Cooper & Quick, 2017; Cox & Griffiths, 2010; Lazarus & Folkman, 1984).

The lack of consideration in stimulus-response definitions on how the individual interprets the stimuli resulted in a second broad category of stress explanations: relational approaches to stress, as in the formative work of Richard S. Lazarus and Susan Folkman (1984). Relational definitions of stress emphasize relationships among individuals and environments. Furthermore, it accounts for both individual characteristics and the properties of the stimulus that underlie the relationship. Individuals appraise whether the stimulus taxes or exceeds their coping resources (e.g., self-efficacy), situational factors (e.g., job autonomy), and coping styles (e.g., how a similar experience was coped with in the past; Boyd et al., 2009; Dewe & Cooper, 2007; Lazarus & Folkman, 1984). If overwhelmed, the appraisal determines the significance of the transaction on well-being. In other words, the person-environment relationship—and whether it is stressful—relies on constant cognitive appraisal of stimuli within an environment. This

cognitive process results in meaning and significance being ascribed to a specific individual/environmental transaction. The variation in individual characteristics and the complexity with environmental factors explains heterogeneity of stress processes. In sum, inherent within the transactional approach are many factors in the individual and environment that must converge to produce stress and its response.

Theoretical Models

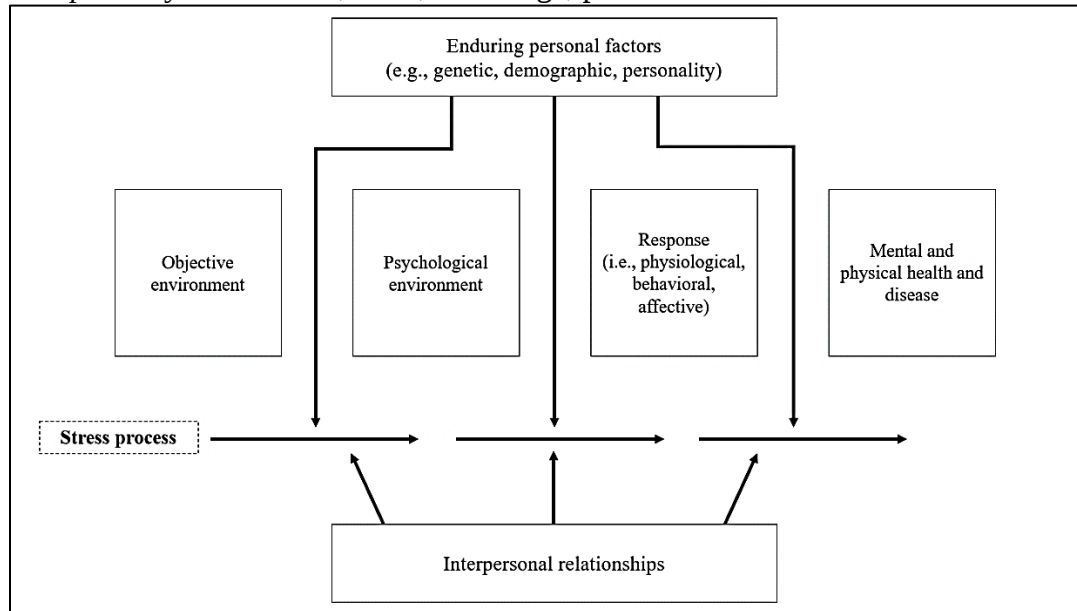
The prior section discussed how the conceptualization of stress is inconsistent across disciplines. The implications of this study's findings cannot guide decision-making regarding how best to define stress. The debate on how to conceptualize stress will not be settled here because the current meta-analysis only included articles investigating perceived occupational stress among criminal-legal professionals. Rather, the focus of this section is to provide readers with a general notion of common frameworks of perceived stress, thereby providing a theoretically grounded starting points for future research on stress among criminal-legal employees. Given this complexity, numerous theoretical models have been developed to explain the etiology of stress in the workplace. This section will mainly restrict the discussion to theoretical frameworks on occupational stress, rather than general life stress models (e.g., Transactional Model of Stress; Lazarus & Folkman, 1984).

Michigan Model of Occupational Stress. Scholars from the University of Michigan Institute for Social Research developed one version of the well-known Michigan model (see Figure 1; French & Kahn, 1962; House, 1991; Katz & Kahn, 1978). The model provides a robust framework for conceptualizing the various factors and complex relationships found within the workplace. The Michigan model represents a relational approach to stress. The underlining assumption is that occupational stress unfolds through complex and dynamic processes. The

model suggests that individual or environmental characteristics influence an employee's perception of the occupational stress process. Stressors, perceived stress, short-term responses, and modifying characteristics all influence each other and long-term health outcomes (i.e., reciprocal relationships).

Objective stressors experienced by employees represent psychosocial and environmental conditions, such as death of a colleague, meeting deadlines, role overload, and dangerous job activities. Yet, exposure to those stressors does not necessarily result in adverse outcomes; rather the employees must perceive these conditions as stressful. If perceived as stressful, short-term responses to stress can include physiological reactions (e.g., increased blood pressure), psychological reactions (e.g., feeling anxious), and behavioral reactions (e.g., drug use). In situations where employees experience chronic perceived stress and short-term reactions to stress, the model posits that long-term negative health outcomes may emerge, such as cardiovascular disease, suicidal ideation, and substance use disorder. Finally, a number of individual and situational factors may modify how an employee experiences the stress process based on certain social, psychological, biophysical, behavioral, and genetic variables.

Figure 1. Michigan Model of Occupational Stress. Adapted from *Psychological stress in the workplace* by T. A. Beehr, 1995, Routledge, p. 31.

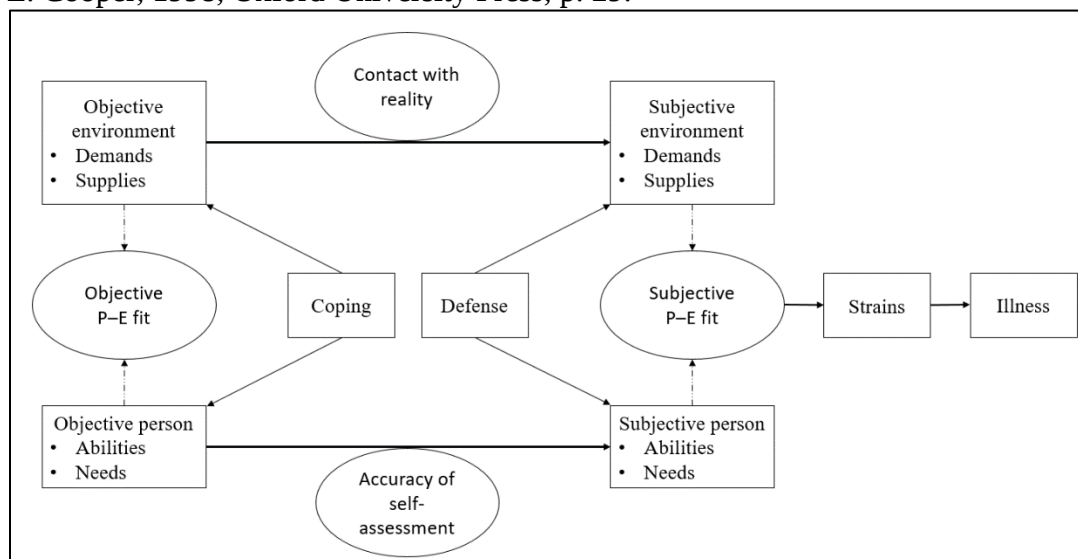


Person-Environment Fit Model. A second well-known Michigan model is the Person-Environment fit theory of stress (P-E fit; French et al., 1974), which was later elaborated on by Caplan (1983), Harrison (1985), and Edwards (1996; see Figure 2). The theory of P-E fit explicates two types of misfits that contribute to adverse health outcomes for employees: (1) an employee has inadequate abilities that coincide with the job's demands and (2) an employee's needs are misaligned with the job's provision of rewards and supplies. Thus, the core premise of the theory is that occupational stress arises from a misfit between the employee and the work environment. Consistent with relational approaches to stress, P-E fit theory emphasizes dynamic processes between person and environment and how person and environment jointly influence outcomes.

The first type of P-E fit involves the demands of the environment and the abilities of the employee. Demands represent subjective or objective requirements of the job, role expectations, and cultural norms of the workplace, whereas abilities may include training, skills, knowledge,

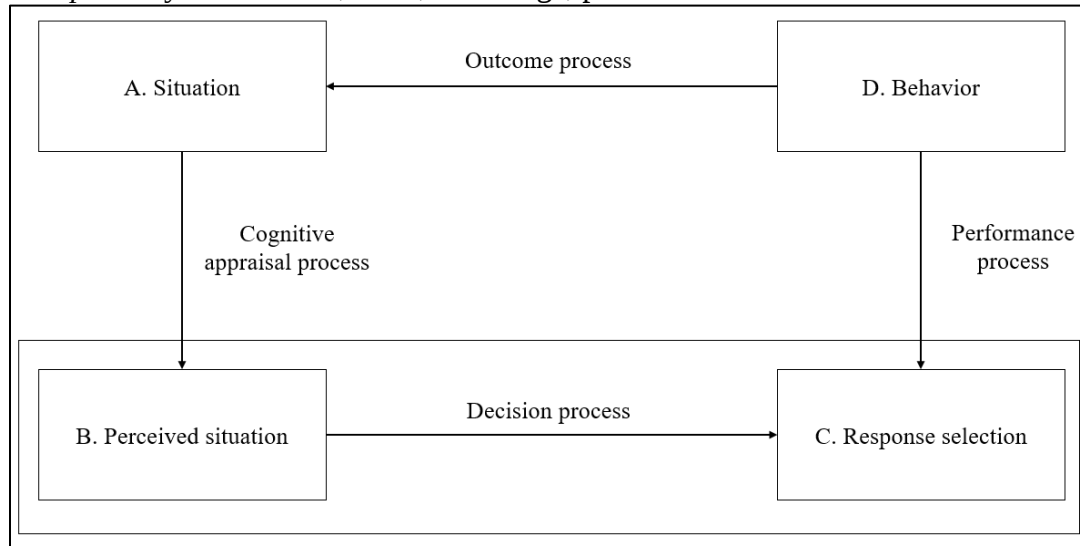
and energy an employee must expend to meet demands. The second type of P-E fit involves the alignment between the needs of the employee and the supplies in the workplace that relate to the employee's needs. An employee's needs consist of innate biological and psychological requirements, whereas environmental supplies include extrinsic and intrinsic resources and rewards (Edwards et al., 1998).

Figure 2. Person-Environment Fit Model. Adapted from *Theories of organizational stress* by C. L. Cooper, 1998, Oxford University Press, p. 29.



Response Selection Model of Stress. McGrath's (1976) response selection model of stress represents another approach to examine stress in the workplace (see Figure 3). In this model, similar to the prior Michigan models, an objective working situation is perceived. However, the response selection model differs from the previous two models because it strongly emphasizes the cognitive appraisal in this perception process. The employee's appraisal of the situation leads to the decision-making process of the model in which an employee decides whether to engage in a specific stress response. While the Michigan models focus on a range of physiological, psychological, and behavioral responses to stress, the response selection model of stress was designed to primarily explain voluntary performance behaviors, such as task performance.

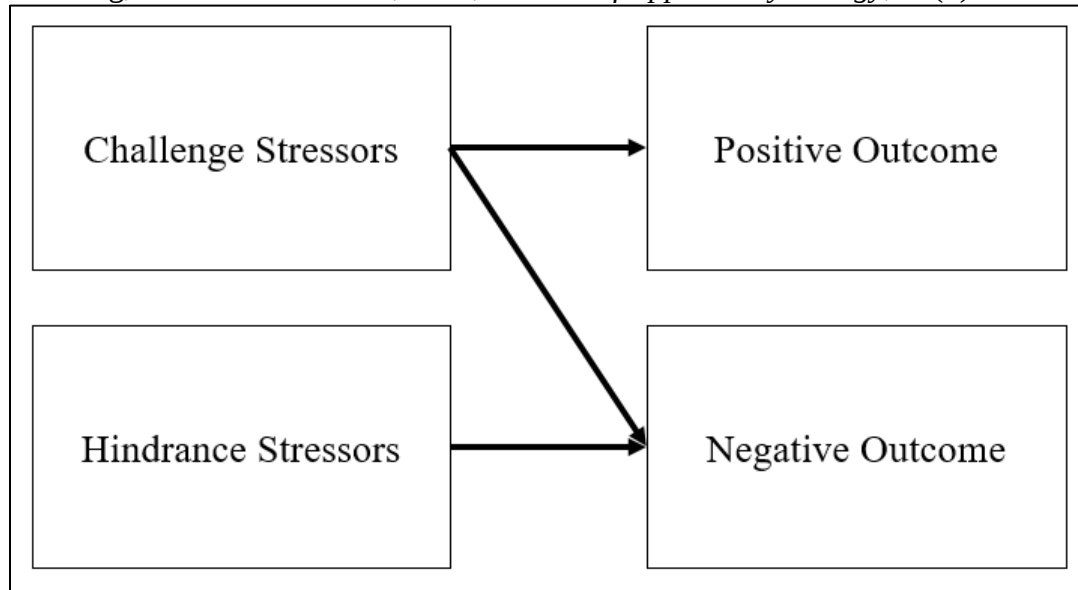
Figure 3. Response Selection Model of Stress. Adapted from *Psychological stress in the workplace* by T. A. Beehr, 1995, Routledge, p. 32.



Challenge-Hindrance Stress Model. The Challenge-Hindrance Stress Model (CHM) proposes that workplace stressors can be categorized into challenge stressors and hindrance stressors (Cavanaugh et al., 2000; see Figure 4). Employees subjected to challenge stressors experience performance opportunities, whereas hindrance stressors will disrupt an employee's performance or goals. While challenge stressors (e.g., workload and impending deadlines) have the potential to lead to adverse psychological, physical, and behavioral responses to stress, they do not necessarily cause such outcomes. Indeed, challenge stressors offer opportunities for employees to feel a sense of fulfillment or professional growth and development. In contrast, hindrance stressors will result in specific stress responses by employees and will not increase their feelings of achievement. Job conditions that prevent employees from carrying out responsibilities in the workplace or organizational constraints represent common hindrance stressors. The model posits that hindrance stressors are more associated with negative outcomes compared to challenge stressors. Until recently (see, e.g., Searle & Auton, 2015; J. R. Webster et

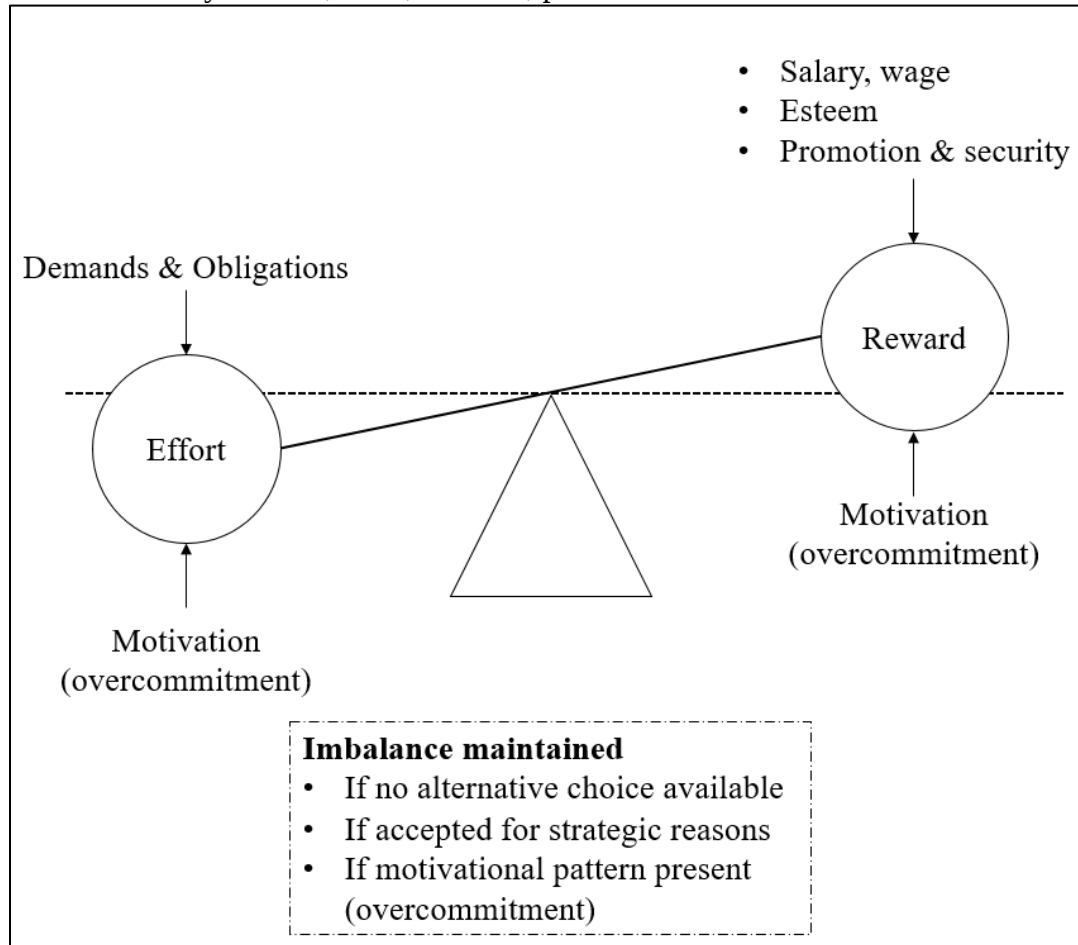
al., 2011), CHM did not explicitly incorporate cognitive appraisals into the stress process even though employee perceptions of both types of stressors are appraisals at their core.

Figure 4. Challenge-Hindrance Stress Model. Adapted from “An empirical examination of self-reported work stress among U.S. managers” by M. A. Cavanaugh, W. R. Boswell, M. V. Roehling, and J. W. Boudreau, 2000, *Journal of Applied Psychology*, 85(1).



Effort-Reward Imbalance Model. In the Effort-Reward Imbalance (ERI) model, occupational stress results from an unfairness regarding the reciprocity between the effort expended by an employee and the reward received (Siegrist, 1996, 2005; see Figure 5). In other words, the model proposes that high effort and low reward (i.e., effort-reward imbalance) jointly increase the risk of short-term and long-term negative outcomes (van Vegchel et al., 2005). Thus, the principles of social reciprocity and distributive justice (Adams, 1965) in the work environment are at the core of this model. Efforts include the employee’s job demands and work responsibilities, whereas rewards represent financial compensation, recognition, and job advancement that the employee expects in return from the organization.

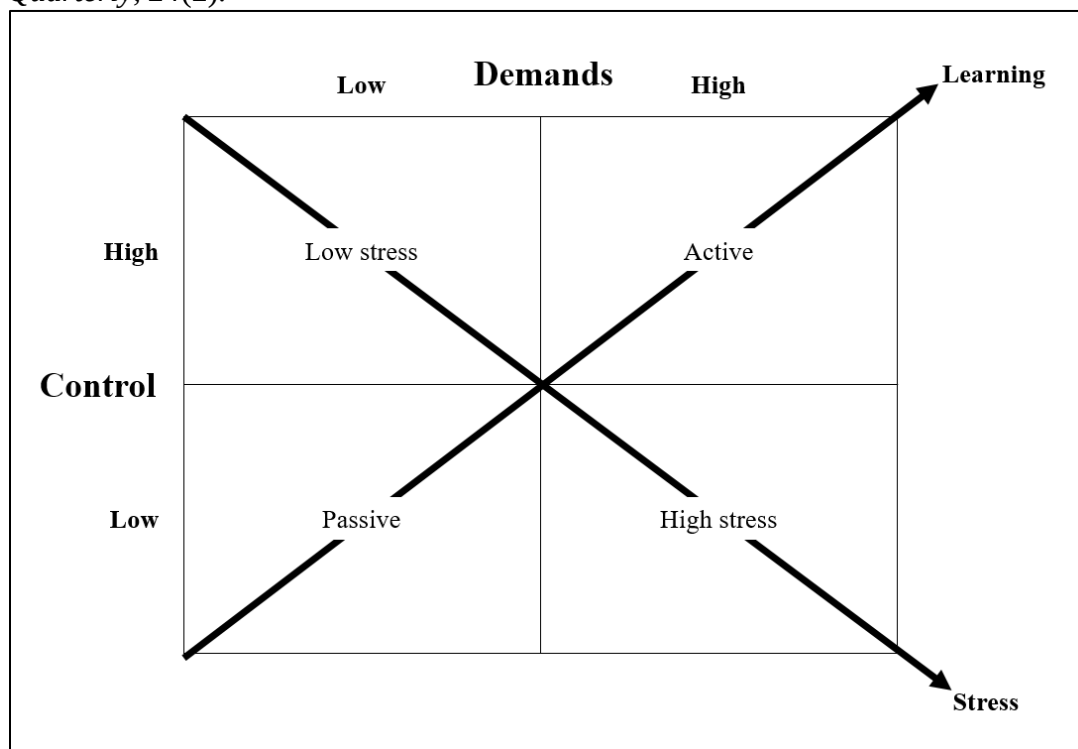
Figure 5. Effort-Reward Imbalance Model. Adapted from *Stress: Concepts, Cognition, Emotion, and Behavior* by G. Fink, 2016, Elsevier, p. 83.



Job Demand Control Model. Robert Karasek's (1979) Job Demand Control model (JDC model; also called Demand Control Support model) represents another well-known model that explains how certain job characteristics affect occupational stress and psychological well-being (see Figure 6). The model emphasizes two important work-related factors: demands (i.e., height of strain) and control (i.e., decision latitude). Demands in the work environment include excessive job requirements, unrealistic deadlines, taxing work, and role ambiguity, whereas control focuses on the autonomy or freedom that employees have in their job when it comes to selecting and performing job-related duties. While factors such as competence and decision-making authority underline control, the JDC model also recognizes the benefits of forming

strong relationships with colleagues and supervisors to cope with stress. The model posits that employees who have an excessive workload will experience occupational stress if they perceive a low level of personal control in the work environment. As such, the combination of high demands and low control leads to high occupational stress. However, employees can manage excessive job demands—which in turn reduces the likelihood of stress—by gaining control and autonomy over their job and developing meaningful social supports at work.

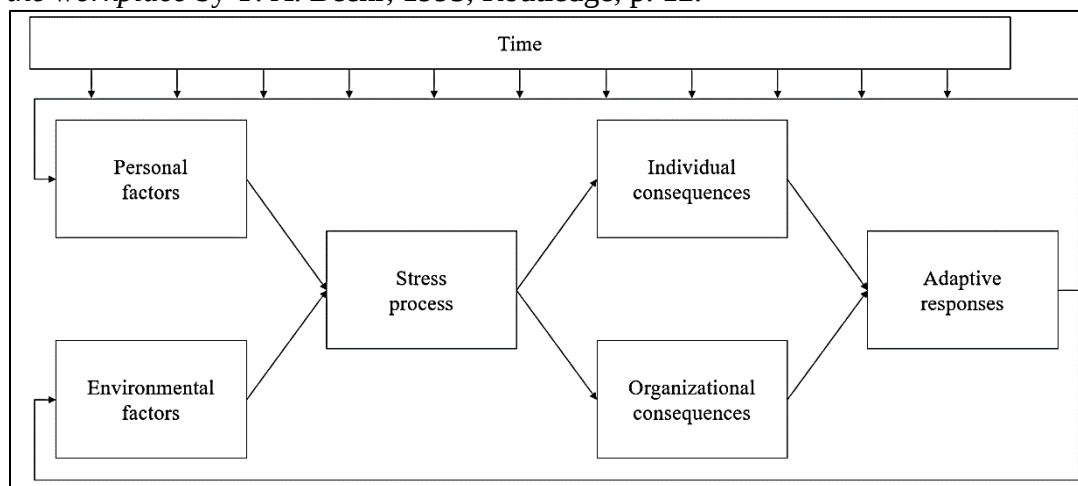
Figure 6. Job Demand Control Model. Adapted from “Job demands, job decision latitude, and mental strain: Implications for job redesign” by R. A. Karasek, 1979, *Administrative Science Quarterly*, 24(2).



Beehr-Newman Model of Occupational Stress. For some models, theoretical breadth and comprehensiveness are emphasized over parsimony, as seen in the Beehr-Newman model of occupational stress (Beehr, 1995; Beehr & Newman, 1978; see Figure 7). The Beehr-Newman model incorporates all elements found within the previously discussed frameworks and virtually all theoretical perspectives about the topic. Personal facets (e.g., demographics, psychological

conditions) and environmental facets (e.g., job demands and task characteristics, organizational characteristics and conditions) lead to human consequences (e.g., psychological health, physical health, behavioral consequences) and organizational consequences (e.g., changes in quality of work life, changes in quality of job performance). These relationships have an intervening step through psychological and physical processes, and factors, such as time and adaptive responses, influence the occupational stress process. The Beehr-Newman model serves as a starting point for researchers to develop hypotheses, models, and theories on stress that can be empirically tested. In other words, this is a type of model that is meant to serve as theoretical guidance but not meant to be proved or disproved.

Figure 7. Beehr-Newman Model of Occupational Stress. Adapted from *Psychological stress in the workplace* by T. A. Beehr, 1995, Routledge, p. 12.



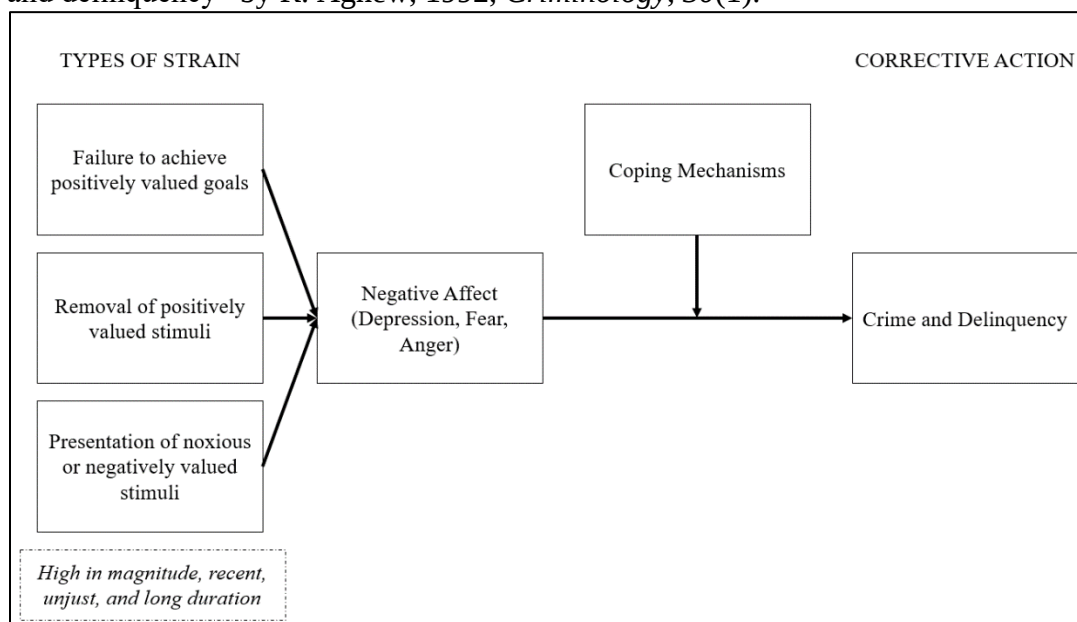
General Strain Theory. While not specifically designed to examine the concept of stress in the workplace, General Strain Theory (GST; see Figure 8) has been used to investigate stress among criminal-legal professionals in the field of criminology (see, e.g., Bishopp et al., 2019, 2020; M. M. Moon & Jonson, 2012; Swatt et al., 2007). In the first iteration of GST, Agnew (1992) proposed that strain leads to negative affect within persons which in turn increases their likelihood of crime and delinquency. GST is comprised of two central elements: (1) negative

relationships which represent “strain” and (2) negative affective states. Additionally, factors, such as coping skills and resources or social supports, may condition the effect of strains on deviant behaviors. Agnew conceptualized individual level strain as three dimensions of negative relationships with systems or others: (1) failure to achieve positively valued goals; (2) removal of positively valued stimuli; and (3) presentation of noxious or negatively valued stimuli. Strains most likely to result in deviant behavior are those that are perceived as severe, recent, unjust, and frequent (Agnew, 2001). These manifestations of strain engender negative emotional states, particularly anger. This uncomfortable event of experiencing strain pressures individuals to seek out ways to attenuate the negative event and affect, which GST proposes crime and delinquency as one possible adaptation. Specifically, individuals are pressured into delinquent behaviors because (1) approved abilities and resources to address strain may be taxed; (2) the cumulative effect of strain may compromise one’s threshold in dealing with adverse and complex conditions; (3) the cumulative nature of strain may engender aggressive orientations and attitudes; and (4) strain consistently applied to persons may increase their likelihood that they experience negative affect at any given time. In other words, delinquency and crime served as a method to escape from strain—correcting the negative affect associated with it.

While the development of GST was informed by stress and psychological literature, the framework suffers a lack of theoretical integration. It fails to acknowledge and incorporate much of the prior stress research and lexicons found in other academic disciplines. To cite a few examples of misspecification by Agnew, he stated “Three sources of strain have been presented...” (Agnew, 1992, p. 59), “Each type of strain increases the likelihood that individuals will experience one or more of a range of negative emotions” (Agnew, 1992, p. 59), and “General strain theory (GST) states that a range of strains or stressors increase the likelihood of

crime” (Agnew, 2008, p. 101). While it may be semantics to some, viewing ‘sources of strain’ and ‘types of strains’ or ‘strains’ and ‘stressors’ as synonymous terms further contributes to theoretical intermediacy in an already chaotic literature (for examples of other scholars perpetuating Agnew’s misspecification, see, e.g., Bishopp et al., 2016, 2019; Wu et al., 2017). Stressors, stress, strain (i.e., stress response), and organizational consequences of stress have distinct conceptualizations in other disciplines, like psychology.

Figure 8. General Strain Theory. Adapted from “Foundation for a general strain theory of crime and delinquency” by R. Agnew, 1992, *Criminology*, 30(1).



Conclusion

Agnew most likely developed GST in good faith and saw the productive and constructive benefits of borrowing concepts and theories from other academic disciplines. However, GST is a quintessential example in the field of criminology of how scholars are speaking past one another when discussing and researching stress. Clearly, this issue is broader than just GST. We have taken a lengthy excursion across theoretical models of occupational stress, and it is evident that scholars who want to investigate this concept have numerous options to choose from and many

decisions to make regarding occupational stress. Indeed, criminal-legal scholars and criminologists can select from a buffet of definitions and theoretical models to study the stress process in the workplace. All of the ambiguities and complexities related to work stress, however, have contributed to a disjointed evidence base on occupational stress in criminology. A quick read of the criminal-legal stress scholarship reveals variations regarding theoretical orientations, measurement strategies and rigor, and empirical findings across articles, which have produced theoretical indeterminacy in the literature. When a literature base reaches this point, it is imperative for scholars to take stock of the research evidence. One method to achieve this is through a meta-analysis, which is discussed in the chapter that follows.

CHAPTER 3: THE NATURE OF META-ANALYSIS

History of Meta-Analysis

If, as is sometimes supposed, science consisted in nothing but the laborious accumulation of facts, it would soon come to a standstill, crushed, as it were, under its own weight. The suggestion of a new idea, or the detection of a law, supersedes much that has previously been a burden on the memory, and by introducing order and coherence facilitates the retention of the remainder in an available form...Two processes are thus at work side by side, the reception of new material and the digestion and assimilation of the old; and as both are essential we may spare ourselves the discussion of their relative importance. One remark, however, should be made. The work which deserves, but I am afraid does not always receive, the most credit is that in which discovery and explanation go hand in hand, in which not only are new facts presented, but their relation to old ones is pointed out (Rayleigh, 1885, p. 20).

During the Right Honorable Lord Rayleigh's presidential address to the 54th meeting of the British Association for the Advancement of Science held in 1884, he reminded the academic community about the importance of research synthesis. Making sense of numerous articles that aim to answer similar research questions can be challenging, particularly when relevant articles employ disparate methods and analytic approaches and when they are spread across numerous journals that are affiliated with a wide range of academic disciplines (H. Cooper et al., 2019; Denney & Tewksbury, 2013; Turanovic & Pratt, 2021). Without strategies to synthesize the results of past investigations of the same phenomenon, a disjointed evidence base may emerge. Indeed, scholars long ago recognized a body of empirical literature can be influenced by methodological decisions or biased by researchers favoring certain results during narrative reviews of the literature (Booth et al., 2016; Hunt, 1997). Early examples of research synthesis as a scientific enterprise existed in the 18th and 19th century (see, e.g., Lind, 1772; Nichols, 1891), but it was not until the 20th century when researchers acknowledged the dizzying array of empirical literature on the same problem with positive, null, and negative results. Thus, the visibility of research synthesis as we know it today proliferated during this time.

In 1904, for example, Karl Pearson reviewed research evidence on the effects of serum inoculations against typhoid fever. Using incidence and mortality statistics of British soldiers from 11 research reports, Pearson calculated effect size estimates (i.e., correlation coefficients) for each article and then synthesized the estimates within two subgroups to produce average correlations between survival and inoculation (Pearson, 1904). In 1916, Thorndike and Ruger (1916) calculated average effect size estimates from two studies examining the effects of outside air and recirculated air in classrooms on various abilities among students. A couple decades later, psychologists synthesized 60 years of research evidence about extra-sensory perception (J. G. Pratt et al., 1940). Other examples of synthesizing the results of separate but similar research occurred during the first half of the 20th century (see, e.g., Fisher, 1925; C. C. Peters, 1933; Yates & Cochran, 1938).

By the middle of the 20th century, an influential figure in psychology—Hans Eysenck—argued that psychotherapy had no beneficial effects on patients (Eysenck, 1952). While research had produced a large evidence base concerning the effect of psychotherapy by the mid-1970's, the body of evidence had mixed findings. To assess the validity of Eysenck's original claim, Gene Glass analyzed a large collection of psychotherapy articles by standardizing and averaging treatment-control differences, calling the method 'meta-analysis' (Glass, 1976). Glass and his colleague, Mary Lee Smith, published their meta-analysis, which indicated that psychotherapy was effective (Smith & Glass, 1977). Similar statistical methods and techniques to quantitative research synthesis were being developed by more scholars at about the same time, such as Rosenthal and Rubin (1978), Schmidt and Hunter (1977), and Wolf (1986).

Yet, some scholars challenged the adoption of quantitative research synthesis to reduce bias and imprecision and referred to meta-analysis as “mega-silliness” (Eysenck, 1978), “meta-

analysis/shmeta-analysis” (Shapiro, 1994), and “statistical alchemy for the 21st century” (Feinstein, 1995). Despite the criticism, meta-analysis is widely adopted within the social and physical sciences to statistically synthesize the empirical results from a few or many articles. It allows scholars to see the distribution of empirical findings for a given phenomenon and can address the limitations of a single primary article (H. Cooper et al., 2019; Hall & Rosenthal, 1995; Hunt, 1997; Hunter & Schmidt, 2004; Turanovic & Pratt, 2021).

A Note on Terminology

A number of terms have been used to describe the summary, integration, and interpretation of results from a set of articles, including research synthesis, narrative reviews, systematic reviews, and meta-analysis. The term research synthesis represents a broad array of approaches to summarize, integrate, and interpret selected sets of quantitative and qualitative research but can be generally defined as,

[An] attempt to integrate empirical research for the purpose of creating generalizations ...[and] almost always pay attention to relevant theories, critically analyze the research they cover, try to resolve conflicts in the literature, and attempt to identify central issues for future research (H. Cooper et al., 2019, p. 6).

Narrative reviews—also called literature reviews—of the research literature represent the most basic approach to understand a problem of interest. To conduct a narrative review, scholars use a few keywords to search for relevant articles in a variety of databases, but they do not follow a systematic or specified procedure when reviewing a body of literature. Inclusion or exclusion of articles are based, in part, on qualitative judgements of the scholar conducting the narrative review. Then, articles are described discursively, and their relative importance within a manuscript is determined by the scholar with subjective criteria. Although a narrative review will assist scholars in understanding the problem, it is an insufficient approach to gain a comprehensive understanding of the evidence base related to the problem and can only provide

crude estimates of relationships between variables. Given this approach relies on qualitative appraisals of the literature, it is influenced by selection bias. Some results are prioritized above others without sufficient justification when synthesizing the research literature (Booth et al., 2016; H. Cooper et al., 2019; Denney & Tewksbury, 2013).

Alternatively, systematic reviews were developed to address the limitations of narrative reviews (e.g., ad hoc searching and selection of scholarly work) by providing an objective and complete understanding of the state of knowledge on a specific topic. To collate all the empirical evidence on a given topic of interest, systematic reviews use methodical and explicit methods in the identification, selection, and appraisal of relevant research to ensure that the process is transparent and replicable. Systematic review methodology generally involves: developing a clearly formulated research question that fills important gaps in knowledge; determining the scope of the review; defining the criteria for including articles; attempting to locate all relevant scholarly work; ensuring issues of bias and conflicts of interests in included articles are accounted for; and analyzing the included articles to interpret the results and draw conclusions (Higgins et al., 2019).

While a systematic review represents a method to synthesize relevant research on a specific topic, meta-analysis represents a technique to statistically analyze and summarize the results of the included articles. Indeed, a crucial step in a systematic review is determining whether to represent the effect size statistics from a selected set of comparable articles in a standardized form, which allows for meaningful numerical comparison across the articles. The sixth edition of *A Dictionary of Epidemiology* (Porta, 2014) defines meta-analysis as,

A statistical analysis of results from separate studies, examining sources of differences in results among studies, and leading to a quantitative summary of the results if the results are judged sufficiently similar or consistent to support such synthesis.

Given a meta-analytic review shares the framework of systematic reviews, meta-analysis can reduce selection bias while also reducing the imprecision of a single primary article by statistically combining effects size statistics across numerous articles. It is important to remember that while all meta-analytic reviews are systematic reviews, not all systematic reviews are meta-analytic reviews. A researcher must decide if it is appropriate to employ techniques consistent with meta-analysis. There are many situations to which meta-analysis is not applicable. For example, a meta-analysis cannot be used to summarize conceptual or theoretical papers given they do not contain effect size statistics. Relatedly, meta-analysts may still encounter empirical articles that fail to provide adequate statistics to compute effect size estimates. In these situations, vote-counting procedures may be employed if the articles provide information about the direction and statistical significance (H. Cooper et al., 2019; Hall & Rosenthal, 1995; Hunter & Schmidt, 2004; Lipsey & Wilson, 2001; Wolf, 1986).

To produce a vote count estimate, a researcher categorizes findings from relevant articles into three groups: articles with significant positive results, articles with significant negative results, and articles with nonsignificant results. The category with the largest number of articles presumably offers the best indication about the direction of the population effect size. Yet, such an approach is limited because it is based on a significant-nonsignificant dichotomy and is unable to compare the relative strength of key theoretical relationships (H. Cooper et al., 2019; Hedges & Olkin, 1980). Lastly, meta-analysis only applies to findings that are conceptually comparable. It is generally not appropriate to aggregate and compare the empirical findings of research studies that address different constructs and relationships (H. Cooper et al., 2019; Lipsey & Wilson, 2001). Attempting to statistically analyze a set of articles that do not deal with

the same constructs and relationships is called the “apples and oranges” problem in meta-analysis (Eysenck, 1984; Sharpe, 1997).

The Concept of Effect Size Estimates

Inconsistent operationalizations of key variables across articles is common in the literature to date. For example, criminology and criminal-legal articles vary in the construction of occupational stress scales. Some articles may use stressor items from the Police Stress Survey (Spielberger et al., 1981; e.g., “How stressful are high speed chases” or “How stressful is job conflict”) or the Operational/Organizational Police Stress Questionnaire (McCreary & Thompson, 2006; e.g., “How stressful is paperwork” or “How stressful is bureaucratic red tape”) to operationalize occupational stress.¹ Other criminal-legal articles may use a general life stress measure, such as the Perceived Stress Scale (S. Cohen et al., 1983; e.g., “In the last month, how often have you been upset because of something that happened unexpectedly” or “In the last month, how often have you felt nervous and stressed”), to tap into occupational stress.² While some authors may deviate from validated scales and develop specific, idiosyncratic items to measure this concept (see, e.g., Morash & Haarr, 1995; e.g., “In the last year, the amount of unwanted stress on my job has had a negative effect on my physical well-being” or “For my most recent year in law enforcement, my feeling is that I needed to get some special help in managing the stress of my job”). As such, these different operationalizations produce numerical values that are meaningful only in relation to a given measurement strategy. Thus, an essential feature of a meta-analysis is to operationalize quantitative findings on a numerical scale, such

¹ Using these scales to measure occupational stress is problematic because they would represent “a measure of stress that...confound[s] individual’s perceptions of stress with factors hypothesized to be responsible for such perceptions or the resulting outcomes” (Lait & Wallace, 2002, p. 473).

² A global measure of stress lacks the ability to partition job stress from stress experienced in other social environments, and as such, it is not a useful measure of occupational stress.

that the values can be statistically combined and meaningfully compared. This relates to the concept of standardization. The various effect size estimates used to represent meta-analytic results are standardized, which allows researchers to interpret the resulting numerical values in a consistent manner—regardless of measurement strategy (H. Cooper et al., 2019; Lipsey & Wilson, 2001).

Effect size estimates in meta-analysis commonly “standardize on the variation in the sample distributions of scores for the measures of interest” (Lipsey & Wilson, 2001, p. 4). For example, the mean difference between two groups on an occupational stress scale can be represented by the metric of standard deviation units. Once in a consistent metric, a meta-analyst can combine and compare these statistics across disparate measurement strategies of occupational stress. A study using the Perceived Stress Scale may show a .25 difference in standard deviations between the two groups while a study using some other quantitative measure of occupational stress may reveal a difference of .17 standard deviations. Operating under the assumption that the respective samples were drawn from the same underlying population, these values can be compared and used in statistical analysis to compute various effect size estimates. Thus, the resulting effect size estimates for each article can—to an extent—be treated as meaningful values of the same construct—in this case, differences between the amount of occupational stress experienced by individuals in the two groups (Lipsey & Wilson, 2001).

Therefore, the resulting effect size estimate must be capable of representing the findings in an appropriate form that allows for meaningful numerical comparison and analysis across the included articles. As discussed previously, vote-counting procedures can produce a rudimentary effect size estimate (i.e., number of effects with significant positive, significant negative, and nonsignificant results). However, this approach offers meta-analysts a poor effect size estimate.

It is solely based on statistical significance, which is influenced by sample size, and does not index the overall magnitude and direction of a relationship. When an article provides enough quantitative information, a meta-analysts can compute a range of effect size estimates. The actual coding of an effect size estimate involves computing a value based on an article's quantitative information that conforms to a chosen effect size type. There is no shortage of available formulas and procedures for computing effect size estimates from the statistics reported in articles, which might be in the form of means and standard deviations or test statistics. Indeed, effect size computing and coding in meta-analysis is an important part of the meta-analytic process (H. Cooper et al., 2019; Hall & Rosenthal, 1995; Hunter & Schmidt, 2004; Lipsey & Wilson, 2001; Wolf, 1986).

Relatedly, heterogeneity of effect sizes is inevitable when conducting a meta-analytic review. Indeed, it would be surprising for different research teams in different locations with different methods and analytical approaches to estimate identical magnitudes and directions of effects. Moreover, heterogeneity in the results may be an artifact of different biases across a body of evidence (e.g., publication bias) which may inflate or deflate the observed estimate. Given meta-analysts will most likely encounter heterogeneous articles in their investigation, understanding the degree of statistical heterogeneity is important. Therefore, meta-analysts have access to an array of metrics when using certain methodological approaches (e.g., Cochran Q statistic, I^2 statistic) and tests (e.g., funnel plots, *fail-safe N*) to evaluate the presence of between-study heterogeneity and publication bias, respectively (H. Cooper et al., 2019; Higgins et al., 2019; Lipsey & Wilson, 2001). A heterogeneous distribution of effect sizes can influence the type of model adopted by a meta-analyst (e.g., a random-effects model versus a fixed-effects

model) and indicate that the average mean effect size yielded from the analysis may be a poor representation of the distribution.

The Strengths of Meta-Analysis

A meta-analysis has four primary strengths that would lead a scholar to choose this form of research synthesis over alternatives (H. Cooper et al., 2019; Lipsey & Wilson, 2001; Turanovic & Pratt, 2021). First, a meta-analysis offers more transparent methodological processes and procedures in summarizing research findings than a narrative review. A meta-analytic review can summarize the empirical evidence based on systematic research techniques that are explicit and, thus, open to scrutiny and amenable to replication. Each step in a meta-analysis is documented whether that be specifying the search criteria to identify and retrieve eligible articles or listing the coding decisions of article characteristics and findings. By making the identification and encoding process explicit and systematic, scholars who, for example, are skeptical of the results of the meta-analysis can evaluate the author's assumptions and the methodological rigor of the article.

Second, meta-analysis can summarize empirical relationships between key variables under different methodological conditions. Research evidence on a topic can differ methodologically from one another. For example, articles on a given research question may employ different data collection techniques and model specifications, use disparate measurement strategies, and examine diverse samples. Such methodological variations across articles contribute to a chaotic research evidence on a topic. Thus, readers are often left to figure out for themselves how such variations may influence empirical relationship between variable X and outcome Y. A meta-analysis can help straighten out a messy evidence base by assessing whether such differences impacted the strength of the relationship between two variables.

Third, meta-analysis can yield an overall effect size of a one-variable (i.e., central tendency descriptions) or two-variable relationship. For example, what is the overall effect of role-related stressors on occupational stress among criminal-legal employees? A meta-analytic review can statistically synthesize a large number of separate but comparable articles that examine the relationship between role-related stressors and occupational stress in a criminal-legal context and offer a single, precise estimate of the direction and magnitude of this relationship. In contrast, a traditional narrative review of scientific literature relies on subjective assessments of the evidence or possibly vote-counting procedures, offering crude estimates of the key theoretical relationships. Furthermore, estimating the size of the effect in each article and pooling the findings across numerous articles allow scholars to make sense of a literature base that may contain instances of negative, null, and positive relationships between the variables of interest. Prior to meta-analysis, this variability of effects would obscure a researcher's understanding of the true effect of the relationship between variables. Meta-analytic techniques, however, can synthesize these difference effect size estimates and yield a quantitative summary of the pooled results that has considerably more statistical power than a single article.

Lastly, meta-analyses are useful because they create a "living" database of empirical studies where new research can be added as the evidence base grows. Accordingly, the overall effect size yielded from an initial meta-analysis on a topic can be reassessed with additional evidence. For example, Wolfe and Lawson (2020) subjected the body of criminal-legal literature on organizational justice to a meta-analysis, in part, because the previous meta-analyses on the topic were conducted over two decades ago and included few articles that focused on the organizational justice effect in a criminal-legal context (see, e.g., Cohen-Charash & Spector, 2001; Colquitt et al., 2001). Since those initial meta-analyses, hundreds of studies had been

conducted examining the organizational justice effect on key work outcomes in criminal-legal organizations. As such, Wolfe and Lawson used these existing meta-analyses' reference lists to find relevant articles to include in their database on the organizational justice effect in a criminal-legal context.

Methodological Debates in Meta-Analysis

Meta-analysis is not without criticism. First, a concern with meta-analysis is the “file drawer problem” (Rosenthal, 1979). Scholars argue that published academic research mainly represents significant results given academic journals are less likely to publish nonsignificant findings (i.e., remain in the file drawer; Conn et al., 2003; J. L. Peters et al., 2006). In fact, the argument has been made that published research does not even begin to adequately represent the larger population of research of any given topic (Logan & Gaes, 1993). Accordingly, meta-analytic reviews contain bias toward statistically significant relationships, and thus, their utility is limited due to the omission of null findings. Scholars have extended this argument to hold that explicit focus on published academic research when conducting meta-analysis fails to capture empirical findings contained within the grey literature (e.g., dissertations/theses, conference proceedings, government publications; Conn et al., 2003; H. Cooper et al., 2019). Of course, researchers may choose to include only peer-reviewed articles in their meta-analysis to minimize other biases, such as selection bias³, and ultimately to increase the validity of the results by synthesizing commensurable articles (B. Fox et al., 2021).

³ While searching for grey literature may mitigate publication bias, selection bias is introduced because it is impossible to ensure all the unpublished literature is included in the meta-analysis. Factors such as professional networks, power differentials, or corresponding author contact information may influence whether unpublished articles are included.

Beyond developing more robust processes of searching for eligible articles to address publication bias (e.g., searching for grey literature), scholars can statistically examine the presence of publication bias. In response to the “file drawer problem” critique, for example, Rosenthal (1979) developed a statistical process to determine the number of additional articles that would have to contain nonsignificant findings to reverse a significant grand mean effect size computed in a meta-analysis, called the *fail-safe N*. Concerns about publication bias can be assessed through other meta-analytic techniques such as *p*-curve or *p*-uniform procedures (Harms et al., 2018; van Assen et al., 2015), funnel plot asymmetry tests (Duval & Tweedie, 2000; Egger et al., 1997), and the replicability index (R-index; Schimmack, 2020). The takeaway is that a degree of methodological sophistication is being applied to meta-analysis to assess the risk of publication bias—albeit some methods to assess publication bias (e.g., *fail-safe N*, trim-and-fill method) have been considered outdated (see, e.g., Chin et al., 2021; van Assen et al., 2015).

A second concern for meta-analysis relates to its scope (Turanovic & Pratt, 2021). A meta-analysis begins with specifying the problem to be investigated or the question to be answered. During this phase, a scholar needs to determine how broad or narrow the inclusion criteria will be when selecting articles to include in the meta-analysis. For some, a meta-analysis should employ strict selection criteria that only captures articles of similar design and high methodological quality (Eysenck, 1994; Murray et al., 2009; Slavin, 1987). The assumption is that “the results of a meta-analysis are only as good as the quality of studies that are included” (Lam & Kennedy, 2005, p. 171). Simply put, garbage in-garbage out. Another perspective is that a meta-analysis should include all relevant research produced on a topic, regardless of methodological rigor (Glass, 1978, 2015). This approach views methodological variations across

articles as an open empirical matter to be assessed in the meta-analysis. The debate between these two approaches is still ongoing, but Turanovic and Pratt (2021) recommend that the scope of a meta-analysis be based on the research question being asked.

If the research question is “What *is the true effect* of variable X on outcome Y”, this approach tends to focus on the “best” studies in the literature. In practice, this means meta-analysts will develop restrictive selection criteria that captures only methodologically rigorous studies (e.g., randomized controlled trial or comparable true experiments) to achieve homogeneity of effect sizes. Advocates of this approach argue that only methodologically rigorous studies can isolate the “true effect” of X on Y and thus be of value (Eysenck, 1994; Murray et al., 2009; Slavin, 1987). This is a debatable assumption and comes with costs (see, e.g., Berk, 2007; Ioannidis, 2005). Furthermore, it can be a real challenge for meta-analysts in the field of criminology to restrict their investigation to randomized controlled trials. While true experiments are the gold standard for testing causal hypotheses, it may not be feasible or ethical to randomly assign research participants to different conditions in a criminal-legal context. By having an overly narrow approach in selecting what articles to include, it results in a loss of relevant evidence on a topic and an unrealistic portrayal of what the full body of existing literature looks like. Furthermore, the problem of underpowered primary studies in the literature is well established (see, e.g., Barnes et al., 2020; Earp & Trafimow, 2015; Gelman & Loken, 2014), and overly restrictive selection criteria in a meta-analysis also has the potential to raise issues involving statistical power (Scherbaum & Ferreter, 2009; Valentine et al., 2010). Restrictive criteria can lead to a small sample size. In these situations, the results of a meta-analysis that synthesized effect size estimates from a select number of articles must be interpreted with caution.

However, if the research question is “What *does the literature say* is the effect of variable X on outcome Y”, then scholars should employ a broad selection process with respect to the articles to be included in the meta-analysis (Turanovic & Pratt, 2021). Instead of excluding articles with different designs or low methodological quality, this approach places value on methodological variations and heterogeneity of effect sizes across articles. Accordingly, meta-analysts treat such differences as an empirical matter to be assessed (Greenland, 1994; Lipsey & Wilson, 2001), and inclusion criteria are designed to capture all studies that investigate the empirical relationship between X and Y. Utilizing broad inclusion criteria, however, requires a rigorous coding protocol that can quantify all relevant methodological variations represented in the sample of articles. When developing the coding protocol, one might code article descriptors including, but not limited to, sample source, sample characteristics, sampling procedures or method, survey design, quality of measures, year of publication, country of publication, and publication form (H. Cooper et al., 2019; Lipsey & Wilson, 2001). Once all relevant information is extracted from the articles, scholars can make informed decisions about inclusion or exclusion—such as excluding some articles because outcome Y is too different or there is not enough information to calculate an effect size. In short, the researcher has made an empirical assessment about each article, which distinguishes this approach from the “true effect” approach that relies on subjective, a priori evaluations of the articles by the meta-analysts.

I remain staunchly committed to the idea that meta-analyses must deal with all studies—with good or bad and indifferent studies—and that their results are only properly understood in the context of each other, not after having been censored by some a priori set of prejudices (Glass, 2015, p. 229).

Third, bivariable versus multivariable effect sizes represent a serious point of contention with respect to meta-analysis in social sciences (Turanovic & Pratt, 2021). When scholars encode information about the empirical findings of the study (i.e., effect sizes), they must decide

whether bivariable effect sizes, multivariable (i.e., partial) effect sizes, or both will be extracted from each eligible article and analyzed. Correlations or tests of mean, median, and proportional differences represent bivariable effect size estimates, whereas multivariable statistical models generate adjusted effect size estimates. The decision of which to extract and analyze will be based on the research question. If, for example, the research question revolves around determining whether there is simply a meaningful empirical two-variable relationship, a meta-analysis focusing solely on bivariable effect sizes may be sufficient to achieve the research objectives (see, e.g., Myers et al., 2020; T. Pratt et al., 2016). However, if answering the research question requires an understanding of how the relationship between variable X and outcome Y is affected by disparate model specifications, then the meta-analysis must synthesize multivariable effect size estimates (see, e.g., T. Pratt et al., 2014; Pyrooz et al., 2016; Wolfe & Lawson, 2020).

Synthesizing multivariable effect size estimates in meta-analysis has been criticized, given the variability of such estimates within and across articles. Indeed, depending on the model specification, effect size estimates produced from multivariable models can fluctuate drastically (Aloe et al., 2016; H. Cooper et al., 2019; Lipsey & Wilson, 2001). As such, these estimates are either too different (Aloe, 2015) or simply misleading (Aloe & Thompson, 2013) to be included in a meta-analysis with bivariable effect size estimates. The position ultimately falls under the “true effect” approach discussed previously, which advocates for meta-analytic techniques that achieve homogeneity of effect sizes. The reliance on bivariable relationships makes sense in disciplines and bodies of work that predominately use experimental designs—“where bivariate effect sizes tend to represent differences between randomly assigned ‘treatment’ and ‘control’ groups, and where there is rarely a need to use multivariate regression analysis” (Turanovic &

Pratt, 2021, p. 9). Bivariable analyses in the field of criminology, however, do not represent the primary analytical strategy; instead, multivariable results are commonly reported in articles.

To examine multivariable effect sizes in meta-analysis, what has or has not been specified in the models must be considered when coding eligible articles. The coding scheme should then capture the type of model, the number of covariates, and the types of covariates (Ousey & Kubrin, 2018; T. Pratt et al., 2014; Pyrooz et al., 2016). While bivariable and multivariable effect sizes do differ in fundamental ways, excluding informative data results in narrowly focused meta-analyses. Accordingly, extracting both bivariable and multivariable effect sizes when possible has been recommended, but the estimates should also be analyzed separately. Encoding both can lead to a more comprehensive understanding of the empirical relationship between variable X and outcome Y in relation to a meta-analysis composed of only bivariable effect sizes (Turanovic & Pratt, 2021).

Finally, addressing statistical dependence in meta-analytic data represents another common debate. Meta-analysts often come across multiple effect sizes nested within articles, nested within data sets. When scholars analyze nested data, they violate the assumption that observations are independent and that error terms are uncorrelated (Heck et al., 2022; Hox et al., 2018). Accordingly, two schools of thought emerged to deal with the issue of statistical dependence. On one side—which represents the traditional methodological paradigm—are those who argue that meta-analysis can only focus on one statistical relationship between variable X and outcome Y per group (per article or per data set), which eliminates statistical dependence issues by creating a statistical independent set of effect sizes. When scholars encounter an article with multiple effect sizes or numerous articles with multiple effect sizes based on a single data set, this approach entails selecting (at random or based on some other predetermined criteria) one

effect size for each eligible article or group of articles, or by averaging the effect sizes per group. In Lipsey and Wilson's (2001, p. 113) formative textbook on meta-analysis, the authors advocate for the following process if one article (or group of articles from the same data set) produces several effect sizes:

...they should not be included in the same analysis as if they were independent data points. Multiple effect sizes in this situation can be reduced to a single effect size in one of two ways. First, they can be averaged so that the sample on which they are based contributes only one mean effect size to the distribution. Second, one of the effect sizes may be selected for inclusion in the analysis and the other(s) omitted.

By eliminating or condensing multiple effect sizes, meta-analysts will lose valuable information on the relationship between variable X and outcome Y (Cheung & Chan, 2004, 2008; Tanner-Smith et al., 2016). Given a typical criminology and criminal-legal study will almost always report more than one effect size of interest, the traditional paradigm to address statistical dependence between effect sizes will result in a considerable amount of lost information. On the other side, however, are those who advocate for analyzing dependent effect sizes in meta-analytic data with a statistical technique common in criminology—multilevel modeling (Heck et al., 2022; Hox et al., 2018). This technique was designed specifically to model the statistical dependence in effect sizes with data hierarchies (e.g., multiple students nested within classrooms, multiple classrooms nested within schools). Meta-analytic data (i.e., multiple effect sizes nested within articles, and multiple articles nested within data sets) experience the same issue of statistical dependence as seen with other multilevel data. Thus, the same multilevel modeling approach can be—and has been—applied to meta-analysis in criminology (see, e.g., Myers et al., 2020; T. Pratt et al., 2014; Pyrooz et al., 2016; Wolfe & Lawson, 2020) and other academic disciplines (see, e.g., Becker, 2000; Cheung & Chan, 2004, 2008; Hedges et al., 2010).

Current Study

The criminal-legal literature on occupational stress contains numerous empirical and theoretical inconsistencies, which obscures scholars' understanding of the potential injurious effect of stressors among criminal-legal employees. Accordingly, this makes it well-suited for meta-analysis. A meta-analytic investigation can shed light on the impact of theoretical and methodological variations present in the body of research on the stress process. Beyond these issues, a key question is which stressors have the strongest impact on occupational stress. If researchers were to conduct a narrative review to answer this question, they would find mixed results depending on the stressor of interest. For example, past studies have shown significant effects of job-related dangerousness on criminal-legal employees' occupational stress (Frank et al., 2017; Triplett et al., 1999). Other studies have failed to find effects of job-related dangerousness on work stress (Mack & Rhineberger-Dunn, 2022; Rhineberger-Dunn & Mack, 2020). Furthermore, researchers have investigated the effect of race as a stressor on occupational stress and found null (Griffin, 2006; Lambert et al., 2005) and significant (Morash, Kwak, et al., 2006; Morash & Haarr, 1995) effects. In the end, research has yielded a substantial evidence base concerning the role of various stressors on occupational stress among criminal-legal employees. Yet, with considerable variability in theoretical and methodological approaches and mixed results concerning the stressor-stress relationship, lingering questions remain.

Researchers have recognized these problems and assessed the empirical status of the relationship between stressors and occupational stress among criminal-legal employees by conducting meta-analytic investigations (Dowden & Tellier, 2004; J. H. Webster, 2013). However, these studies are limited for several reasons. For one, a significant amount of time has elapsed since these meta-analyses were conducted, and there has been substantial growth in the

research literature on the effect of stressors on occupational stress. Second, the number of effects included in the analyses exceeded the number of eligible articles, which means multiple effect sizes were extracted from some articles. Given these investigations relied on a traditional methodological paradigm of meta-analysis, creating an independent set of effect sizes was necessary. However, no discussions on addressing statistical dependence were included in these meta-analyses. Third, each meta-analysis constrained its inclusion criteria to a specific criminal-legal sample (i.e., police officers or correctional officers). Stressors and occupational stress impact all professionals in the criminal-legal system, and as such, all employees must be included in a meta-analytic investigation to better understand the stressor-stress relationship in the criminal-legal workplace. The meta-analyst can then empirically assess if stressors have differential effects on occupational stress by the type of criminal-legal employee.

Accordingly, there is a need to reexamine the effect of stressors on occupational stress within the criminal-legal literature. A meta-analysis was conducted to answer several key questions regarding the stressor-stress relationship in the criminal-legal professional workplace:

1. What does the literature say is the average effect of stressors on occupational stress among criminal-legal professionals?
2. Does the type of stressor influence the average effect size?
3. How does variation in theoretical conceptualization and methodological decisions across articles influence the average effect size?

CHAPTER 4: STUDY DESIGN AND IMPLEMENTATION

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021) for reporting of eligibility criteria, assessment of publication bias, and synthesis of results were followed (see Appendix A). This study was approved and determined not human subject research by the Institutional Review Board (IRB) of Michigan State University (IRB Study Number STUDY00006238) in Spring 2021 (see Appendix B for IRB letter).

Sample of Studies

A peer-reviewed, quantitative article must have met four primary eligibility criteria to be included in the meta-analysis. First, the article must have been published between July 1936 and July 2021. The year 1936 was chosen as a start date because it coincided with the publication of Selye's (1936) paper introducing the concept of stress to the field of life sciences. Second, the article's sample must have been comprised of criminal-legal professionals. Third, the article must have included a stressor as a covariate. Fourth, a construct of self-reported occupational stress must have been included as an outcome and broadly conceptualized as employees who perceived experiencing a short-term form of psychological or emotional pressure or tension. Of note, articles that examined relationships between stressors and long-term stress responses (e.g., posttraumatic stress disorder, depression, burnout, job performance, job satisfaction, workplace misconduct, etc.), investigated general forms of perceived life stress (e.g., Cohen and colleagues' (1983) Perceived Stress Scale), or used an occupational stress scale that confounds perceived occupational stress with the sources of such perceptions (e.g., Spielberger and colleagues' (1981) Police Stress Survey or McCreary and Thompson's (2006) Police Stress Questionnaire) were excluded.

A systematic literature review was conducted in four computerized bibliographic databases⁴ written in English using two distinct categories of Boolean search terms: Occupational Stress - ‘Distress’ OR ‘Resiliency’ OR ‘Strain’ OR ‘Stress’ OR ‘Stressor’ AND Criminal-legal employee - ‘Correctional’ OR ‘Correction’ OR ‘Court’ OR ‘Judge’ OR ‘Law enforcement’ OR ‘Officer’ OR ‘Parole’ OR ‘Police’ OR ‘Prison’ OR ‘Probation’ OR ‘Prosecutor’. As the list of potentially eligible articles was developed, article titles and abstracts were reviewed against the eligibility criteria to narrow down the results. Articles that appear suitable for inclusion were subjected to a full-text review. Additionally, reference lists in eligible (and near eligible) articles and prior meta-analyses (Dowden & Tellier, 2004; J. H. Webster, 2013) were reviewed to identify any candidate article not already known. The final sample comprised 80 peer-reviewed, empirical articles representing 57 unique data sets that contained 1,993 effect size estimates and 44,427 individual cases (see Table 1 for more detailed summary of these articles, and Appendix C for the coding manual that specifies the information to be extracted from each eligible article). For a flow diagram of the search and screening process, see Figure 9.

⁴ The literature search through electronic holdings included the following: APA PsycINFO (1806 – current), Business Source Complete, Criminal Justice Database (1981 – current), and Sociology Database (1985 – current).

Table 1. Overview of Articles included in Meta-Analysis

Study	Total <i>k</i> (Range)	Analysis Type	Sample Characteristics	Type of Stressors	Occupational Stress Operationalization
Armstrong et al. (2015)	22 (-0.05, 0.74)	Both	Total <i>N</i> = 312-441; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Armstrong & Griffin (2004)	23 (-0.04, 0.47)	Both	Total <i>N</i> = 703-3,794; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Atkin-Plunk & Armstrong (2013)	24 (-0.27, 0.38)	Both	Total <i>N</i> = 103; Law enforcement; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Blevins et al. (2006)	22 (-0.18, 0.62)	Multivariable	Total <i>N</i> = 195; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Boateng & Hsieh (2019)	11 (-0.03, 0.13)	Multivariable	Total <i>N</i> = 169; Corrections; Ghana	Organizational, Demographic	Self-constructed
Britton (1997)	12 (-0.02, 0.27)	Multivariable	Total <i>N</i> = 2,979; Corrections; USA	Operational, Organizational, Demographic	Saylor & Wright (1992)
Carlan & McMullan (2009)	1 (0.01)	Bivariable	Total <i>N</i> = 1,085; Law enforcement; USA	Demographic	Hall (1968)
Carlan & Nored (2008)	15 (0.00, 0.35)	Both	Total <i>N</i> = 1,029; Law enforcement; USA	Organizational, Demographic	Hall (1968)
Castle & Martin (2006)	16 (-0.13, 0.40)	Multivariable	Total <i>N</i> = 373; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Cheeseman & Downey (2012)	26 (-0.11, 0.17)	Both	Total <i>N</i> = 471; Corrections; USA	Demographic	Cullen, Lemming, et al. (1985)
Chopko et al. (2013)	1 (0.00)	Bivariable	Total <i>N</i> = 193; Law enforcement; USA	Demographic	Self-constructed
Cullen, Lemming, et al. (1985)	9 (-0.13, 0.70)	Multivariable	Total <i>N</i> = 91; Law enforcement; USA	Operational, Organizational, Demographic	Self-constructed
Cullen, Link, et al. (1985)	12 (0.04, 0.61)	Multivariable	Total <i>N</i> = 155; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)

Table 1 (cont'd)

Elechi et al. (2020)	14 (-0.26, 0.45)	Both	Total <i>N</i> = 120; Corrections; Nigeria	Organizational, Demographic	Cullen, Lemming, et al. (1985)
Ellison & Caudill (2020)	23 (-0.25, 0.55)	Multivariable	Total <i>N</i> = 1,380; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Frank et al. (2017)	28 (-0.13, 0.48)	Both	Total <i>N</i> = 827; Law enforcement; India	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Griffin (2006)	21 (-0.12, 0.53)	Both	Total <i>N</i> = 636-2,576; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Griffin et al. (2010)	8 (-0.11, 0.40)	Bivariable	Total <i>N</i> = 160; Corrections; USA	Operational, Demographic	Cullen, Lemming, et al. (1985)
Griffin et al. (2020)	9 (-0.03, 0.85)	Bivariable	Total <i>N</i> = 3,327; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Grossi & Berg (1991)	12 (-0.16, 0.55)	Multivariable	Total <i>N</i> = 106; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Hartley et al., 2013)	26 (-0.09, 0.76)	Both	Total <i>N</i> = 1,557; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Hassell & Brandl (2009)	13 (-0.19, 0.46)	Multivariable	Total <i>N</i> = 1,191; Law enforcement; USA	Operational, Organizational, Demographic	Self-constructed
Holt & Blevins (2011)	7 (-0.35, 1.01)	Multivariable	Total <i>N</i> = 56; Law enforcement; USA	Operational, Demographic	Cullen, Lemming, et al. (1985)
Holt et al. (2012)	20 (-0.06, 0.97)	Both	Total <i>N</i> = 224; Law enforcement; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Jin et al. (2018)	24 (0.00, 0.38)	Multivariable	Total <i>N</i> = 225; Community- based corrections; China	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2010)	25 (-0.27, 0.60)	Both	Total <i>N</i> = 66-160; Corrections; USA	Operational, Demographic	Cullen, Lemming, et al. (1985)

Table 1 (cont'd)

Lambert & Cluse-Tolar (2007)	20 (-0.06, 0.65)	Both	Total <i>N</i> = 272; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert & Hogan (2010)	20 (-0.20, 0.55)	Both	Total <i>N</i> = 272; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2006)	26 (-0.06, 0.53)	Both	Total <i>N</i> = 272; Corrections; USA	Operational, Organizational, Demographic	Saylor & Wright (1992)
Lambert et al. (2007)	12 (-0.06, 0.38)	Multivariable	Total <i>N</i> = 160; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2008)	7 (-0.11, 0.22)	Bivariable	Total <i>N</i> = 160; Corrections; USA	Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2009)	10 (0.03, 0.44)	Multivariable	Total <i>N</i> = 160; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2005)	20 (-0.09, 1.01)	Both	Total <i>N</i> = 160; Corrections; USA	Operational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2018)	6 (-0.05, 0.17)	Bivariable	Total <i>N</i> = 322; Corrections; China	Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2020)	28 (-0.08, 0.51)	Both	Total <i>N</i> = 322; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2019)	8 (-0.09, 0.42)	Multivariable	Total <i>N</i> = 322; Corrections; USA	Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2016)	22 (-0.11, 0.64)	Both	Total <i>N</i> = 160; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert & Paoline (2008)	42 (-0.13, 0.65)	Both	Total <i>N</i> = 1,062; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Lambert et al. (2017)	18 (-0.14, 0.76)	Both	Total <i>N</i> = 827; Law enforcement; India	Operational, Demographic	Cullen, Lemming, et al. (1985)
Law & Guo (2016)	10 (-0.08, 1.15)	Both	Total <i>N</i> = 133; Corrections; Taiwan	Operational, Demographic	Cullen, Lemming, et al. (1985)

Table 1 (cont'd)

Lindquist & Whitehead (1986a)	40 (-0.64, 0.78)	Multivariable	Total <i>N</i> = 33-216; Mixture; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Lindquist & Whitehead (1986b)	10 (-0.18, 0.25)	Multivariable	Total <i>N</i> = 216; Corrections; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Liu et al. (2017)	20 (-0.04, 0.97)	Both	Total <i>N</i> = 322; Corrections; China	Operational, Demographic	Cullen, Lemming, et al. (1985)
Mack & Rhineberger-Dunn (2022)	28 (-0.05, 0.35)	Both	Total <i>N</i> = 298; Corrections; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Moon & Maxwell (2004)	24 (-0.07, 0.69)	Both	Total <i>N</i> = 260; Corrections; South Korea	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Morash & Haarr (1995)	209 (-0.15, 0.72)	Both	Total <i>N</i> = 257-1,191; Law enforcement; USA	Operational, Organizational, Demographic	Self-constructed
Morash, Haarr, et al. (2006)	60 (-0.15, 0.73)	Both	Total <i>N</i> = 947; Law enforcement; USA	Operational, Organizational, Demographic	Morash & Haarr (1995)
Morash et al. (2011)	84 (-0.14, 0.60)	Both	Total <i>N</i> = 675-904; Law enforcement; USA; South Korea	Operational, Organizational, Demographic	Morash & Haarr (1995)
Morash, Kwak, et al. (2006)	125 (-0.19, 0.73)	Both	Total <i>N</i> = 241-911; Law enforcement; USA	Operational, Organizational, Demographic	Morash & Haarr (1995)
Morash et al. (2008)	41 (-0.13, 1.58)	Both	Total <i>N</i> = 676; Law enforcement; South Korea	Operational, Organizational, Demographic	Morash & Haarr (1995)
Na et al. (2018)	26 (-0.17, 0.94)	Both	Total <i>N</i> = 198; Courts; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985); Morash & Haarr (1995)
O'Donnell & Stephens (2001)	3 (0.20, 0.38)	Bivariable	Total <i>N</i> = 50; Community-based corrections; New Zealand	Operational	Self-constructed
Oliver & Meier (2004)	8 (-0.04, 0.08)	Bivariable	Total <i>N</i> = 664; Law enforcement; USA	Demographic	Self-constructed

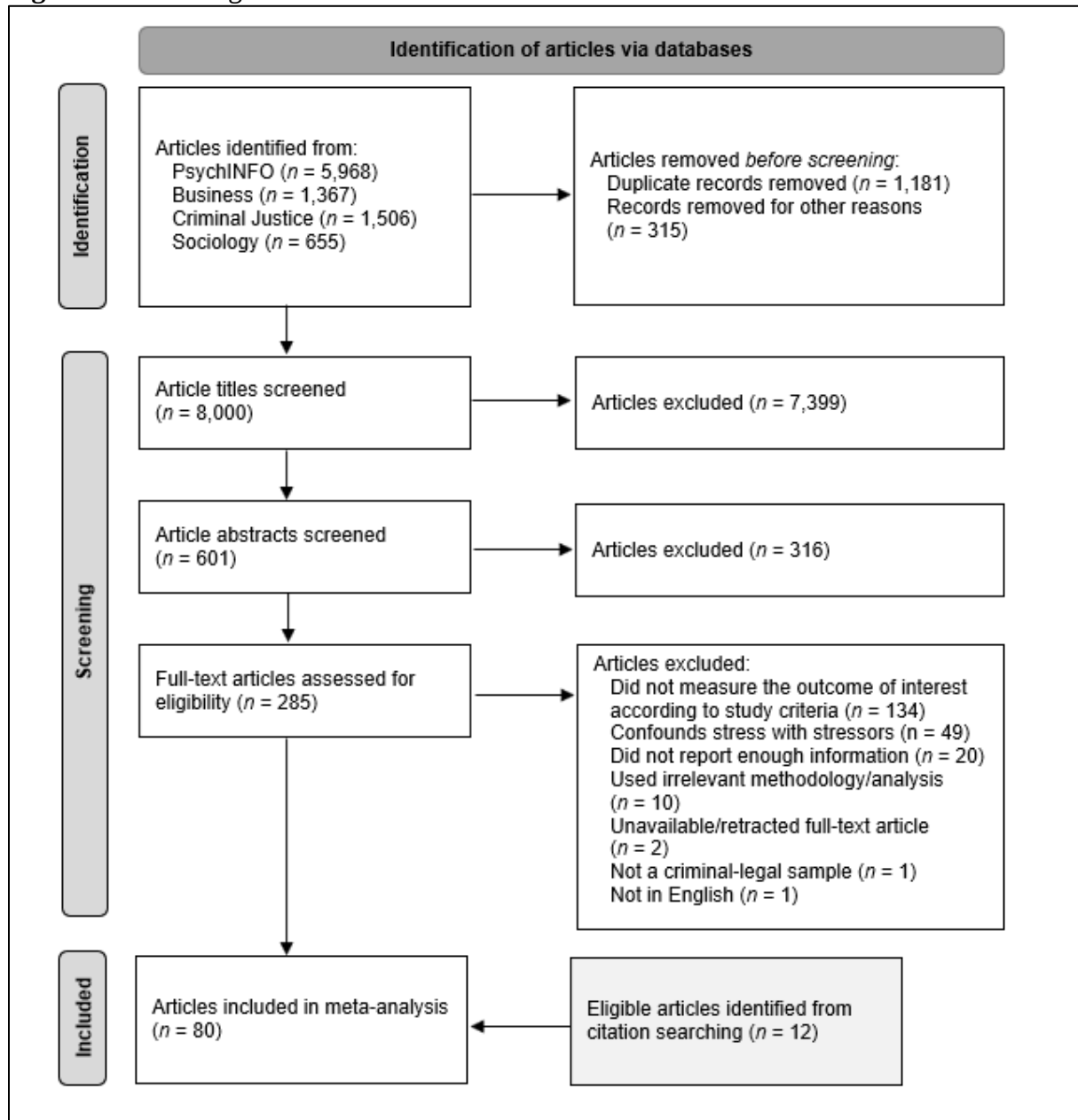
Table 1 (cont'd)

Oliver & Meier (2006)	9 (-0.02, 0.30)	Bivariable	Total <i>N</i> = 98; Law enforcement; USA	Demographic	Self-constructed
Otu et al. (2018)	24 (-0.22, 0.57)	Both	Total <i>N</i> = 120; Corrections; Nigeria	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Padyab et al. (2016)	1 (0.19)	Bivariable	Total <i>N</i> = 856; Law enforcement; Sweden	Demographic	Glasberg et al. (2006)
Paoline & Lambert (2012)	20 (-0.11, 0.61)	Both	Total <i>N</i> = 1,062; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Paoline et al. (2006)	20 (-0.11, 0.48)	Both	Total <i>N</i> = 1,062; Corrections; USA	Organizational, Demographic	Cullen, Lemming, et al. (1985)
Paoline et al. (2015)	64 (-0.25, 0.76)	Both	Total <i>N</i> = 419-493; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Rhineberger-Dunn & Mack (2019)	23 (-0.06, 0.52)	Both	Total <i>N</i> = 98-277; Community- based corrections; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Rhineberger-Dunn & Mack (2020)	39 (0.01, 0.43)	Both	Total <i>N</i> = 277; Community- based corrections; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Robinson et al. (1997)	10 (-0.13, 0.42)	Bivariable	Total <i>N</i> = 213; Corrections; Canda	Operational, Demographic	Cullen, Lemming, et al. (1985)
Saylor & Wright (1992)	12 (0.01, 0.63)	Both	Total <i>N</i> = 3,470; Corrections; USA	Operational, Organizational, Demographic	Self-constructed
Schiff & Leip (2019)	9 (-0.09, 0.55)	Bivariable	Total <i>N</i> = 313; Corrections; USA	Operational, Organizational, Demographic	Self-constructed
Singh & Nayak (2015)	5 (0.02, 1.49)	Bivariable	Total <i>N</i> = 599; Law enforcement; India	Operational, Demographic	Lait & Wallace (2002)
Steiner & Wooldredge (2015)	34 (-0.00, 0.51)	Multivariable	Total <i>N</i> = 1,802; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Tewksbury & Higgins (2006)	20 (-0.18, 0.62)	Both	Total <i>N</i> = 228; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)

Table 1 (cont'd)

Triplett et al. (1996)	190 (-0.27, 0.67)	Both	Total <i>N</i> = 254; Corrections; USA	Operational, Organizational, Demographic	Self-constructed
Triplett et al. (1999)	39 (-0.09, 0.50)	Multivariable	Total <i>N</i> = 54-211; Corrections; USA	Operational, Organizational, Demographic	Triplett et al. (1996)
Tyagi & Lochan Dhar (2014)	9 (0.24, 1.00)	Both	Total <i>N</i> = 444; Law enforcement; India	Operational, Organizational	Lait & Wallace (2002)
Van Voorhis et al. (1991)	25 (-0.16, 0.81)	Both	Total <i>N</i> = 140-155; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Vickovic & Morrow (2020)	26 (-0.12, 1.13)	Both	Total <i>N</i> = 515-641; Corrections; USA	Operational, Organizational, Demographic	Cullen, Lemming, et al. (1985)
Wells et al. (2009)	21 (0.12, 0.44)	Both	Total <i>N</i> = 443; Corrections; USA	Operational, Organizational, Demographic	Saylor & Wright (1992)
Wells et al. (2016)	9 (0.01, 0.51)	Bivariable	Total <i>N</i> = 437; Corrections; USA	Operational, Organizational, Demographic	Saylor & Wright (1992)
Whitehead & Lindquist (1985)	10 (-0.27, 0.34)	Multivariable	Total <i>N</i> = 93; Community-based corrections; USA	Operational, Organizational, Demographic	Smith & ward (1983)
Whitehead & Lindquist (1986)	10 (-0.27, 0.31)	Both	Total <i>N</i> = 220; Corrections; USA	Operational, Organizational, Demographic	Smith & Ward (1983)
Whitehead et al. (1987)	4 (-0.08, 0.07)	Bivariable	Total <i>N</i> = 214; Corrections; USA	Operational	Smith & Ward (1983)
Wright & Saylor (1992)	2 (-0.20, -0.08)	Multivariable	Total <i>N</i> = 3,325; Corrections; USA	Demographic	Saylor & Wright (1992)
Yang et al. (2019)	1 (0.39)	Bivariable	Total <i>N</i> = 231; Law enforcement; Taiwan	Operational	Self-constructed
Youngcourt & Huffman (2005)	6 (0.02, 0.41)	Bivariable	Total <i>N</i> = 866; Law enforcement; USA	Operational, Organizational, Demographic	Self-constructed

Figure 9. Flow Diagram



Effect Size Estimate

Effect size estimates represent the dependent variable in meta-analysis, which reflect the statistical representation of one-or two-variable relationships in an article. In the current study, effect sizes were coded as the correlation coefficient (r) because it is intuitive and formulas exist for computing r from other test statistics (e.g., t -value, z -value) and raw data from means,

standard deviations, and sample sizes (Lipsey & Wilson, 2001; T. Pratt et al., 2014). Using the following equations,

$$r = \sqrt{t^2 / (t^2 + n - 2)} , \quad (\text{eq. 1})$$

$$r = z / \sqrt{z^2 + n} , \quad (\text{eq. 2})$$

$$r = \frac{\text{Effect Size}_{\text{standardized mean difference}}}{\sqrt{(1/p(1-p)) + \text{Effect Size}_{\text{standardized mean difference}}^2}} , \quad (\text{eq. 3})$$

t-values, *z*-values, and standardized mean difference effect sizes, respectively, were converted into an *r*. Standardized regression coefficients were drawn from multivariable statistical models in each article when reported (i.e., a beta weight [β] from ordinary least squares regression models).⁵ Similarities exist between the properties of β and *r* (i.e., mathematical construction, statistical assumptions, coefficient boundaries), and as such, researchers have pooled effect sizes from both correlation coefficients and beta weights in meta-analyses of criminological research (see, e.g., T. Pratt et al., 2014; Pyrooz et al., 2016; Wolfe & Lawson, 2020). Following these transformations, individual effect size estimates were adjusted for attenuation due to unreliability for the variable(s) used in the effect size with the following equations (Hunter & Schmidt, 2004),

$$ES' = \frac{ES}{\sqrt{r_{yy}}} , \quad (\text{eq. 4})$$

$$ES_r' = \frac{ES_r}{\sqrt{r_{xx}} \sqrt{r_{yy}}} , \quad (\text{eq. 5})$$

Next, ESEs were converted to the Fisher's *z* scale, and all analyses were performed using this *z*(*r*) score. The transformation from *r* to Fisher's *z* is given by,

$$z(r_i) = \frac{1}{2} * \ln \left(\frac{1+r_i}{1-r_i} \right) , \quad (\text{eq. 6})$$

⁵ In instances where articles only reported unstandardized regression coefficients and standard errors, *t*-values were converted into an *r* using eq. 1.

to approximate normality with all bivariable and multivariable effect sizes. Fisher's r to z transformations, however, can still positively bias effect size estimates. Following the recommendation by Hedges and Olkin (2014) and Overton (1998), all estimates were transformed prior to calculating the Fisher-transformed correlation with the following equation,

$$r_i = \frac{r(1-r^2)}{2(n-3)}, \quad (\text{eq. 7})$$

to help attenuate this estimation bias and normalize the effect size estimates. Following these transformations, standardized effect size estimates are produced which can be interpreted as the change in occupational stress associated with a standard deviation change in stressors.

Directionality was standardized across all ESEs. Positive Fisher-transformed correlations represent effects in the theoretically expected direction (i.e., more exposure to a stressor leading to more occupational stress).

Moderator Variables

Type of stressor. A primary objective of this study was to examine how the type of stressor investigated in each article potentially affects the grand mean effect size estimate.⁶ To achieve this goal, stressors were coded and grouped into various “stressor domains.” McCreary and Thompson's (2006) Police Stress Questionnaire categorization of stressors guided the coding of all survey items used in stressor-related scales for all effects sizes included in the meta-analysis. Specifically, effect size estimates were coded into one of three higher order stressor domains (each representing a binary variable; 1 = yes, 0 = no): *organizational*, *operational*, or *individual demographic*. The stressor was considered organizational if it was associated with the organization and cultural-context within which criminal-legal employees performed their work.

⁶ Consistent with the language used in Heck and colleagues (2022), the phrase “grand mean effect size estimate” is synonymous with “the average effect size estimate” or “the overall mean effect size estimate.”

Operational stressors measured sources of stress associated with doing the job. Finally, survey items were coded as individual demographics if they measured individual-level characteristic of employees.⁷

To achieve more granularity, lower order stressor domains of organizational stressor, operational stressor, and individual demographic were coded to determine whether they influenced the overall effect size estimate. Organizational stressor was coded into five lower order stressor domains (each representing a binary variable; 1 = yes. 0 = no). *View of organization* included stressors in which employees' perceptions of their management or administration were measured (e.g., "For the most part, management at this prison supports its workers" or "I lack the proper opportunities to advance in this agency"). *View of supervisor* captured stressors that measured employees' perceptions of supervisory considerations and the level that their supervisor supports them (e.g., "My supervisor is friendly and approachable" or "Supervisors at this prison are supportive of employees"). *View of coworkers* included stressors that measured employees' perceptions of support from peers at work (e.g., "I am able to discuss problems with my coworkers" or "My coworkers provide me support in solving personal problems"). *Organizational justice* captured fairness-related scales that tapped into employees' perceptions of outcome allocation in the organization (i.e., distributive justice), policies and procedures during decision-making processes (i.e., procedural justice), interpersonal treatment

⁷ The minority stress model (Meyer, 2003) guided the coding of the direction of the effect for some of the individual demographic stressors. Criminal-legal employees from stigmatized social groups (e.g., employees who have a racial identity of Black or are female) would theoretically be exposed to excess stress as a result of their minority position in the organization. Recall, a positive ESE in the current study indicated that a high value on a stressor was associated with a high value on occupational stress. This means that, for example, as the variable *Sex* in a study (coded as 1 = female, 0 = male) changes from 0 to 1, a one-unit change corresponds to the presence of a stressor since 1 equals female and this group is a minority position based on the minority stress model. Accordingly, the direction of the effect for individual demographic ESEs was switched if it was not consistent with the study's directionality pattern (e.g., an ESE based on a response option of 1 = male, 0 = female or 1 = White, 0 = Black would be reverse-coded).

received from superiors (i.e., interpersonal justice), or truthfulness and justification related to agency information (i.e., informational justice). Organizational justice scale items included, “Policies and procedures are applied consistently” or “There is a fair opportunity to be promoted in this correctional agency.” *Organizational demographic* included survey items that captured agency size, crime rates, facility security level, or inmate population size.

Operational stressor was coded into three lower order stressor domains (each representing a binary variable; 1 = yes. 0 = no). *Role factor* captured stressors that measured employees’ perceptions of issues such as role overload (e.g., “I am responsible for an almost unmanageable number of offenders at the same time”), role conflict (e.g., “I do things on the job that are accepted or approved of by one person and not by others”), role ambiguity (e.g., “My job duties and work objectives are unclear to me”), job autonomy (e.g., “I have flexibility in how and when to do my job duties”), or job variety (e.g., “My job requires that I keep learning new things”). *Physical or psychological threats* included stressors that tapped into the physical and emotional workplace risks to employees (e.g., “In the past 60 days, I have feared for my safety while working with a client” or “A lot of people I work with get physically injured in the line of duty”). *Family factor* captured stressors that measures issues such as employees’ perceptions of work on family conflict (e.g., “I frequently argue with my spouse/family members about my job”), family on work conflict (e.g., “I sometimes have to miss work due to pressing family/social issues or problems”), or family support (e.g., “When my job gets me down, I know that I can turn to my family and get the support I need”).

Individual demographic was coded into six lower order stressor domains (each representing a binary variable; 1 = yes. 0 = no). Measures of employee characteristics, which are commonly included in stress research as control variables or in some instances primary variables

of interest (see, e.g., Britton, 1997; Haarr & Morash, 1999; Morash, Kwak, et al., 2006), were included in the meta-analysis: *Age, Education, Tenure, Sex, Race, and Rank*. In the end, the goal is to understand whether the type of stressor impacts the overall ESE.

Confounding mechanisms. Scholars who investigate occupational stress among criminal-legal employees commonly develop multivariable statistical models that account for potentially confounding mechanisms, which can help isolate the effect of a stressor on stress from mediating or confounding relationships. As such, including standardized regression coefficients, such as beta weights, from multivariable models in the meta-analysis of occupational stress research may produce a more precise mean ESE than unadjusted coefficients, such as bivariable correlation coefficients. To assess the impact of direct theoretical controls on the magnitude of the ESE, articles were coded for whether statistical models accounted for *confounding mechanisms* (1 = yes, 0 = no). Morash, Lee, and colleagues' (2006) categorization of stressors primarily guided the coding of confounding mechanisms. These theoretical variables included *individual demographics, macro demographics, family factors, role factors, criminal-legal system and public factors, interpersonal conflicts, stressors intrinsic to job, and organizational factors*.

Occupational stress measure. The operationalization of occupational stress varied across the articles included in the meta-analysis. To assess the impact of this variation, ESEs were coded as to whether the occupational stress scale was developed by *Cullen et al. (1985)*; 1 = yes, 0 = no). Almost one-half of ESEs ($n = 907$, 46%) used this 6-item scale⁸, with fewer using a 4-

⁸ Items include: (1) When I'm at work, I often feel tense or uptight, (2) A lot of times, my job makes me very frustrated or angry, (3) Most of the time when I am at work, I don't feel that I have much to worry about, (4) I am usually calm and at ease when I am working, (5) I usually feel that I am under a lot of pressure when I am at work, and (6) There are a lot of aspects about my job that can make me pretty upset about things.

item scale developed by *Morash and Haarr*⁹ (1995; $n = 545$, 27%; 1 = yes, 0 = no) and a single-item scale ($n = 212$, 11%; 1 = yes, 0 = no).

Research design and sample characteristics. Research design measures and sample characteristics were developed as additional moderator variables in the meta-analysis. Effect size estimates were coded if the article had an occupational stress-relevant *theoretical framework* (1 = yes, 0 = no) that guided the research. A majority of the ESEs ($n = 1,663$, 83%) were drawn from articles that cited relevant literature on the relationships between stressors and occupational stress but were mostly atheoretical because they made no substantive reference to known models of stress (i.e., coded as 0). A conversation that simply acknowledges an empirical relationship between two variables fails to explicate why the association should exist. Additionally, ESEs were coded as to whether authors used *probability sampling* approaches (1 = yes, 0 = no) to create their sample of criminal-legal employees for the research study. A moderator variable for whether effect size estimates from included articles were extracted from a *multivariable* statistical model was also created (1 = multivariable, 0 = bivariable). Sample characteristics included the country from which samples were drawn and the type of criminal-legal employee sample. ESEs were coded for whether they represented a *USA sample* (1 = USA, 0 = international) or *correctional sample* (1 = yes, 0 = no). Approximately 86 percent ($n = 1,704$) of the ESEs were drawn from a USA-based sample and 64 percent from articles comprising of correctional samples ($n = 1,273$), which included community-based corrections (i.e., 109 ESEs

⁹ Items include: (1) In the last year, the amount of unwanted stress on my job has had a negative effect on my physical well-being, (2) In my last year, I really felt a lot of unwanted emotional stress from this job, (3) For my most recent year in law enforcement, my feeling is that I needed to get some special help in managing the stress of my job, and (4) For my last year in law enforcement, it seems that I can deal with the tensions of my job to the point that they do not interfere with family and social life.

of the 1,273 correctional sample ESEs). A small proportion of ESEs were drawn from judicial samples ($n = 26$, 1%).

Study Quality

Incorporating considerations about the quality of articles included in a meta-analysis is a pervasive concern among researchers (Chin et al., 2021; H. Cooper et al., 2019). Even with strict inclusion criteria, the rigor of articles will vary across the articles included in the meta-analysis. This is particularly true if meta-analysts adopt broad inclusion criteria to capture all relevant empirical evidence on a topic. Research has found that variability in study quality can bias effect sizes (see, e.g., Chalmers et al., 1977; Dechartres et al., 2016; Shadish et al., 2008; Spinelli et al., 2015). Given it is almost certain that study quality will vary across articles included in a meta-analysis, using a study quality scale, such as the Cochrane Collaboration's Risk of Bias tool (Higgins et al., 2011) or the Quality Assessment Tool (QAT) for Quantitative Studies (Thomas et al., 2004), is a popular approach to assess the impact of study quality on effect sizes. Quality scales yield a single score for each article based on several methodologically relevant items (e.g., "Was there adequate sample description" or "Was the response rate at least 60%") and are presented as an ordinal level (e.g., low quality, moderate quality, high quality) or scaled score (e.g., 0 to 7). However, study quality is a multidimensional construct. When researchers utilize a single value to represent study quality, they obscure study quality dimensions and their respective indicators. Accordingly, some meta-analysts recommend against addressing study quality with a scale:

All of these [study quality scale] approaches are problematic because the scores produced by quality scales are likely error prone. That is they introduce an additional source of measurement error into analyses because the validity of quality scales has rarely been subject to empirical examination...an even bigger problem is that most study quality scales result in a single number that represents study quality. This means that two studies

with very different strengths and weaknesses might receive the same score on the same scale (H. Cooper et al., 2019, pp. 133–134).

Cooper and colleagues recommend that meta-analysts should address study quality by developing defensible inclusion criteria at the beginning of the research synthesis and integrating study quality considerations throughout a project. With this approach, study quality indicators can be statistically tested in moderator analyses. For example, sample sizes, sampling approaches, and theoretical explanations may differ across articles, but meta-analysts can create study quality indicators for each and test the relationships between these factors and the effect size. Moreover, if meta-analysts have concerns about unreliability in the variables contributing to the effect size estimate, then coding procedures can be adjusted to capture the relevant information (i.e., Cronbach's α) in articles to mitigate this concern. Using study quality indicators has the potential to be more informative and productive in meta-analyses than relying on a unitary judgment of study quality (e.g., low quality versus high quality). Accordingly, this meta-analysis integrated study quality decisions (e.g., correcting ESEs for attenuation due to unreliability) and indicators (e.g., sampling considerations) throughout the meta-analytic process and did not rely on a study quality scale.

Publication bias

Articles with null findings that remain “in the file drawer” are often a concern among meta-analysts (Rosenthal, 1979). This form of bias may create inferential errors resulting from restricted range of large effect sizes in meta-analytic data (Egger & Smith, 1998; Lipsey & Wilson, 2001). Nevertheless, effect size estimates that comprised the current meta-analytic data had substantial variation (Fisher's $z(r)$ range: -0.64 to 1.58, with a standard deviation of 0.21). About one-half of the ESEs ($n = 1,052$, 53%) were also not statistically significant in their original articles. Taken together, these findings showed little substantive evidence of publication

bias. If publication bias was present in the occupational stress scholarship among criminal-legal employees, this amount of variation in ESEs would not be present. The diversity of effect sizes in the current meta-analysis (i.e., small to large, negative to positive, and significant to nonsignificant) casts doubt on the assertion that null findings are absent within the published literature on occupational stress among criminal-legal employees. Accordingly, publication bias is not being considered a primary issue in this meta-analysis.

Analytic strategy

To determine the grand mean effect size of the relationship between stressors and occupational stress among criminal-legal professionals, a two-pronged approach was used. First, random-effects analyses using multilevel modeling (MLM) procedures were conducted given such analyses can provide information about how relationships unfold at various levels of a data hierarchy (e.g., effect size estimates are nested within articles, nested within data sets); whereby level 1 contained the effect sizes, level 2 represented the articles, and level 3 corresponded to the unique data sets used between articles. In defining the three-level multilevel model in this meta-analysis, this study's notation follows that used by Heck and colleagues (2022). For ESE i in article j in data set k , the general level-1 model was defined as

$$Y_{ijk} = \pi_{0jk} + \sum_{p=1}^P \pi_{pj k} * a_{pijk} + \varepsilon_{ijk}, \quad (\text{eq. 8})$$

where π_{0jk} was an intercept, a_{pijk} represented level-1 predictors ($p = 1, \dots, P$), such as sample size, for ESE i in article j and data set k , $\pi_{pj k}$ were corresponding level-1 coefficients, and ε_{ijk} was the level-1 residual. At level 2, the general article model was defined as

$$\pi_{pj k} = \beta_{p0k} + \sum_{q=1}^{Q_p} \beta_{pqk} * X_{qjk} + r_{pj k}, \quad (\text{eq. 9})$$

where β_{p0k} was the intercept for article k , X_{qjk} were level-2 predictors ($q = 1, \dots, Q_p$), such as the number of effect sizes extracted from the article, β_{pqk} were corresponding level-2

coefficients, and r_{pjk} represented level-2 random effects. Between data sets (level 3), the general model was specified as

$$\beta_{pqk} = \gamma_{pq0} + \sum_{s=1}^{S_{pq}} \gamma_{pqs} * W_{sk} + u_{pqk} , \quad (\text{eq. 10})$$

where γ_{pq0} was an intercept, W_{sk} were level-3 predictors ($s = 1, \dots, S_{pq}$), γ_{pqs} were corresponding level-3 coefficients, and u_{pqk} represented level-3 random effects.

Although multiple effect sizes were extracted from articles (i.e., nested, statistically dependent data), MLM techniques allowed for all effect size estimates to be meta-analyzed because sources of dependence can be accounted for in the models by incorporating variance/covariance parameters (i.e., random coefficients) into the model for each level of the analysis. Multilevel procedures addressed the lack of independence by partitioning the variance in effect size estimates into its within-and between group components. Importantly, meta-analytic data assumes that there is a portion of the variance in the effect size estimate known (Hox et al., 2018) given these estimates were calculated from articles containing heterogeneity in methodologies, operationalization of outcomes, and sample characteristics. Thus, it was necessary to account for this level 1 variance when developing the multilevel model.

To generate variance-known models, standard errors for bivariable effect size estimates were calculated with the equation,

$$\sigma = \sqrt{1(n-3)} , \quad (\text{eq. 11})$$

and standard errors for the multivariable effect size estimates were calculated using,

$$\sigma = \frac{\text{Fisher's } z(r)}{b/SE} , \quad (\text{eq. 12})$$

where b represents the unstandardized regression coefficient and SE is the corresponding standard error reported in each article for each estimate (Hox et al., 2018; Lipsey & Wilson,

2001). For articles that do not report enough information to calculate a standard error for the effect size estimate, multiple imputation by chained equations was used to impute the missing standard errors rather than deleting these missing cases (Allison, 2002; Carlin et al., 2008; Royston, 2005) and m was set to 10.¹⁰ In the variance-known models, the standard errors of the ESEs represented a level-1 random slope parameter, and as such, the covariance matrix of the random effects part of the MLM equation changed to accommodate this predictor at level 1 with a constrained variance of one.¹¹ An overall mean effect size estimate between stressors and occupational stress was estimated which assessed the strength of stressors across articles and data sets. Fisher-transformed correlations of 0.10, 0.31, and 0.55 represent small, medium, and large effect sizes, respectively (J. Cohen, 1988). A series of moderator analyses examined the degree to which the magnitude of the relationship was conditioned by differing methodological decisions. Stata 15's *meglm* with an iterative method based on full maximum likelihood estimation was used to estimate all variance-known models.

Second, techniques consistent with a traditional methodological paradigm of meta-analysis were conducted given the ongoing debate on how best to address statistical dependence in meta-analytic data. In these analyses, the final data set was constrained to bivariable effect sizes (Total $N = 626$). Random-effects models using the restricted maximum likelihood estimate for the random-effects variance component (τ^2) were used given the high likelihood of heterogeneity in articles and the number of groups was small (Hox et al., 2018). To proceed with

¹⁰ The standard errors for the ESEs had 54 percent missing ($n = 1,080$). The missingness equation included all variables used in the meta-analysis and the bivariable σ estimate of $\sqrt{1/(n - 3)}$. The analyses used pooled estimates across all imputed datasets. This approach is consistent with prior meta-analyses in the field of criminology (see, e.g., T. Pratt et al., 2014; Pyrooz et al., 2016; Wolfe & Lawson, 2020).

¹¹ A constrained variance of one allowed σ for each ESE to be equal to its estimated value, resulting in each ESE to be treated as an independent random variable, each with variance unity, and each being adjusted by the standard error of the ESE as a random covariate at level 1.

the random-effects analysis, grand mean effect sizes were calculated by weighting each effect size by the inverse of its variance with the following general formula,

$$\overline{ES} = \frac{\sum(\omega_i ES_i)}{\sum \omega_i}, \quad (\text{eq. 13})$$

corresponding standard error, z-value, and 95% confidence intervals around the weighted mean effect size were also computed. Effect size estimates and their respective inverse-variance weights were corrected for measurement unreliability (Hunter & Schmidt, 2004). Following these adjustments, Fisher's r to z transformation was applied to effect size estimates. To avoid multiple effect size estimates from the same data set—thus having statistically dependent effects—no more than one effect size per data set was used in the analyses. If included articles contained multiple relevant effect sizes, one effect size was randomly chosen from its respective data set before performing any meta-analysis to create an independent set of effect sizes. This resulted in a final sample of 44 effect size estimates in the meta-analysis (Fisher's $z(r)$ range: -0.10 to 0.94). Regarding the homogeneity of the effect size distribution, Cochran's homogeneity Q -value was computed which indicated if there were considerable differences among the effect size estimates that were not attributable to sampling error alone. To provide context to the forest plot, the I^2 statistic (i.e., the ratio of variances) was calculated which approximated the proportion of the observed variance that reflects variation in true effects. A high I^2 is interpreted as a plot of the true effects would appear similar to a plot of the observed effects. In contrast, a low I^2 means the dispersion would begin to disappear, and all true effects would start to regress to the mean (H. Cooper et al., 2019). An additional objective was to examine the relative impact of methodological decisions on the grand mean ESE. Accordingly, moderator analyses using the meta-analysis analog to the analysis of variance were used to determine if there were significant between-group effects. The ANOVA analog partitioned the total Q into two components, a

between groups Q and a within groups Q . A significant Q_{Between} is interpreted as the moderator variable accounting for significant variability in effect sizes by more than sampling error.

CHAPTER 5: RESULTS

Introduction

In this chapter, the meta-analytic results are discussed, separated by the methodological paradigms of meta-analysis. The first section presents the findings yielded from the multilevel investigation of statistically dependent effect sizes, which unfolded as a series of analytic steps: (1) examining variance components using an unconditional model; (2) building the multilevel variance-known random intercept model to understand the overall strength of the stressor effect; (3) using the multilevel variance-known random intercept model to understand the stability of the effect; and (4) conducting meta-regression to assess statistical heterogeneity between ESEs when multiple methodological decisions and study quality indicators are controlled for simultaneously. In the second section, random-effects inverse-variance weighted models were used on an independent set of effect sizes. With this approach, a grand mean effect size was calculated by weighting each ESE by the inverse of its variance. Next, moderator analyses using the ANOVA analog were conducted to test the homogeneity among the effect sizes within mutually exclusive groups and differences between them. Significant between-group effects are interpreted as significant differences in the effect size across groups.

Multilevel Models

Unconditional model. When conducting a multilevel analysis, an unconditional (null) random intercept model (i.e., no-predictors model) should be developed first to partition the variance in the outcome into its within-and between-groups components. The unconditional model therefore provides useful information regarding how much of the variance in the ESEs lies between the articles and between the data sets in the sample. It also reports the estimates of the fixed effect in the model, which corresponds with the intercept (or the estimated grand mean

effect size estimate for stressors on occupational stress across all data sets and articles). This intercept from the unconditional model was 0.16 and represented the overall mean stressor effect size in the 80 articles and 57 data sets (and was close to the unadjusted mean of 0.15 from a single-level analysis that only considered the 1,993 ESEs in the sample and not their nesting within articles or data sets). The level 1 residual parameter was 0.04 (Wald $Z = 30.88$, $p < .001$), demonstrating significant variance due to differences among ESEs within their respective articles. The level 2 intercept parameter was less than 0.001 (Wald $Z = 0.58$, $p = .280$), and the intraclass correlation coefficient (ICC) was 0.083. This result demonstrated that approximately 8 percent of the total variability in the ESEs lies between articles. The level 3 variance component associated with data sets was 0.003 (Wald $Z = 2.23$, $p = .013$), and the ICC estimate was 0.075 (7.5%) between data sets. Comparing the -2LL (deviance) for three levels (-2LL, 4 parameters = 334.14) against the model with one level (-2LL, 2 parameters = 309.82), the delta chi-square for two degrees of freedom between models favored the three-level formulation ($\Delta 2\chi^2 = 48.64$, $p < .001$). Since there was adequate variability at each level¹², supportive evidence existed to develop variance-known MLMs.

Overall strength of the stressor effect. Table 2 contains the overall ESE for stressors and occupational stress adjusted for grand mean centered *sample size* and *number of effect sizes* associated with a given article. Multilevel modeling treats the level-1 intercept as a key outcome of interest to researchers (i.e., the average effect size estimate), but sample size and number of effects per study cannot be zero. In instances where predictors cannot be zero (such as the current study with sample size and number of effects), the intercept has little utility. To ensure a

¹² Consistent with standards in multilevel modeling, a three-level multilevel regression model was developed—rather than a general linear model—given the portion of variance between groups was greater than 0.03 (Heck et al., 2022).

meaningful and interpretable model intercept, sample size and number of effects per study were altered by centering them on zero, which makes zero have real interpretative use (i.e., zero is equal to the covariate's mean). Thus, the mean stressor effect size in the models with grand mean centered predictors in Table 2 can be interpreted as the expected ESE for stressors on occupational stress when sample size and number of effect sizes per article were at their mean values.

Table 2. Mean Effect Size Estimates for Stressors on Occupational Stress

	Intercept	SE	z	95% CI
Overall effect size	0.15	0.01	12.07***	[0.13, 0.18]
Bivariable effect size	0.25	0.02	13.92***	[0.21, 0.28]
Multivariable effect size	0.10	0.01	13.02***	[0.08, 0.11]

Notes. There are 1,993 overall ESEs, 626 bivariable ESEs, and 1,367 multivariable ESEs. Each model controls for the grand mean centered sample size and number of effects sizes per article.

*** $p < .001$ (two-tailed test).

As seen in Table 2, the overall mean ESE for stressors on occupational stress (M_z) was 0.15 (95% confidence interval [CI] = 0.13 to 0.18; $p < .001$), net of sample size and number of effect sizes per article. This finding suggests that stressors had a statistically significant, modest effect on occupational stress.¹³ The results also revealed variation in the effect of stressors on occupational stress between bivariable ($M_z = 0.25$; 95% CI = 0.21 to 0.28; $p < .001$) and multivariable ($M_z = 0.10$; 95% CI = 0.08 to 0.11; $p < .001$) statistical models. To illustrate this variation further, 33 percent and 62 percent of the bivariable and multivariable ESEs,

¹³ Prior to analyses, ESEs and their respective standard errors were corrected for attenuation due to unreliability (Hunter & Schmidt, 2004). However, this approach to correct artifacts has been criticized by scholars because the *a priori* adjustment will inflate effect sizes and the sampling variance from their original values in instances of low measurement reliability (Hox et al., 2018). This is problematic because if the reported reliability is inaccurate, the correction will yield incorrect estimates. Accordingly, Hox and colleagues recommend keeping estimates unadjusted and adding reliability as a grand mean centered predictor variable in the fixed part of level 1 in the MLM equation. Including reliability as an explanatory variable did not alter the pattern of findings yielded from the analyses that corrected effect sizes and standard errors for attenuation due to unreliability (see Appendix D). The overall mean ESE for stressors on occupational stress was 0.13 (95% CI = 0.11 to 0.15; $p < .001$), controlling for sample size per article, number of effect sizes per article, and unreliability.

respectively, were not statistically significant. Additionally, the bivariable ESEs ranged from -0.27 to 1.58, and the multivariable ESEs ranged from -0.64 to 1.15. Overall, the model intercepts revealed a robust, modest relationship between stressors and occupational stress but also showed instability in the magnitude of the effect across statistical models. This finding supports the need to further understand the stability of the effect of stressors on occupational stress across various methodological considerations and study quality indicators.

Stability of the stressor effect. As presented in Table 3, a series of moderator analyses were conducted to assess the impact of various methodological conditions and study quality indicators on the relationship between stressors and occupational stress. Specifically, this stage of the analysis used separate variance-known MLMs for several substantively¹⁴ important moderator characteristics (e.g., type of stressor, measurement operationalization considerations, and sample characteristics across articles), controlling for grand mean centered sample size and the number of effects per article. Two fixed-effect coefficients are of note in these models. First, the model intercepts represent the adjusted effect of stressors on occupational stress when the predictors in the model are all equal to zero (i.e., centered on their sample mean). The model intercepts in Table 3 showed the robustness of the stressor effect on occupational stress across a variety of methodological decisions and study quality indicators, $ps < .001$.

¹⁴ Defined as moderator domains that had $k \geq 50$.

Table 3. Impact of Moderator Variables on the Effect of Stressors on Occupational Stress

Moderator Variable (k)	Estimate	SE	z	Model Intercept	Intercept 95% CI
<u>Type of Stressor</u>					
Individual Demographics (779)	-0.22	0.01	-22.64***	0.24***	[0.22, 0.27]
Age (131)	-0.18	0.02	-9.37***	0.17***	[0.14, 0.19]
Education (125)	-0.10	0.02	-4.99***	0.16***	[0.14, 0.18]
Tenure (123)	-0.07	0.02	-3.26**	0.16***	[0.13, 0.18]
Sex (118)	-0.09	0.02	-4.25***	0.16***	[0.13, 0.18]
Race (93)	-0.14	0.02	-5.73***	0.16***	[0.13, 0.18]
Rank (50)	-0.16	0.03	-5.15***	0.16***	[0.13, 0.18]
Organizational Stressors (541)	0.06	0.01	5.55***	0.14***	[0.11, 0.16]
View of organization (137)	0.07	0.02	3.31**	0.15***	[0.12, 0.17]
View of coworker (98)	0.03	0.02	1.47	0.15***	[0.13, 0.18]
Organizational justice (98)	0.13	0.02	5.90***	0.15***	[0.12, 0.17]
View of supervisor (87)	0.05	0.02	2.11*	0.15***	[0.13, 0.18]
Organizational demographic (71)	-0.11	0.03	-3.97***	0.16***	[0.13, 0.18]
Operational Stressors (673)	0.16	0.01	15.64***	0.10***	[0.08, 0.13]
Role factor (280)	0.15	0.02	9.67***	0.13***	[0.10, 0.16]
Physical/psychological threat (275)	0.10	0.01	6.60***	0.14***	[0.12, 0.17]
Family factor (71)	0.19	0.03	7.13***	0.15***	[0.12, 0.17]
<u>Confounding Mechanisms</u>					
Controls for confounding mechanism (1,366)	-0.14	0.01	-13.58***	0.24***	[0.22, 0.27]
Controls for individual demographics (1,213)	-0.13	0.01	-12.44***	0.23***	[0.20, 0.25]
Controls for macro demographics (403)	-0.12	0.02	-7.21***	0.18***	[0.15, 0.20]
Controls for family factor (425)	-0.14	0.02	-7.84***	0.17***	[0.14, 0.21]
Controls for role factor (763)	-0.11	0.01	-7.84***	0.19***	[0.17, 0.22]
Controls for criminal-legal/public factor (103)	-0.08	0.03	-2.58*	0.16***	[0.13, 0.18]
Controls for interpersonal conflicts (893)	-0.13	0.01	-10.74***	0.21***	[0.18, 0.24]
Controls for stressor intrinsic to job (641)	-0.10	0.01	-7.44***	0.19***	[0.16, 0.21]
Controls for organizational factor (914)	-0.13	0.01	-11.01***	0.21***	[0.18, 0.25]

Table 3 (cont'd)Research Design

Theoretical framework (330)	-0.01	0.02	-0.45	0.16***	[0.13, 0.18]
Probability Sampling (430)	-0.03	0.02	-1.48	0.16***	[0.13, 0.19]

Stress Measure

Cullen et al. scale (907)	0.01	0.02	0.43	0.15***	[0.12, 0.18]
Morash & Haarr scale (545)	0.06	0.04	1.54	0.14***	[0.12, 0.17]
Single-item scale (212)	-0.08	0.03	-2.92**	0.16***	[0.14, 0.19]

Sample Characteristics

Correctional sample (1,273)	-0.04	0.02	-1.68 [†]	0.18***	[0.14, 0.22]
USA sample (1,704)	-0.06	0.03	-2.25*	0.20***	[0.15, 0.25]

Notes. All estimates are based on the full sample of effect sizes ($N = 1,993$). All moderator variables are binary (1 = yes, 0 = no). The number of effect sizes (k) are indicated in parentheses.

[†] $< .10$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed test).

Second, the fixed slopes for the moderator variables revealed their impact on the magnitude of the stressor effect on occupational stress. Many moderator variables were statistically significant predictors of the ESE. As shown in Table 3, the type of stressor impacted the ESE. The first set of stressor moderator variables related to the relationship between demographic characteristics of criminal-legal employees and occupational stress. The predicted ESE was smaller if the researcher investigated an individual demographic as a stressor ($b = -0.22, p < .001$). Specifically, studies had smaller ESEs if the stressor was age ($b = -0.18, p < .001$), rank ($b = -0.16, p < .001$), race ($b = -0.14, p < .001$), education ($b = -0.10, p < .001$), sex ($b = -0.09, p < .001$), or tenure ($b = -0.07, p < .01$) when compared to all other stressor types. Taken together, these results demonstrated that individual demographics had weaker associations with occupational stress.

Organizational stressors represented another type of stressor categorization and impacted the magnitude of the ESE ($b = 0.06, p < .001$). The effect of stressors on occupational stress was larger if researchers used organizational stressors such as organizational justice ($b = 0.13, p < .001$), view of organization ($b = 0.07, p < .01$), and view of supervisor ($b = 0.05, p < .05$). Conversely, researchers who used organizational demographics as a type of stressor produced weaker ESEs ($b = -0.11, p < .001$). View of coworkers as a type of organizational stressor had no statistically significant effect on the magnitude of ESEs. Overall, these results demonstrate that organizational (in)justice had the strongest effect on occupational stress among the organizational stressors.

Operational stressors were examined to assess their impact on the relationship between stressors and occupational stress, which resulted in significantly stronger ESEs than other types of stressors ($b = 0.16, p < .001$). All the operational stressor domains were significantly

associated with the ESEs. Operational stressors that dealt with family factors ($b = 0.19, p < .001$), role-related factors ($b = 0.15, p < .001$), and physical or psychological threats ($b = 0.10, p < .001$) tended to be more strongly associated with occupational stress in relation to other stressor types. Taken together, the results from this set of moderator analyses revealed that operational stressors have a significant impact on the magnitude of the stressor-stress effect size.

Next, ESEs that were adjusted by any confounding mechanism resulted in smaller effects than effect sizes that did not control for a confounding mechanism ($b = -0.14, p < .001$). Indeed, all the confounding mechanism domains resulted in smaller ESEs compared to instances where direct theoretical controls were not accounted (b range: -0.08 to $-0.14, ps < .05$). Therefore, these results underscore the importance of accounting for confounding mechanisms in analyses of stressors and occupational stress. Scholars who do not control for theoretically relevant factors when assessing the stressor-stress relationship may produce biased parameter estimates.

The final sets of moderator variables dealt with research design, the operationalization of occupational stress, and sample characteristics. Theoretically-grounded articles and probability sampling considerations did not impact ESEs. Scholars who used single-item occupational stress scales tended to report smaller ESEs compared to scholars who used multi-item scales ($b = -0.08, p < .01$). Occupational stress scales based off prevalent measures in the criminal-legal stress literature did not influence the magnitude of the ESE. Finally, the effect of stressors on occupational stress was found to be weaker in US samples ($b = -0.06, p < .05$) and in correctional samples ($b = -0.04, p < .10$).

Overall, the mean effect sizes between stressors and occupational stress were robust yet modest across a variety of methodological decisions and study quality indicators in the moderator analyses. Yet, variations in type of stressor, measurement operationalization

considerations, and sample characteristics impacted the magnitude of effects. Because these analyses used separate variance-known MLMs to investigate the influence of each moderator variable on the ESE, it is possible that there were considerable correlations between moderator variables. In the last stage of this multilevel modeling approach, statistically significant moderator variables¹⁵ were simultaneously included in a single variance-known MLM—net of grand mean sample size and number of effects per article—to assess if the overall pattern of findings changed in this multivariable context.

As shown in Table 4, the results of the multivariable MLM using the full sample of ESEs revealed that the type of stressor was associated with the ESE in different ways (organizational stressors as the reference category). Individual demographics yielded smaller ESEs than did organizational stressors ($b = -0.19, p < .001$), while operational stressors tended to produce larger ESEs compared to organizational stressors ($b = 0.06, p < .001$). In supplemental analyses (see Appendix E) that altered the reference category for the stressor type, operational stressors consistently produced larger effect sizes than the other stressor types. Scholars who controlled for confounding mechanisms ($b = -0.16, p < .001$) or used single-item occupational stress scales ($b = -0.08, p < .001$) had smaller effect sizes.

¹⁵ Model diagnostics revealed harmful levels of multicollinearity (i.e., variance inflation factors [VIF] > 4.0; J. Fox, 1991) if all the lower order stressor domains were included. Accordingly, only the higher order stressor domains (e.g., organizational stressor, operational stressor, individual demographic) were included in the multivariable MLMs.

Table 4. The Multivariable Impact of Methodological Variations on the Effect of Stressors on Occupational Stress (Full Sample)

Moderator Variables	Estimate	SE	z	95% CI
Fixed Effects				
Intercept	0.33	0.02	15.57***	[0.28, 0.37]
<u>Level 1 Moderators</u>				
Individual demographic	-0.19	0.01	-17.86***	[-0.21, -0.17]
Operational stressor	0.06	0.01	5.22***	[0.04, 0.08]
Controls for confounding mechanism	-0.16	0.01	-17.27***	[-0.17, -0.14]
Single-item scale	-0.08	0.02	-3.98***	[-0.12, -0.04]
Correctional sample	-0.001	0.02	-0.08	[-0.03, 0.03]
USA sample	-0.01	0.02	-0.59	[-0.05, 0.03]
Sample size ^a	-0.03	< 0.001	-0.28	[-0.00, 0.00]
<u>Level 2 Moderators</u>				
Number of effect sizes per article ^b	-0.04	< 0.001	-2.12*	[-0.00, -0.00]
Random Effects				
Level 1 – Effect Size Estimates				
Variance between models, within articles	0.02	0.001	22.50 [†]	[0.02, 0.02]
Level 2 – Articles				
Variance between article, within datasets	0.002	0.001	2.90 [†]	[0.00, 0.00]
Level 3 – Dataset				
Variance between datasets	< 0.001	< 0.001	0.00	[0.00, 0.00]

Notes. All moderator variables are binary (1 = yes, 0 = no), except sample size and number of effect sizes per article.

Organizational stressor served as the reference category. $N = 1,993$.

^aEstimate multiplied by 10,000.

^bEstimate multiplied by 100.

* $p < .05$; *** $p < .001$ (two-tailed test).

[†] $p \leq .001$ (one-tailed test).

Consistent with the standards in meta-analysis when including both bivariable and multivariable ESEs in a meta-analytic review (Turanovic & Pratt, 2021), Table 5 presents the results of the multivariable MLM using a restricted subsample of ESEs that were extracted from multivariable statistical models. Stressors that were classified as individual demographic yielded smaller ESEs than other stressor types ($b = -0.08, p < .001$). ESEs that represented operational stressors tended to be larger than other stressor types ($b = 0.06, p < .001$). The impact of these two stressor types on the effect size in the multivariable subsample closely resembled the findings produced with the full sample of ESEs.

Table 5. The Multivariable Impact of Methodological Variations on the Effect of Stressors on Occupational Stress (Restricted to Multivariable Subsample)

Moderator Variables	Estimate	SE	z	95% CI
Fixed Effects				
Intercept	0.43	0.33	1.28	[-0.23, 1.08]
Level 1 Moderators				
Individual demographic	-0.08	0.01	-7.61***	[-0.10, -0.06]
Operational stressor	0.06	0.01	5.20***	[0.04, 0.08]
Controls for confounding mechanism	-0.29	0.33	-0.87	[-0.94, 0.36]
Single-item scale	-0.03	0.02	-1.75	[-0.07, 0.00]
Correctional sample	-0.02	0.02	-1.04	[-0.05, 0.01]
USA sample	-0.01	0.02	-0.61	[-0.04, 0.02]
Sample size ^a	-0.06	< 0.001	-0.76	[-0.00, 0.00]
Level 2 Moderators				
Number of effect sizes per article ^b	-0.05	< 0.001	-4.13***	[-0.00, -0.00]
Random Effects				
Level 1 – Effect Size Estimates				
Variance between models, within articles	0.01	0.001	11.67 [†]	[0.01, 0.01]
Level 2 – Articles				
Variance between article, within datasets	< 0.001	< 0.001	0.00	[0.00, 0.00]
Level 3 – Dataset				
Variance between datasets	0.001	< 0.001	1.62	[0.00, 0.00]

Notes. All moderator variables are binary (1 = yes, 0 = no), except sample size and number of effect sizes per article.

Organizational stressor served as the reference category. $n = 1,367$.

^aEstimate multiplied by 10,000.

^bEstimate multiplied by 100.

*** $p < .001$ (two-tailed test).

[†] $p < .001$ (one-tailed test).

Conclusion. The first section of the results chapter established the relative strength and stability of the relationship between stressors and occupational stress among criminal-legal professionals through a multilevel investigation. The findings revealed that the effect of stressors on perceived occupational stress was modest ($M_z = 0.15$). However, the average ESE was influenced by certain moderator variables. Specifically, larger ESEs were yielded if the type of stressor was operational ($b = 0.16, p < .001$), followed by organizational stressors ($b = 0.06, p < .001$). The predicted ESE was smaller, however, if the stressor was an individual demographic ($b = -0.22, p < .001$). Of note, MLM techniques allow for all effect size estimates to be meta-analyzed because sources of dependence can be accounted for in the models. Such techniques, however, substantially deviate from a traditional methodological paradigm of meta-analysis to establish statistical independence (i.e., one effect size per article or per data set). Accordingly, the second section of the results chapter relied on a traditional (but commonly used) approach to address statistical dependence to see how well the findings “hold up” in random-effects inverse-variance weighted models.

Random-Effects Inverse-Variance Weighted Models

Study characteristics. A total of 44 articles of 31,975 criminal-legal employees were published between 1986 and 2022. Individual demographics were the most frequently investigated type of stressor ($n = 26, 59\%$), followed by operational stressors ($n = 11, 25\%$) and organizational stressors ($n = 7, 16\%$). Most articles used the occupational stress scale developed by Cullen et al. (1985); $n = 22, 50\%$), with fewer using a single-item scale ($n = 9, 20\%$) and Morash & Haarr scale (1995; $n = 4, 9\%$). Most articles represented correctional-based samples ($n = 28, 64\%$) and were conducted in the United States ($n = 32, 73\%$).

Effect sizes. Weighted mean effect sizes are presented in Table 6. Overall, results showed a positive, modest, and statistically significant effect of stressors on occupational stress ($M_z = 0.21$; 95% CI = 0.14 to 0.27; $p < .001$). Figure 10 presents the forest plot of the 44 selected bivariable effect sizes. Visual inspection of the forest plot revealed a general pattern of effects to the right of the no-effect value of zero, suggesting generally injurious effects of stressors. Homogeneity analyses indicated, however, that the distribution of effect sizes was highly heterogeneous ($Q = 913.29$, $p < .001$), meaning an overall mean effect size may not be a good representation of this distribution. Thus, the results from homogeneity testing supported the use of random-effects models. Analyses that were conducted using a fixed-effect model did not substantively change the direction, magnitude, or significance of this overall effect ($M_z = 0.19$; 95% CI = 0.18 to 0.21; $p < .001$). Given the high level of heterogeneity, modeling between study variability with moderator analyses was important to examine whether methodological decisions and study quality indicators differentially impact the relationship between stressors and occupational stress.

Moderator analyses showed articles investigating operational stressors observed larger effects than other stressor types ($M_z = 0.47$ vs. $M_z = 0.13$, respectively), and the difference between these means was significant ($Q_{\text{Between}} = 30.57$, $df = 1$, $p < .001$). Stressors that represented individual demographics had a significantly smaller mean effect size than other stressor types ($M_z = 0.07$ vs. $M_z = 0.42$, respectively, $Q_{\text{Between}} = 63.73$, $df = 1$, $p < .001$). Articles that investigated the effect of organizational stressors on occupational stress observed larger effects than other stressor types ($M_z = 0.35$ vs. $M_z = 0.18$, respectively), although the difference between these means was not significant ($Q_{\text{Between}} = 3.47$, $df = 1$, $p = .063$). The remaining moderator variables yielded no significant effect on the ESE, $p \geq .098$. Overall, operational

stressors ($Mz = 0.47$) showed a stronger effect on occupational stress than organizational stressors ($Mz = 0.35$) and individual demographics ($Mz = 0.07$).

Table 6. Effect Sizes for the Impact of Stressors on Occupational Stress in a Meta-Analysis of Data from 44 Articles

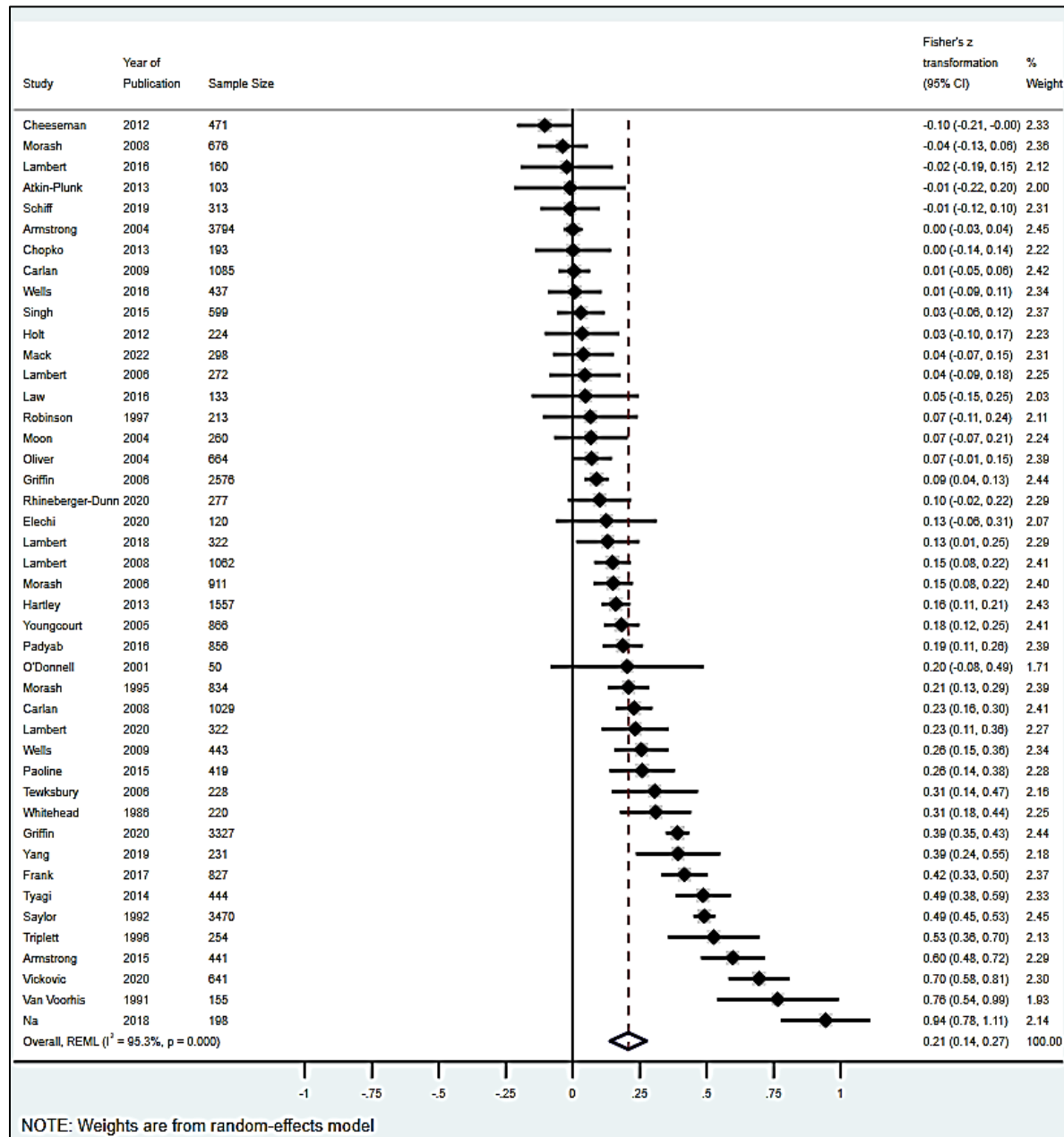
Effect size	<i>k</i>	Total N	Mz	SE	95% CI	<i>z</i>	<i>Q</i> _(<i>k</i>-1)	<i>I</i> ²
Overall	44	31,975	0.21	0.03	[0.14, 0.27]	6.02***	913.29***	96.23
<u>Type of Stressor</u>						<i>Q</i> _(Between)	df	<i>p</i>
Individual demographic	26	19,258	0.07	0.03	[0.01, 0.12]	63.73	1	< .001
Operational	11	9,268	0.47	0.05	[0.36, 0.57]	30.57	1	< .001
Organizational	7	3,449	0.35	0.08	[0.19, 0.51]	3.47	1	.063
<u>Research Design</u>								
Theoretical framework	9	7,953	0.31	0.07	[0.16, 0.45]	2.22	1	.136
Probability sampling	9	9,040	0.24	0.08	[0.09, 0.38]	0.18	1	.672
<u>Stress Measure</u>								
Cullen et al. scale	22	17,553	0.24	0.05	[0.14, 0.34]	0.92	1	.337
Single-item scale	9	3,966	0.10	0.07	[-0.05, 0.24]	2.74	1	.098
Morash & Haarr scale	4	2,619	0.30	0.11	[0.08, 0.52]	0.76	1	.384
<u>Sample Characteristics</u>								
USA sample	32	27,244	0.22	0.04	[0.14, 0.30]	0.26	1	.611
Correctional sample	28	22,235	0.21	0.04	[0.12, 0.30]	0.01	1	.934

Notes. All models estimated as random-effects models using the restricted maximum likelihood estimate for τ^2 .

Positive effect size estimates reflect higher levels of occupational stress. All moderator variables are binary (1 = yes, 0 = no), but estimates for reference categories are not presented.

*** $p < .001$.

Figure 10. Forest Plot for the Impact of Stressors on Occupational Stress in a Meta-Analysis of Data from 44 Articles



Publication bias was explored through visual examination of a funnel plot and Duval and Tweedie's (2000) trim-and-fill method. A funnel plot was generated on the 44 ESEs (see Figure 11) and showed evidence of missing effects on the lower region (e.g., beneficial, null, or harmful effects from small studies). In addition, the funnel plot was not funnel-shaped and symmetrically

centered around the mean effect size. Egger's test for asymmetry on the funnel plot, however, supported a conclusion of no small-study effects. The estimated bias coefficient was 0.49 with a standard error of 1.50, giving a p -value of .745. The trim-and-fill method also confirmed this because it resulted in no additional articles being imputed (i.e., identical observed and corrected random-effects summary estimates).¹⁶ These findings suggestive of no publication bias must be interpreted with caution given the distribution of effect sizes are highly heterogeneous. Funnel plot asymmetry may not result from bias but true heterogeneity in results or methodological irregularities across articles (Palmer & Sterne, 2016). Indeed, when the 44 ESEs were sorted by the type of stressor in the funnel plot (see Figure 12), distinct clusters emerged.

¹⁶ This meta-analysis of 44 articles yielded a weighted effect size of 0.21. Using the *fail-safe N* formula, $k = k * \left[\frac{ES_k}{ES_c} - 1 \right]$, (Orwin, 1983) an additional 880 articles with an effect size of zero would be needed to reduce the mean to .01. This finding suggested little evidence of publication bias.

Figure 11. Funnel plot with pseudo 95% confidence limits

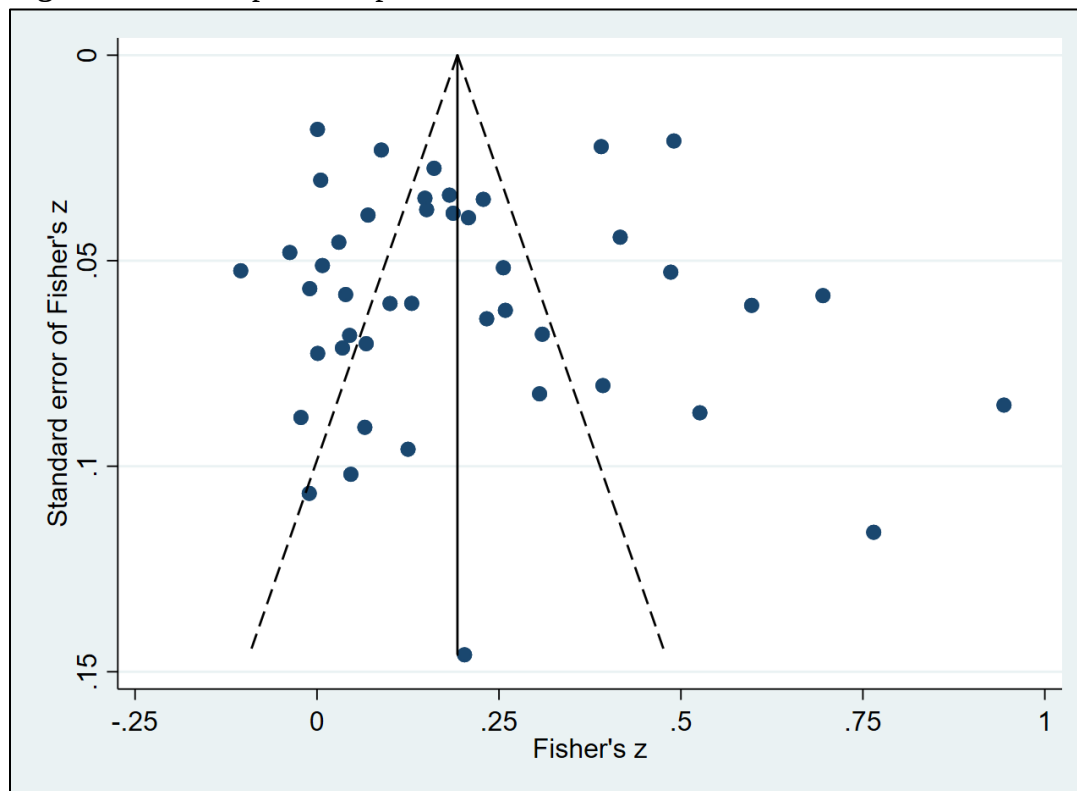
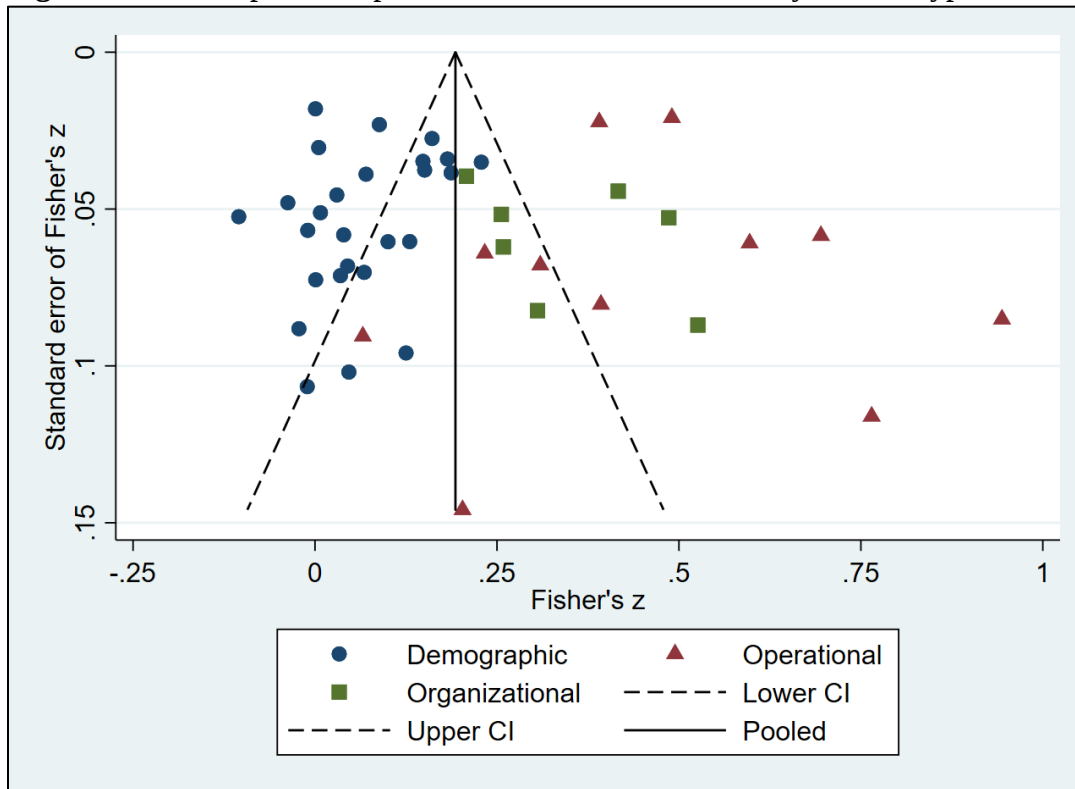


Figure 12. Funnel plot with pseudo 95% confidence limits, by stressor type



Supplemental analyses. In this section, separate random-effects inverse-variance weighted models are presented by stressor type. These analyses were particularly important because of the observed heterogeneity present in the sample of 44 ESEs. In instances where a group of articles from a single data set yielded multiple effect sizes per stressor type, one ESE per stressor type per data set was randomly chosen before performing any meta-analysis to maintain statistical independence within each sample of ESEs. This resulted in a sample of operational stressor ESEs ($k = 35$), organizational stressor ESEs ($k = 30$), and individual demographics ($k = 38$). For descriptive purposes only, the meta-analytic findings from the three samples were compared to the results of the effect size analyses presented in the previous section.

The results of the supplemental analyses are shown in Tables 7 – 9. The general pattern of evidence was consistent with the moderator analyses from the sample of 44 ESEs. For operational stressors, the overall mean effect across the 35 selected effects sizes and for the 44 effect sizes were comparable ($Mz = 0.44$ and 0.47 , respectively, with $95\% CI = 0.33$ to 0.55 and 0.36 to 0.57 , respectively). Both were medium size effects. Moderator analyses by types of operational stressors showed no significant effects on occupational stress when compared to their respective reference category mean, $ps \geq .178$. The results were similar for the analysis based on the 30 organizational stressor ESEs. The overall mean effect was medium in size ($Mz = 0.37$; $95\% CI = 0.29$ to 0.44), which is comparable to the organizational stressor estimate from moderator analyses based on the sample of 44 ESEs ($Mz = 0.35$; $95\% CI = 0.19$ to 0.51). Moderator analyses by types of organizational stressors showed no significant effects on occupational stress when compared to their respective reference category mean, $ps \geq .149$. The overall mean effect for the 38 individual demographic ESEs was weak but statistically significant ($Mz = 0.06$; $95\% CI = 0.02$ to 0.09 ; $p < .001$), and it was roughly the same as the individual demographic effect from moderator analyses based on the sample of 44 ESEs ($Mz = 0.07$; $95\% CI = 0.01$ to 0.12). Age as a stressor yielded stronger effects but negative in direction than articles not accounting for this characteristic ($Mz = -0.12$ vs. $Mz = 0.07$, respectively, $Q_{\text{Between}} = 15.14$, $df = 1$, $p < .001$). As age of an employee increases, occupational stress should increase theoretically due to, for example, increased job responsibilities and demands associated with higher ranks (employees who have higher ranks are typically older). However, the findings suggest that as age increases, occupational stress decreases. For the remaining demographics, no significant effects were observed, $ps \geq .309$.

Table 7. Effect Sizes for the Impact of Operational Stressors on Occupational Stress

Effect size	<i>k</i>	Total N	Mz	SE	95% CI	<i>z</i>	<i>Q</i> _(<i>k</i>-1)	<i>I</i> ²
Overall	35	20,461	0.44	0.06	[0.33, 0.55]	7.89***	1,217.44***	97.48
Operational Stressor						<i>Q</i> _(Between)	df	<i>p</i>
Role factor	17	5,647	0.45	0.08	[0.29, 0.61]	0.04	1	.842
Phy/psy threat	11	8,880	0.35	0.10	[0.16, 0.55]	1.11	1	.291
Family factor	4	2,228	0.64	0.16	[0.33, 0.96]	1.81	1	.178

Notes. All models estimated as random-effects models using the restricted maximum likelihood estimate for τ^2 .

Positive effect size estimates reflect higher levels of occupational stress. All moderator variables are binary (1 = yes, 0 = no), but estimates for reference categories are not presented. Phy = Physical; Psy = Psychological.

*** $p < .001$ (two-tailed test).

Table 8. Effect Sizes for the Impact of Organizational Stressors on Occupational Stress

Effect size	<i>k</i>	Total N	Mz	SE	95% CI	<i>z</i>	<i>Q</i> _(<i>k</i>-1)	<i>I</i> ²
Overall	30	19,242	0.37	0.04	[0.29, 0.44]	9.72***	657.25***	94.10
Organizational Stressor						<i>Q</i> _(Between)	df	<i>p</i>
Organizational justice	10	4,321	0.44	0.06	[0.31, 0.56]	1.94	1	.164
View of organization	6	3,394	0.40	0.08	[0.23, 0.56]	0.16	1	.689
View of supervisor	6	2,843	0.26	0.08	[0.09, 0.42]	2.09	1	.149
View of coworker	4	3,783	0.26	0.11	[0.05, 0.47]	1.11	1	.291
Org demographic	2	756	0.24	0.14	[-0.05, 0.52]	0.89	1	.345

Notes. All models estimated as random-effects models using the restricted maximum likelihood estimate for τ^2 .

Positive effect size estimates reflect higher levels of occupational stress. All moderator variables are binary (1 = yes, 0 = no), but estimates for reference categories are not presented. Org = Organizational.

*** $p < .001$ (two-tailed test).

Table 9. Effect Sizes for the Impact of Individual Demographics on Occupational Stress

Effect size	<i>k</i>	Total N	Mz	SE	95% CI	<i>z</i>	<i>Q</i> _(<i>k</i>-1)	<i>I</i> ²
Overall	38	26,674	0.06	0.01	[0.02, 0.09]	3.89***	122.64***	73.63
<u>Individual Demographics</u>						<u><i>Q</i>_(Between)</u>	<u>df</u>	<u><i>p</i></u>
Sex	8	7,352	0.08	0.03	[0.02, 0.14]	0.74	1	.389
Race	5	6,709	0.07	0.04	[-0.00, 0.15]	0.24	1	.621
Tenure	5	1,384	0.03	0.05	[-0.06, 0.12]	0.41	1	.520
Education	3	1,612	0.05	0.05	[-0.05, 0.16]	0.01	1	.934
Age	3	884	-0.12	0.05	[-0.22, -0.03]	15.14	1	< .001
Rank	3	1,441	0.11	0.05	[0.01, 0.21]	1.03	1	.309

Notes. All models estimated as random-effects models using the restricted maximum likelihood estimate for τ^2 .

Positive effect size estimates reflect higher levels of occupational stress. All moderator variables are binary (1 = yes, 0 = no), but estimates for reference categories are not presented.

*** $p < .001$ (two-tailed test).

Conclusion. The results from the supplemental analyses were comparable to the moderator analyses from the sample of 44 ESEs. The mean effect on occupational stress for operational stressors remained the strongest effect (Mz range: 0.44 to 0.47) followed by organizational stressors (Mz range: 0.35 to 0.37) and individual demographics (Mz range: 0.06 to 0.07). When examining whether specific lower order stressor domains within each higher order stressor domain impacted effect sizes differently than others, many had moderate to strong effects on occupational stress, such as family-related factors (Mz = 0.64), factors impacting an employee's role (Mz = 0.45), and lack of organizational justice (Mz = 0.44); although the differences between these means and their respective reference category mean were not significant. Only one moderator variable (i.e., *Age*) had a statistically significant effect. Given the estimates were produced from lower order stressor domains that reflected a small number of effect sizes (*k* range: 2 to 17), the results must be interpreted cautiously.

Taken together, the results from both the MLMs and the random-effects inverse-variance weighted models revealed that stressors are an important predictor of occupational stress. Notably, the pattern of evidence demonstrated certain types of stressors that criminal-legal employees experience while on the job have stronger effects on their perceived occupational stress than other types of stressors. The final chapter of the dissertation provides a summary of the findings and explores the theoretical, methodological, and practical relevance of the results.

CHAPTER 6: DISCUSSION & CONCLUSION

Introduction

A review of the criminal-legal literature revealed that occupational stress is a personalized phenomenon that varies between professionals depending on personal factors and environmental conditions. Employees simply being exposed to stressors in the workplace does not necessarily cause or exacerbate their occupational stress. Stressors must be perceived and processed by professionals as aversive challenges in the work environment that overcame their perceived ability (whether psychological or physiological) to cope with the situation effectively. Thus, the meaning of occupational stress varies for different employees under different work conditions. Scholars agree that stressors are inextricably linked with perceptions of occupational stress (see, e.g., Dowden & Tellier, 2004; J. H. Webster, 2013). At the same time, however, substantial variations in guiding theoretical frameworks, methodologies, underlying sources of stress, and research findings exist throughout the extent scholarship in criminology. This chaotic state of the literature limits the discipline's ability to reach consensus on the stress process among criminal-legal employees. A traditional narrative literature review lacks the methodological rigor and analytical precision necessary to adequately intervene on open empirical issues in the criminal-legal literature on occupational stress: (1) establish an average effect size of stressors on occupational stress among criminal-legal employees; (2) determine whether the type of stressor influences the magnitude of the effect; and (3) identify whether theoretical and methodological decisions moderate the effect.

Accordingly, this study subjected the body of research on occupational stress among criminal-legal employees to a meta-analysis. A meta-analytic investigation has the ability to statistically summarize, integrate, and interpret the quantitative results for a group of empirical

research articles to form empirically-grounded conclusions about the pattern of findings. Specifically, this study meta-analyzed 80 peer-reviewed, empirical articles representing 57 unique data sets that contained 1,993 effect size estimates. In addition to examining the empirical associations between stressors and occupational stress among criminal-legal professionals, the current study also intervened on a major methodological debate among meta-analysts—addressing statistical dependence in meta-analytic data. To assess the issue of statistical dependence, a two-pronged analytic approach was used: (1) random-effects analyses using multilevel modeling techniques and (2) procedures consistent with a traditional methodological paradigm in meta-analysis. The following section summarizes the key findings, organized by analytic approach.

Summary of Findings

Multilevel models. Recall that the first stage of analyses for this meta-analysis sought to understand the effect of stressors on occupational stress using multilevel analysis techniques given the data structure was hierarchical. Specifically, this study's sample consisted of articles and effect size estimates within these articles, with articles organized within data sets. The primary aims were to establish the overall strength of the effect of stressors on occupational stress among criminal-legal employees and determine the types of stressors most closely linked to occupational stress. Overall, this study's results indicate that stressors had a modest, but significant, effect on occupational stress among criminal-legal employees ($M_z = 0.15$).

Beyond establishing the overall strength of the stressor effect, scholars and practitioners require clarity on which stressors have stronger associations with occupational stress. This study was able to identify and compare the key correlates of occupational stress. Broadly, occupational stress among criminal-legal employees seems to be more strongly associated with operational

stressors ($b = 0.16$) than organizational stressors ($b = 0.06$). This finding contradicts historical assumptions about the importance of organizational stressors over operational stressors. Indeed, organizational sources of stress were considered to be more problematic for criminal-legal employees than operational stressors:

Findings indicates that overall exposure rates are highest for organizational and management stressors rather than routine operational duties (Brown & Campbell, 1990, p. 305).

Most interesting was the finding that organizational stressors had a total effect on distress of approximately 6.3 times that of inherent police stressors (Violanti & Aron, 1993, p. 903).

Occupational stressors ranking most highly within the population were not specific to policing, but to organizational issues (Collins & Gibbs, 2003, p. 256)

These conclusions were taken from individual studies. If scholars were to rely on a narrative summary of these findings, however, meaningful relationships could be obscured. Indeed, the current meta-analytic investigation across all 80 articles and 1,993 effect size estimates found that operational stressors had stronger effects on occupational stress than other stressor types, which is consistent with results from prior meta-analyses (Dowden & Tellier, 2004; J. H. Webster, 2013). In contrast, individual demographics tended to have smaller effect sizes than other stressor types ($b = -0.22$). Overall, this study found evidence that certain stressors had stronger influences on occupational stress than others.

Operational stressors, organizational stressors, and individual demographics represent higher order stressor domains, but lack granularity. As such, lower order stressor domains were also analyzed in this meta-analysis to provide scholars and practitioners more nuanced conclusions regarding the stressor effect on occupational stress. Table 10 displays the rank-order of the effect size estimates from the 14 types of stressors. The rank ordering of these values was based on the b estimates contained in Table 3. As a reminder, b estimates from the moderator

analyses should not be interpreted as overall mean Fisher-transformed correlation estimates (Mz). The *b* estimates simply indicate if the ESE was larger (i.e., positive estimate) or smaller (i.e., negative estimate) in instances when the moderator variable was present.

Table 10. Rank-Ordered *b* Estimates of Stressors

Rank	Stressor	Stressor Domain	Estimate
1	Family factor	Operational	0.19
2	Role factor	Operational	0.15
3	Organizational justice	Organizational	0.13
4	Physical/psychological threat	Operational	0.10
5	View of organization	Organizational	0.07
6	View of supervisor	Organizational	0.05
7	View of coworker	Organizational	0.03
8	Tenure	Individual demographic	-0.07
9	Sex	Individual demographic	-0.09
10	Education	Individual demographic	-0.10
11	Organizational demographic	Organizational	-0.11
12	Race	Individual demographic	-0.14
13	Rank	Individual demographic	-0.16
14	Age	Individual demographic	-0.18

The top five stressors that strongly influenced the effect size estimate ($b \geq 0.07$) were family factor, role factor, organizational justice, physical or psychological threat, and view of organization. Three out of the five top stressors were categorized as operational stressors, suggesting sources of stress may be evolving as the climate surrounding the criminal-legal system changes. Of note, stressors related to work-family dynamics and conflicts significantly impacted the ESE. Consistent with the huge body of empirical evidence within the industrial and organizational psychology scholarship (Amstad et al., 2011), family factors being ranked as the top stressor for criminal-legal professionals underscore the far-reaching bidirectional effects of the pressures from the job and family domains on occupational stress. Work-related issues have the potential to spill over into the home and complications at home may interfere with work, causing counterproductive work outcomes (e.g., occupational stress).

The roles of criminal-legal employees are often multifaceted, and as a result, this can engender role-related stressors, such as role ambiguity, role conflict, and role overload. This study found that role factors had a substantively meaningful effect on occupational stress. Danger-related factors also influenced occupational stress. Physical and psychological risks to employees are inherent in criminal-legal work, and the perception of real or potential job threats to employees' safety have serious implications for work stress. Looking at these results, it can be inferred that certain dimensions of criminal-legal work—like conflicting directions, unclear job expectations, too many job demands, and job dangerousness—are closely linked to occupational stress.

Another top-tier stressor was organizational justice (or more precisely lack thereof). Several decades of research on the organizational justice effect suggest fair managerial practices in the workplace matter to employees across a variety of job sectors (see, e.g., Cohen-Charash & Spector, 2001; Colquitt et al., 2001; Wolfe & Lawson, 2020). Indeed, organizational justice predicts a wide range of beneficial work-related perceptions, attitudes, and behaviors. In the absence of fair supervisory conduct, however, counterproductive outcomes can materialize among employees. Indeed, the results of this meta-analysis suggest that poor perceptions of organizational justice in criminal-legal agencies contributed to more occupational stress among employees. This finding can be considered in conjunction with the view of organization stressor. Lack of organizational support or negative perceptions of the agency by employees had a significant influence on occupational stress.

Another discernable pattern emerged when the bottom tier stressors were examined ($b \leq -0.07$). Across these stressors, each one represented a demographic-related stressor, suggesting on their own they had very little influence on occupational stress. It should be noted that these

results do not necessarily mean individual or organizational demographics are unimportant in the field's understanding of the stress process among criminal-legal employees. Indeed, using a combination of demographic controls in multivariable statistical models may yield more precise estimates of the stressor effect. These results simply demonstrated that, compared to other stressor types, demographics tended to have weaker effects on occupational stress. As researchers continue to investigate the effect of certain demographics on occupational stress, model specification must be guided by theoretical frameworks and expectations. Far too often, authors justify including demographics in their models with atheoretical statements (e.g., "These demographic characteristics are often included as variables when examining correctional staff attitudinal states" or "Previous research on police found that individual characteristics were associated with stress"). Such justifications do not help provide a deeper understanding of how and why these characteristics are important to the stress process.

Beyond identifying the most influential types of stressors on occupational stress, this study also investigated if the ESE was conditioned by methodological decisions and study quality indicators. Consistent with other meta-analytic investigations (see, e.g., T. Pratt et al., 2014; Pyrooz et al., 2016; Wolfe & Lawson, 2020), this meta-analysis found that the stressor-stress link was significantly smaller when scholars accounted for theoretical confounders in their multivariable models. Controlling for family factors ($b = -0.14$), individual demographics ($b = -0.13$), interpersonal conflicts ($b = -0.13$), and organizational factors ($b = -0.13$) yielded much smaller effect sizes. Thus, future researchers may want to consider controlling for the constructs within these domains to yield unbiased estimates of the stressor effect. Furthermore, ESEs drawn from single-item scales ($b = -0.08$) of occupational stress and USA samples ($b = -0.06$) had smaller effect sizes. All other methodological decisions and study quality indicators had

negligible effects on the ESE. Of note, the type of criminal-legal sample did not influence the effect size, suggesting the stress process is meaningful regardless of the profession. Only a small percentage of effect sizes in the meta-analysis, however, were extracted from studies involving judicial and community-based corrections samples. Future research should continue to investigate the stressor-stress link among these criminal-legal employees.

Random-effects inverse-variance weighted models. To intervene on the methodological debate concerning statistical dependence in meta-analytic data, the second stage of analyses relied on meta-analytic techniques consistent with a traditional methodological paradigm in meta-analysis—random-effects inverse-variance weighted models. To create an independent set of bivariable effect sizes, no more than one effect size per data set was used in the analyses. This resulted in a final sample of 44 effect size estimates. Grand mean effect sizes were calculated by weighting each effect size by the inverse of its variance. Overall, stressors had a positive, modest, and statistically significant effect on occupational stress ($Mz = 0.21$).

Moderator analyses indicated that operational stressors ($Mz = 0.47$) far outweighed organizational stressors ($Mz = 0.35$) and individual demographics ($Mz = 0.07$) in terms of their contribution to occupational stress. Next, supplemental analyses that relied on separate samples of ESEs sorted by higher order stressor domains were conducted to investigate the influence of the lower order stressor domains in further detail. Table 11 displays the rank-order of the mean effect size estimates from the operational stressor sample ($k = 35$), organizational stressor sample ($k = 30$) and individual demographic sample ($k = 38$). The rank ordering of these values was based on the relative magnitude of the Fisher-transformed correlation estimates contained in Tables 7 – 9.

Table 11. Rank-Ordered Fisher-Transformed Correlation Estimates of Stressors

Rank	Stressor	Stressor Domain	Mz
1	Family factor	Operational	0.64
2	Role factor	Operational	0.45
3	Organizational justice	Organizational	0.44
4	View of organization	Organizational	0.40
5	Physical/psychological threat	Operational	0.35
6	View of supervisor	Organizational	0.26
7	View of coworker	Organizational	0.26
8	Organizational demographic	Organizational	0.24
9	Rank	Individual demographic	0.11
10	Sex	Individual demographic	0.08
11	Race	Individual demographic	0.07
12	Education	Individual demographic	0.05
13	Tenure	Individual demographic	0.03
14	Age	Individual demographic	-0.12

The top five predictors of occupational stress were family factor ($Mz = 0.64$), role factor ($Mz = 0.45$), organizational justice ($Mz = 0.44$), view of organization ($Mz = 0.40$), and physical or psychological threat ($Mz = 0.35$). Each stressor had a moderate to large effect on occupational stress ($Mz > 0.30$). The bottom tier of the mean effect size estimates was dominated by individual demographic stressors (Fisher's z range: -0.12 to 0.11). In particular, the individual demographics of rank, sex, race, education, tenure, and age were all located in this bottom tier of relative effect sizes. Thus, the utility of individual demographics to influence occupational stress—compared to operational and organizational stressors—is fairly limited. These results must be interpreted cautiously because “studies with small samples may find effects or relationships of meaningful magnitude that are not statistically significant because of low statistical power” (Lipsey & Wilson, 2001, p. 6).

Conclusion. Overall, the pattern of findings across both stages of analyses is consistent, which provides strong evidence for the true effect. Operational stressors had stronger effects on occupational stress than organizational or individual demographics. Specifically, family conflicts, role issues, organizational injustice, physical or psychological threats, and negative

views of the organization represented the top five ranked stressors among criminal-legal employees. Using both methodological approaches to meta-analysis was an attempt to intervene on the statistical dependence debate. Both techniques, however, yielded similar conclusions on average (albeit the mean effect size estimates yielded with the traditional approach were substantially inflated, which is not surprising since the analyses were based on unadjusted, bivariable ESEs). Of note, researchers may want to avoid the traditional approach to meta-analysis given the potential for inflated effect size estimates. Meta-analysts adhering to a traditional methodology in meta-analysis must at minimum be transparent about the potential inflation of effects. The importance of this methodological finding is discussed further in the implication for research section.

Implications

This meta-analysis has several implications that will impact stress theory, research, and practice in criminology. These implications are discussed below.

Implications for theory. Research on occupational stress among criminal-legal employees has grown substantially in the past several decades; however, theoretical gaps remain. Scholars have access to a variety of theoretical frameworks to guide their stress research, such as the Person-Environment Fit Model, Job Demand Control Model, and the Effort-Reward Imbalance Model. While research is still accumulating, evidence on the utility of these models to explain work-related outcomes has been generally positive (Asif et al., 2018; Eddy et al., 2017; Gilbert-Ouimet et al., 2014; van Vianen, 2018). Given this strong evidence base, it was surprising that a large percentage of ESEs (83%) were extracted from eligible articles void of theoretically-guided approaches to understand occupational stress. While authors commonly provided sufficient reviews of the correlates of occupational stress, these conversations were largely atheoretical.

Listing references to prior scholarly work on occupational stress that support a conceptual argument or contain some findings does not represent strong theory (Sutton & Staw, 1995). Such approaches do not explain why the stressor leads to occupational stress.

Many of the theoretical models on stress discussed in this study—except for General Strain Theory—are deeply rooted in the discipline of psychology. Whether using theoretical explanations external to the field of criminology is unappealing to criminologists, researchers lack the necessary theory building skills, or criminal-legal scholars are simply unaware of these stress frameworks, the criminal-legal research on occupational stress contains inadequate theory on the stress process. Without theoretical and empirical attention on the stressor-stress link among criminal-legal professionals, research on occupational stress will be unable to fully explicate the importance of stressors on stress among criminal-legal employees.

The current study can only affirm researchers of perceived stress among police officers need to “get on the same page” about what is important, starting with a theory about stress, generally. Having a theoretical basis will guide decision making regarding the selection of variables to measure. When researchers are more consistently measuring the same variables, the tools used to measure them can be refined. Then, through repeated use of valid measures, researchers can begin to systematically support or debunk theories. Unless these challenges are embraced, scholars in this area of research may still be debating the same questions ad nauseam (J. H. Webster, 2013, p. 644).

It has been almost a decade since this ‘call to action’ was made, but few scholars investigating occupational stress among criminal-legal professionals have answered the call. The field is indeed still debating the same questions ad nauseam. To address this lack of theoretical engagement, scholars who study occupational stress among criminal-legal employees must first acknowledge the problem. Without this critical mass, the literature base will become even more piecemealed and largely atheoretical. After scholars recognize the theoretical weakness in the literature, they can begin integrating—or if necessary building—theories that generate explanations of occupational stress. A theory of occupational stress must adequately explain the

origins and forms of the stress phenomenon and provide theory-based answers to the questions why and how. Importantly, to achieve progress in understanding occupational stress among criminal-legal professionals, good theory must rise above simplistic perspectives, taxonomies, or descriptions of occupational stress. To meet the need, theories of occupational stress must coalesce into a coherent body of thought and fully explicate the interconnections of the stress process in the workplace, while being general enough to encompass a variety of stressors and stress responses across diverse settings in the criminal-legal system.

Furthermore, the literature on this topic suffers from inconsistent and inappropriate measures on occupational stress. Indeed, strict methodological criteria for study inclusion regarding the measurement of occupational stress were created for this meta-analysis to ensure articles dealt with the same constructs and relationships. Articles that relied on alternative stress outcomes (e.g., physiological measures of stress, global measures of life stress, or occupational stress scales that confound perceived occupational stress with stressors) were excluded from the current study. While meta-analysis techniques, such as moderator analyses, do allow for the comparison of the findings of disparate articles with varying measurement strategies, effect sizes still need to be conceptually comparable. This meta-analysis cannot claim to fully resolve the issue of measurement inconsistency in the literature on occupational stress among criminal-legal employees or indicate one measurement approach is superior to another. Nevertheless, this meta-analysis offers a starting point for meaningful dialogues about conceptualization and operationalization of the stress process among criminal-legal employees. A review of the current literature on occupational stress among criminal-legal employees indicates scholars are continuing to wander aimlessly without strong theoretical guidance and consistency in the measurement of key concepts. Future research investigating the stressor-stress link with

criminal-legal professionals need to fully consider (and be transparent with) their theoretical conceptualization of occupational stress and measurement strategy justification.

Implications for research. Overall, the meta-analytic findings indicate that certain types of stressors have stronger effects than others on occupational stress among criminal-legal professionals.¹⁷ Specifically, there is need for continued research examining the influence of those stressors (for example, family conflicts, role-related issues, and organizational injustice) on work-related stress in criminal-legal systems. While individual studies have investigated these associations, there has been limited investigation of the dimensions of these stressors. For example, criminal-legal research indicates that work-family conflict has three dimensions: time-based, strain-based, and behavior-based (Lambert et al., 2017; Liu et al., 2017). However, a unidimensional construct of work-family conflict was the common measurement strategy for this construct in the current meta-analysis. Given certain stressors had stronger associations with occupational stress, future stress research should examine these constructs with more granularity. Failing to explicate all the nuance and variations of a concept will lead to further theoretical confusion in the criminal-legal scholarship on occupational stress.

This study also intervenes on a key methodological debate and has important implications for future meta-analyses. At first, this study may not provide a clear resolution on the statistical dependence debate among meta-analysts given both methodological approaches to meta-analysis used in this study produced substantively similar findings. Yet, it does reinforce the importance of meta-analysts to carefully consider the purpose of their investigation. The decision of which

¹⁷ An alternative explanation for these stronger effects may be methodological decisions and measurement strategies for stressors not represented in the current meta-analysis. For example, a more validated instrument of organizational justice that is consistently used in the literature compared to idiosyncratic scales of organizational support may explain the stronger effect of organizational justice on occupational stress.

approach to use must be guided by the research question. The current study had broad aims (i.e., to determine the extent to which stressors matter and whether the stressor type influences the magnitude of the effect size). Given the focus of this meta-analysis was on all stressor types in the criminal-legal literature, the traditional approach to meta-analysis was ill-equipped to handle this goal. A considerable amount of information on the stressor-stress link was lost when creating the independent set of effect sizes. More to the point, this current meta-analysis was forced to focus on one type of stressor even if the article examined multiple stressors. This hindered this study's ability to fully investigate the complexity of the stressor effect. Alternatively, a multilevel approach to meta-analysis allowed for analyzing statistically dependent effect sizes, and thus, capturing the full nature of the data extracted from articles. For this study, multilevel modeling represented the superior approach to meta-analysis.

Despite the benefit of multilevel modeling in the current meta-analysis, it is important to emphasize that there is nothing inherently wrong with selecting one effect size per article or group of articles from a single data set. It may well be that some meta-analysts have narrower interests or are synthesizing research evidence comprised of high-quality experimental designs that report a single effect size of interest (e.g., the effect of intervention A on the treatment group versus control group). Meta-analysts must understand though the potential risks of selecting only one effect size estimate when a study yields many and clearly communicate the limitations of these decisions. The current meta-analysis randomly selected a single effect size per study because no alternative criteria were suitable for choosing a preferred ESE. Other common approaches to handle multiple effect sizes within a study include averaging them into a single mean value or selecting a single effect size per study according to some criteria and omitting others (H. Cooper et al., 2019; Lipsey & Wilson, 2001). For example, this meta-analysis could

have relied on selecting the largest ESE to include in analyses in situations when a study yielded more than one effect size. This selection criteria would allow for the creation of an independent set of effect sizes; yet, even greater differences in the magnitude of effects across methodological paradigms may have been observed between stressors with this strategy. While the decision can be debated, it is once again not inherently wrong. Simply, a traditional approach to meta-analysis comes with important limitations that alter the nature of the data. Multilevel modeling, as discussed previously, is an alternative to creating a set of independent effect sizes for analysis because it can statistically model the dependencies among effect sizes, which allows all data to be meta-analyzed.

Furthermore, many of the standard diagnostic statistics for testing effect size heterogeneity (e.g., Cochran's homogeneity Q -value and I^2 statistic) and visual displays (e.g., forest plots) that meta-analysts have come to rely on are inaccessible with meta-analytic data representing complex hierarchical structures and large samples of ESEs. Consistent with recommendations in the field of criminology (Turanovic & Pratt, 2021), the decision on which meta-analytic strategy to use should be informed by: (1) the eligibility criteria, (2) the types of effect size statistics to be extracted, and (3) the structure of the meta-analytic data. Throughout the meta-analytic process, the researcher must also value transparency and reproducibility. Multilevel analyses and the traditional meta-analysis paradigm have advantages and disadvantages, and meta-analysts must come to terms with the limitations of their chosen approach. However, if decision-making processes were clearly documented and have a rationale, other scholars can assess for themselves the utility and meaningfulness of these decision.

Finally, meta-analyses statistically analyze findings from individual articles for the purpose of creating a quantitative summary of the results. However, an article cannot be included

in a meta-analysis if its authors fail to include the necessary summary data to compute effect sizes. Journal submission guidelines typically include page constraints or word limits, and thus, authors must be judicious in the type of information reported when submitting a paper for publication. Standard errors and confidence intervals, for example, are commonly excluded, particularly in situations where authors present numerous statistical tables and charts in their article. Indeed, 54 percent of the multivariable ESEs included in the present meta-analysis had their associated standard error missing. Furthermore, authors who primarily rely on multivariable analyses may view bivariable raw data (e.g., means and standard deviations) or correlation matrices as superfluous. The decision to not report this information, however, may result in their article being excluded in a meta-analysis due to missing data. In order to ensure that the findings of meta-analyses are unbiased, scholars must value the completeness of their reporting of information. Page constraints and word limits were historically valid obstacles to the transparency and reporting quality of primary studies. Yet, academic journals in the digital era allow authors to enhance their submission with supplementary materials, such as comprehensive tables and charts that include standard errors or correlation matrices. By including data and supporting material to an article, it can mitigate some of the issues missing data cause in meta-analyses.

Implications for practice. The findings have implications for criminal-legal practice, particularly in the context of how criminal-legal agencies improve the well-being of their workforce. While this study's findings demonstrate some stressors influenced occupational stress more than others, a weaker association does not mean a null association. Accordingly, criminal-legal agencies must adopt a holistic approach to stress. The stress process is complex and represents a relationship among individual differences and social environments. Employer

considerations that are inclusive of the multifaceted nature of stress have the potential to yield beneficial work-related outcomes (Nelson & Simmons, 2011). While acute stress responses may be inevitable, injurious health outcomes and counterproductive work-related attitudes and behaviors are not. Drawing on a preventive stress management approach and a public health framework (Quick et al., 2013), agency leadership can adhere to the three levels of preventive stress management to promote a more positive, holistic response to occupational stress: (1) mitigate the stressor (i.e., primary prevention, such as reducing overwhelming workloads); (2) change the stress response (i.e., secondary prevention, such as promoting healthy coping strategies); and (3) heal the collateral consequences of occupational stress (i.e., tertiary prevention, such as offering behavioral health services and employee assistance programs).

Numerous types of stressors exist in the workplace, which support a holistic approach by an organization to manage stress among employees. Yet, the results of this meta-analysis clearly revealed specific stressors that criminal-legal managers must target to reduce their impact on employees. For example, family-related issues were the most important job stressor for criminal-legal employees, and as such, organizations and supervisors cannot overlook conflicts between work and family life. To reduce negative work-related outcomes, agencies should foster a family-friendly work environment (Butts et al., 2013). Supportive supervisors can help develop an organizational climate that is viewed by employees as family-friendly. As Marshal and Barnett (1994, p. 253) noted, managers can “(a) help workers manage the time pressures of being working parents by having policies such as vacation time, sick leave, unpaid or personal leave, or flexible work schedules, or (b) help workers meet their continuing family responsibilities through such program as maternity and paternity leave, leave that can be used to care for sick children or elders, affordable health insurance, and child-care or elder care programs.” While

many criminal-legal agencies offer such programs, they need to create an environment where employees feel encouraged to utilize these services for work and nonwork needs (Youngcourt & Huffman, 2005). Relatedly, organizational injustice was an important predictor of occupational stress among criminal-legal employees. As such, organizational decision-making and managerial practices must be aligned with the dimensions of organizational justice and be visible to employees. Fair supervisory treatment needs to be the bedrock of an organization's culture, or it risks creating a toxic workplace setting that can lead to employees experiencing counterproductive work-related attitudes, behaviors, and perceptions (Cohen-Charash & Spector, 2001; Colquitt et al., 2001; Wolfe & Lawson, 2020). In the end, exposure to stressors is inevitable, but certain stressors matter more to criminal-legal employees than others. Agencies must institute policies that minimize the potential harm of these stressors, and when employees experience stress responses, the organization needs to connect them with appropriate services.

Limitations and Future Directions

Although this meta-analysis provides the most up-to-date synthesis of the criminal-legal literature on occupational stress, the study has several overarching limitations, which provide directions for future research. Specifically, for an article to be eligible for inclusion in this meta-analysis, it needed to be formally published in an empirical, peer-reviewed journal outlet. It did not include grey literature (e.g., dissertations, theses, technical reports). Meta-analysts who are trying to decide whether to exclude or include grey literature will find themselves in the middle of yet another debate in meta-analysis. One side of the debate is based on the potential for publication bias in meta-analytic data by excluding grey literature (i.e., the file drawer problem). However, others argue that selection bias is introduced by attempting to include the grey literature (i.e., it is impossible to conduct extensive literature searches that encompass all grey

literature and databases). If meta-analysts aim for transparency and reproducibility, searching the grey literature complicates these goals. Retrieving grey literature is more of an art than a science, which is the opposite direction meta-analysis needs to head in. Grey literature repositories, platforms, and registries exist, which can be easily documented and reported by the meta-analyst. Yet, other methods, such as contacting experts via email/social media or general web searching, are more subjective and less open to scrutiny. Determining whether the grey literature excluded from this meta-analysis changes the overall pattern of findings is a direction for future research. Nevertheless, the findings showed little evidence of publication bias.

Related to inclusion criteria, this meta-analysis did not include all measures of occupational stress. As a reminder, an article was eligible for inclusion if occupational stress was conceptualized as criminal-legal employees' perceived perceptions of psychological or emotional pressure or tension. Other measurements of stress (e.g., physiological responses) were excluded. Therefore, the present study's meta-analytic data is reflective of this inclusion criteria. While a meta-analysis has the analytical sophistication to partition the effect of disparate measurement strategies, a determination must still be made by the meta-analyst if the research findings are comparable enough. This meta-analysis viewed constructing, for example, a distribution of ESEs for a mix of results on perceived occupational stress, the release of adrenaline, and cardiovascular output as an inappropriate form of aggregation. These stress responses may be closely linked in the stress process, but they are arguably distinct topics. Aggregating such results together into a grand average would be misleading to scholars and practitioners on the stressor effect. Researchers need to explore the effect of stressors on these other measurement strategies of occupational stress.

Finally, this meta-analysis focused on one part of the stress process (i.e., the effect of stressors on acute stress responses) but cannot speak to long-term stress responses (e.g., misconduct, depression, burnout, job performance, job satisfaction, etc.) or resiliency to stress among criminal-legal employees. From a theoretical research standpoint, criminal-legal scholars exploring the full occupational stress process will provide a deeper understanding of how and why certain facets are important to criminal-legal professionals. While the aforementioned decisions may seem overly strict and open to debate, they ensured study quality judgements were integrated into the eligibility criteria of this meta-analysis from the start, resulting in effect sizes that could be meaningful compared across articles and meta-analytic results that are more valid.

Conclusion

Occupational stress among criminal-legal employees is pervasive and can have far-reaching effects on employees and organizations. Yet, the stress process is complex and extremely personalized depending on a wide range of individual characteristics and environmental conditions. As interest in workplace stress increased, the criminal-legal literature on occupational stress blossomed. In response to the growing body of literature, two meta-analytic investigations were published in 2004 and 2013 to investigate the stressor-stress link among correctional officers and police officers, respectively. While informative and starting points for discussion, they suffered from methodological limitations, and ultimately, left lingering questions unanswered. One finding of note was the sheer volume of theoretical confusion in the criminal-legal literature on occupational stress. Occupational stress had been examined on numerous types of stressors, using different conceptualizations and operationalizations of key variables, and across various theoretical and methodological characteristics. Research on the stress phenomenon among criminal-legal employees continued

since these prior meta-analyses, and unfortunately, the theoretical indeterminacy in the literature had been left unattended. Accordingly, another meta-analytic investigation was warranted to improve the state of knowledge accumulation on this topic and to remind criminal-legal researchers about the importance of stress theory.

Using a variety of meta-analytic techniques, this study found that operational stressors (e.g., family factors, role factors, and physical and psychological threats) had an overall stronger effect on occupational stress among criminal-legal employees than organizational stressors and individual demographics. It is imperative that researchers continue to explore the dimensions of these constructs to better understand their impact on work stress in the criminal-legal system. More research is also needed that is guided by theoretical frameworks on stress. If the literature on occupational stress among criminal-legal professionals continues its current trajectory, it will evolve into an atheoretical body of scholarship with limited value to science and practice. If course corrections are made, criminology will have a stronger theoretical and empirical understanding of the occupational stress process.

APPENDICES

APPENDIX A: PRISMA Checklist

Table 12. PRISMA Checklist

Section and Topic	Item #	Checklist Item	Location where item is reported
TITLE			
Title	1	Identify the report as a systematic review.	ii
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	ii
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4-5
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5-6
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	43-44
Information sources	6	Specify all databases, registers, websites, organizations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	44
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	44
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Not applicable
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	43-44

Table 12 (cont'd)

Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	51-53
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	53-57
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	58-60
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	51-53
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	43-44
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	51-53, 62
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	45-51
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	60-63
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	60-63
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	72, 81
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Not applicable

Table 12 (cont'd)

Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	60-63
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	51
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	51
Study characteristics	17	Cite each included study and present its characteristics.	45-50
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Not applicable
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	78
Results of syntheses	20a	For each synthesis, briefly summarize the characteristics and risk of bias among contributing studies.	Not applicable
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	68-69, 77-78, 83-84
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	78-81
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	68-69, 72, 77-78, 81, 83-84
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Not applicable
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	68-69, 77-78, 83-84

Table 12 (cont'd)

DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	87-94
	23b	Discuss any limitations of the evidence included in the review.	94-99
	23c	Discuss any limitations of the review processes used.	101-102
	23d	Discuss implications of the results for practice, policy, and future research.	94-100
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Not reported
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Not reported
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not reported
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Not reported
Competing interests	26	Declare any competing interests of review authors.	Not reported
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Not reported

Adapted from Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>

APPENDIX B: IRB Letter

MICHIGAN STATE UNIVERSITY

DETERMINED NOT "HUMAN SUBJECTS" Revised Common Rule

May 17, 2021

To: Spencer Grant Lawson

Re: **MSU Study ID:** STUDY00006238
Principal Investigator: Spencer Grant Lawson
Determination Date: 5/17/2021

Title: The Effect of Occupational Stress among Law Enforcement Officers: A Meta-Analysis

The activity described in this submission was determined not to involve "human subjects" as defined by the Common Rule as codified in the U.S. Department of Health and Human Services (DHHS) regulations for the protection of human research subjects.

Definition of Human Subject

For DHHS, "*Human subject*" means a living individual about whom an investigator (whether professional or student) conducting research:

- (i) Obtains information or biospecimens through intervention or interaction with the individual, and uses, studies, or analyzes the information or biospecimens; or
- (ii) Obtains, uses, studies, analyzes, or generates identifiable private information or identifiable biospecimens." [45 CFR 46.102(e)(1)]



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Determination

This study proposes to conduct a meta-analysis of stressors and occupational stress responses among law enforcement officers. Data will be accessed through publicly available sources, such as Google Scholar. No additional data will be collected through any interactions or interventions with human subjects.

Hence, the activity does not involve human subjects.

Therefore, the federal regulations for the protection of human subjects would not apply to this activity and Michigan State University (MSU) Institutional Review Board (IRB) approval is not needed to proceed. However, please note that while MSU IRB approval is not required, other federal, state, or local regulations or requirements or ethical or professional standards may still be applicable based on the activity.

Modifications: If any of the activities described in this submission change, please contact the IRB office as the activity may involve human subject research and require IRB approval. For example, this determination is not applicable to activities that may

be regulated by U.S. Food & Drug Administration (FDA), such as those involving drugs, medical devices, human food additives, color additives, electronic products, or any other test articles regulated by the FDA.

Modifications to Funding: **Changes in funding may alter this determination.** For example, MSU IRB review and approval is required if MSU receives an award through a grant, contract, or cooperative agreement directly from a federal agency, even where all non-exempt research involving human subjects are carried out by employees or agents of another institution. In addition, the new funding source may have additional or different requirements.

For More Information: See HRPP Manual Section 4-3, Determination of Human Subject Research (available at hrpp.msu.edu).

Contact Information: If we can be of further assistance or if you have questions, please contact us at 517-355-2180 or via email at IRB@msu.edu. Please visit hrpp.msu.edu to access the HRPP Manual, templates, etc.

APPENDIX C: Occupational Stress Meta-Analysis – Article-Level Coding Manual

PART ONE: STUDY INFORMATION

1. First author last name: _____
2. First author first name: _____
3. Year of publication: _____
4. Type of article: _____
 0 = dissertation 1 = peer-reviewed 2 = book 3 = Technical report 4 = Conference paper
5. Article ID # _____
6. Dataset ID # _____
7. Effect size number ID within article _____
8. Effect size number ID (Unique) _____
9. ES page number _____

PART TWO: SAMPLE CHARACTERISTICS

10. Sample size _____
11. Sample type _____
 1 = corrections 2 = law enforcement 3 = courts
 4 = mixture 5 = community-based corrections 6 = other
12. Nationality _____
 1 = US 2 = China 3 = Nigeria
 4 = England 5 = New Zealand 6 = Canada
 7 = Taiwan 8 = Sweden 9 = India
 10 = Ghana 11 = S. Korea
13. Mean age _____
14. Sex _____
 1 = < 5% male 2 = between 5% and 49% male 3 = 50% male
 4 = between 51% and 95% male 5 = > 95% male 9 = cannot tell
15. Race _____
 1 = > 60% White 2 = > 60% Black 3 = > 60% Hispanic
 4 = > 60% Other Minority 5 = Mixed (none more than 60%) 6 = Mixed, but can't estimate proportion
 9 = cannot tell
16. Percent college _____
17. Mean experience/tenure _____
18. Rank (string): _____

PART THREE: MEASUREMENT OF STRESSORS (KEY IV)

Nature of stressor type:

- | | | | |
|------------------------|-------|--------|---------|
| 19. Combo organization | _____ | 0 = no | 1 = yes |
| 20. Combo operational | _____ | 0 = no | 1 = yes |
| 21. Age | _____ | 0 = no | 1 = yes |
| 22. Sex | _____ | 0 = no | 1 = yes |
| 23. Sexual identity | _____ | 0 = no | 1 = yes |
| 24. Race | _____ | 0 = no | 1 = yes |
| 25. Ethnicity | _____ | 0 = no | 1 = yes |
| 26. Marriage | _____ | 0 = no | 1 = yes |
| 27. Children | _____ | 0 = no | 1 = yes |
| 28. Divorced | _____ | 0 = no | 1 = yes |
| 29. Education | _____ | 0 = no | 1 = yes |
| 30. Tenure | _____ | 0 = no | 1 = yes |
| 31. Position | _____ | 0 = no | 1 = yes |
| 32. Rank | _____ | 0 = no | 1 = yes |
| 33. Hours worked | _____ | 0 = no | 1 = yes |
| 34. Income | _____ | 0 = no | 1 = yes |

35. Military experience	_____	0 = no	1 = yes
36. View of organization	_____	0 = no	1 = yes
37. View of supervisor	_____	0 = no	1 = yes
38. View of coworkers	_____	0 = no	1 = yes
39. View of self	_____	0 = no	1 = yes
40. Organizational justice	_____	0 = no	1 = yes
41. Family factor	_____	0 = no	1 = yes
42. Personality trait	_____	0 = no	1 = yes
43. Role stressor	_____	0 = no	1 = yes
44. Physical or psychological threat	_____	0 = no	1 = yes
45. Training experiences	_____	0 = no	1 = yes
46. Control evaluations	_____	0 = no	1 = yes
47. Advancement opportunities	_____	0 = no	1 = yes
48. Other social support	_____	0 = no	1 = yes
49. Organizational demographic	_____	0 = no	1 = yes
50. Scale of measure	_____	1 = dichotomous 3 = ordinal	2 = discrete 4 = continuous
51. Cronbach's alpha	_____	Numerical value	
52. Number of items	_____		
53. Label used in study	_____		

PART FOUR: MODERATION ANALYSIS- CONTROL FOR THEORETICAL CONFOUNDERS

54. Individual demographic	_____	0 = no	1 = yes
55. Macro demographic	_____	0 = no	1 = yes
56. Marital conflict family problems	_____	0 = no	1 = yes
57. Individual's goal/role conflicts, job security	_____	0 = no	1 = yes
58. Criminal justice system, media, public	_____	0 = no	1 = yes
59. Interpersonal conflicts (internal to police work)	_____	0 = no	1 = yes
60. Stressors intrinsic to police work itself	_____	0 = no	1 = yes
61. Policy, procedures, bureaucratic structure, reorganization, promotion competition	_____	0 = no	1 = yes

PART FIVE: MEASUREMENT OF OUTCOME: PERCEIVED OCCUPATIONAL STRESS (KEY DV)

62. Label used in study	_____		
63. Operationalization	_____	1 = Self-constructed	2 = Adapted from previous work
64. Scale used (<i>if #63 = 2</i>)	_____		
65. Scale of measure	_____	1 = dichotomous 4 = continuous	2 = discrete 3 = ordinal
66. Cronbach's alpha	_____	Numerical value	
67. Number of items	_____		
68. Expected theoretical direction effect	_____	0 = no	1 = yes

PART SIX: RESEARCH DESIGN DESCRIPTORS AND EFFECT SIZE ESTIMATE

69. Theoretical framework	_____	0 = no	1 = yes
70. Specify framework (<i>if #69 = 1</i>)	_____		
71. Sampling approach	_____	0 = non-probability	1 = probability
72. Analysis type	_____	0 = bivariate	1 = multivariate
73. Type of correlation	_____	0 = Point biserial	1 = Pearson 2 = Spearman
74. Type of regression	_____	1 = ANOVA	2 = logistic

		3 = OLS	4 = poisson/nbreg
		5 = SEM	6 =HLM
		7 = partial correlation	8 = ordinal regression
		1 = PBr from means/SD/N	
75. Effect size to calculate	_____		
<i>Effect size estimate numbers needed</i>			
76. Correlation	_____	77. F-test	_____
78. df	_____	79. Standardized partial regression coefficient	_____
80. Unstandardized partial regression coefficient	_____	81. SE for unstandardized coefficient	_____
82. t-ratio	_____	83. z-value	_____
84. Group 1 mean	_____	85. Group 1 SD	_____
86. Group 1 sample size	_____	87. Group 2 mean	_____
88. Group 2 SD	_____	89. Group 2 sample size	_____
90. ESE significant	_____	0 = no	1 = yes

APPENDIX D: Supplemental Analyses for Attenuation due to Unreliability

Table 13. Mean Effect Size Estimates for Stressors on Occupational Stress (Cronbach's α as Explanatory Variables)

	Intercept	SE	z	95% CI
Overall effect size	0.13	0.01	13.49***	[0.11, 0.15]
Bivariable effect size	0.20	0.01	15.54***	[0.17, 0.22]
Multivariable effect size	0.08	0.01	12.91***	[0.07, 0.10]

Notes. There are 1,993 overall ESEs, 626 bivariable ESEs, and 1,367 multivariable ESEs.

Each model controls for the grand mean centered sample size per article, grand mean centered number of effects sizes per article, grand mean centered reliability of the independent variable, and grand mean centered reliability of the outcome variable.

*** $p < .001$ (two-tailed test).

APPENDIX E: Supplemental Analyses for Multivariable Models

Table 14. The Multivariable Impact of Methodological Variations on the Effect of Stressors on Occupational Stress (Individual Demographic as Reference Category)

Moderator Variables	Estimate	SE	z	95% CI
Fixed Effects				
Intercept	0.13	0.02	6.60***	[0.09, 0.17]
<u>Level 1 Moderators</u>				
Organizational stressor	0.19	0.01	17.86***	[0.17, 0.21]
Operational stressor	0.25	0.01	24.74***	[0.23, 0.27]
Controls for confounding mechanism	-0.16	0.01	-17.27***	[-0.17, -0.14]
Single-item scale	-0.08	0.02	-3.98***	[-0.12, -0.04]
Correctional sample	-0.001	0.02	-0.08	[-0.03, 0.03]
USA sample	-0.01	0.02	-0.59	[-0.05, 0.03]
Sample size ^a	-0.03	< 0.001	-0.28	[-0.00, 0.00]
<u>Level 2 Moderators</u>				
Number of effect sizes per article ^b	-0.04	< 0.001	-2.12*	[-0.00, -0.00]
Random Effects				
Level 1 – Effect Size Estimates				
Variance between models, within articles	0.02	0.001	22.50 [†]	[0.02, 0.02]
Level 2 – Articles				
Variance between article, within datasets	0.002	0.001	2.90 [†]	[0.00, 0.00]
Level 3 – Dataset				
Variance between datasets	< 0.001	< 0.001	0.00	[0.00, 0.00]

Notes. All moderator variables are binary (1 = yes, 0 = no), except sample size and number of effect sizes per article.

Individual demographic served as the reference category. *N* = 1,993.

^aEstimate multiplied by 10,000.

^bEstimate multiplied by 100.

* $p < .05$; *** $p < .001$ (two-tailed test).

[†] $p \leq .001$ (one-tailed test).

Table 15. The Multivariable Impact of Methodological Variations on the Effect of Stressors on Occupational Stress (Operational Stressor as Reference Category)

Moderator Variables	Estimate	SE	z	95% CI
Fixed Effects				
Intercept	0.38	0.02	18.57***	[0.34, 0.42]
<u>Level 1 Moderators</u>				
Organizational stressor	-0.05	0.01	-5.22***	[-0.08, -0.04]
Individual demographic	-0.25	0.01	-24.74***	[-0.27, -0.23]
Controls for confounding mechanism	-0.15	0.01	-17.27***	[-0.17, -0.14]
Single-item scale	-0.08	0.02	-3.98***	[-0.12, -0.04]
Correctional sample	-0.001	0.02	-0.08	[-0.03, 0.03]
USA sample	-0.01	0.02	-0.59	[-0.05, 0.03]
Sample size ^a	-0.03	< 0.001	-0.28	[-0.00, 0.00]
<u>Level 2 Moderators</u>				
Number of effect sizes per article ^b	-0.04	< 0.001	-2.12*	[-0.00, -0.00]
Random Effects				
Level 1 – Effect Size Estimates				
Variance between models, within articles	0.02	0.001	22.50 [†]	[0.02, 0.02]
Level 2 – Articles				
Variance between article, within datasets	0.002	0.001	2.90 [†]	[0.00, 0.00]
Level 3 – Dataset				
Variance between datasets	< 0.001	< 0.001	0.00	[0.00, 0.00]

Notes. All moderator variables are binary (1 = yes, 0 = no), except sample size and number of effect sizes per article.

Operational stressor served as the reference category. $N = 1,993$.

^aEstimate multiplied by 10,000.

^bEstimate multiplied by 100.

* $p < .05$; *** $p < .001$ (two-tailed test).

[†] $p \leq .001$ (one-tailed test).

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