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Teachers' Executive Functioning Abilities and Levels of Occupational Stress

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TEACHERS' EXECUTIVE FUNCTIONING ABILITIES AND
LEVELS OF OCCUPATIONAL STRESS

A Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy

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Department of School Psychology

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This Dissertation by: Niraj Mukesh Patrawala

Entitled: *Teachers' Executive Functioning Abilities and Levels of Occupational Stress*

has been approved as meeting the requirement for the Degree of Doctor of Philosophy in College of Education and Behavioral Sciences in the Department of School Psychology.

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ABSTRACT

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The current study examined the relationship between levels of occupational stress and executive functioning abilities among 62 teachers working in K-12 public schools. The impact of moderator variables such as years of service and educational setting on the relationship between teacher stress and executive functioning were also explored. Participants' levels of stress were measured via self-report using the Teacher Stress Inventory (TSI) and executive functioning abilities were assessed using the Dimensional Change Card Sorting Task (DCCS) and the Flanker Test of Attention (Flanker) subtests of the National Institutes of Health Toolbox. Multiple Linear Regression (MLR) was used to analyze the effect of EF abilities and moderator variables on self-reported levels of occupational stress. Statistical analyses revealed no significant relationship between occupational stress and executive functioning abilities. Similarly, years of service and educational setting had no impact on reported levels of stress. The lack of statistically significant findings, as well as the exploratory nature of this study, suggest the need for further research in the area of teacher stress and executive functioning.

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CHAPTER I

INTRODUCTION

Teaching has consistently been shown to be a highly stressful profession (Johnson et al., 2005; Kyriacou, 2001). In fact, Johnson et al. (2005) ranked teaching as the second most stressful profession in regards to physical and psychological outcomes – more stressful than nursing, police work, firefighting, and 22 other professions included in their study. Teaching has been plagued by high rates of attrition and turnover and high levels of stress have often been cited by teachers as one of the main reasons for their departure from the field (Smith & Ingersoll, 2004). According to a report by the Alliance for Excellent Education (Haynes, 2014), nearly half a million teachers move to another school or leave the field entirely every year - an exodus that costs the U.S. economy approximately 2.2 billion dollars annually. The 2012 MetLife Survey of the American Teacher (Markow & Pieters, 2012), a nationally representative poll of a thousand school teachers and principals, indicated that job satisfaction among teachers had declined by 23% compared to results from another MetLife survey conducted in 2008, reaching its lowest level in the past 25 years (Markow & Cooper, 2008).

According to Ingersoll, Merrill, and Stuckey (2014) this frequent turnover has caused the teaching force to become less experienced and less stable than in previous decades. Almost three decades ago a majority of teachers had at least 15 years of teaching experience, but data from 2011-12 suggest that this number has dropped to 5 years of experience. Meanwhile, the annual attrition rate has increased from 6.4% in 1988-89 to

9% in 2008-9, an increase of 41%. While alarming on their own, these numbers are particularly concerning when taking into consideration that attrition is highest among teachers who have been in the field for five years or less. The same report, using data from the 2008-09 school year, revealed that 45% of first year teachers cited dissatisfaction with some aspect of their job as the primary reason for leaving the profession entirely. The main reasons for dissatisfaction varied, ranging from student behavior to school and work conditions, salary, classroom resources, accountability policies, professional development opportunities, and decision-making power (Ingersoll et al., 2014). The findings from these surveys are supported by empirical studies aimed at understanding the sources and manifestations of high levels of teacher stress.

Kyriacou (2001) identified several main sources of stress stemming from both internal and external factors. Stressors such as student misbehavior, nature of job demands, role conflict and role ambiguity, and poor professional relationships with colleagues and school administration were found to be some of the most commonly cited sources for teacher stress. These findings have also been confirmed by more recent research that showed time pressures, workload, student misbehavior, lack of resources, lack of professional recognition, lack of support, and sheer diversity of tasks as stressors that negatively affect teachers' functioning inside and outside of school settings (Kokkinos, 2007).

Teacher stress is defined as "the experience by a teacher of unpleasant, negative emotions, such as anger, anxiety, tension, frustration or depression, resulting from some aspect of work as a teacher" (Kyriacou, 2001, p. 28). The fact that teachers are stressed is not new, but the topic continues to hold relevance due to the broad impact of occupational stressors on teachers' job performance, teacher health, student outcomes,

and the health of the teaching profession as a whole. Several negative outcomes, such as lowered self-efficacy (e.g. Klassen & Chiu, 2010), poor teacher-student relationships (e.g. Yoon, 2002), and emotional exhaustion and burnout (e.g. Jennings & Greenberg, 2009), have been identified as products of elevated levels of stress in teaching. Furthermore, similar findings have emerged from international research studies (e.g. Erdiller & Dogan, 2015; Khani & Mirzaee, 2015; Skaalvik & Skaalvik, 2015), therefore indicating that teaching is an inherently stressful profession, regardless of cultural, geographical, political differences between teachers and the educational systems in which they operate. However, the literature also presents evidence that not every teacher reacts to stress in the same way and different types and levels of stress produce different outcomes (Kyriacou, 2001). Research on individual characteristics of teachers has revealed that internal factors such as perceived self-efficacy (Yoon, 2002), capacity to regulate emotions (Mearns & Cain, 2003), and personality traits (Jennings & Greenberg, 2009; Kokkinos, 2007) are associated with the degree of stress experienced by teachers. Similarly, Klassen and Chiu (2010) found that demographic variables such as the educational setting and number of years of experience are also related to levels of teacher stress. Therefore, it can be inferred that teacher stress is likely the product of interactions between individual characteristics and environmental variables, and can change over the course of a teacher's career.

Theoretical Framework

The transactional model of stress and coping (Lazarus & Folkman, 1984) posits that stress is an individually mediated phenomenon, such that individual differences in appraisal of stressors, appraisal of perceived ability to respond appropriately to the stressor, and preferred methods of coping produce unique and individualized profiles of

stress. According to this model, a disparity where the level of threat from the stressor is appraised as being greater than one's ability to respond is likely to increase the perception of the level of harm posed by the stressor. However, other individuals facing the same exact stressor may appraise their personal resources as sufficient to adapt to or ward off potential ill effects from the stressor, therefore lowering the degree of perceived stress. In cases where a stressor's threat potential is appraised as low and one's resources to adapt are viewed as high, it is likely to result in a positive level of stress that has been found to enhance one's performance (e.g., participating in a math or spelling competition). In addition, an individual's tendency to utilize problem-focused coping strategies versus emotional coping strategies has also been shown to affect the perception of stress (Lazarus & Folkman, 1984).

Within the context of the transactional model, individual characteristics such as cognitive processes, temperament, and personality traits are likely to be implicated in the way one appraises and copes with stressful situations. However, the role of cognitive factors in stress regulation has enjoyed less attention in the field of teacher stress. Specifically, the study of a particular set of cognitive processes called executive functions (EF), and their relationship with stress in teachers has only just now begun to emerge.

Executive functioning is an umbrella term used to refer to a set of cognitive processes involved in goal-directed, problem-solving behaviors. Although no single model or definition has been deemed sufficient in explaining the construct, the unity/diversity framework proposed by Miyake et al. (2000) defines EF as three distinct, yet interrelated processes, namely working memory, cognitive flexibility, and inhibition. Working memory refers to the ability to maintain relevant sets of information in short

term memory such that they are readily accessible for use when needed. Cognitive flexibility refers to the ability to shift between different mental sets. Inhibition refers to the ability to resist an automatic response in favor of a more appropriate response as determined by the needs of the situation. In their review of EF and stress regulation, Williams, Suchy, and Rau (2009) stated that individuals who struggle to override dominant emotional responses, stay on task, and effectively organize and plan behaviors, are likely to be more exposed to stress as a result of such difficulties. In addition, they suggested that EF variables be included alongside other individual factors in order to better understand risk and resilience factors, associations between stress and health, and to inform development of more effective interventions.

The research specific to teacher stress and executive functioning is rather scarce. While studies have been conducted on teacher stress and related cognitive constructs such as self-regulation, emotional regulation, and information processing, these constructs are often considered as more complex cognitive mechanisms that rely on underlying processes such as working memory, cognitive flexibility, and inhibition. Only two studies of teacher stress and teachers' EF abilities were found. A study conducted by German researchers Feuerhahn, Stamov-Robnagel, Wolfram, Bellingrath, and Kudielka (2013) found strong links between higher levels of emotional exhaustion and cognitive impairment. Emotional exhaustion is considered a component of burnout and is more extreme than work-related stress, however, these findings may hold some relevance to the present study as ongoing chronic stress may lead to emotional exhaustion. Friedman-Krauss, Raver, Neuspiel, and Kinsel (2014) studied the moderating effect of EF on the relationship between teacher stress and child behavior problems among preschool teachers, but did not find a significant relationship. Nevertheless, the potential

relationship between stress and EF remains an important question to the field of teaching

and more precise measures of EF may yield more consistent findings.

Statement of the Problem

Classroom management is often cited as a big contributor to teachers' stress

(Evertson & Weinstein, 2006). Theoretical links can be established between essential job

functions of teachers, such as classroom management, and the involvement of EF abilities

in successful execution of such duties (Raver, Blair, & Li-Grining, 2012). Classroom

management requires teachers to encode a large amount of information from a

continually changing environment. The ability to be flexible in the face of sudden,

unpredictable changes and the ability to inhibit routine, automatic responses in order to

select responses that are appropriate within the novel context are two ways that EF

processes appear to be relevant to classroom demands. Plus, it must be noted that teachers

typically do not have the freedom to walk away from disruptive classroom environments,

nor are they able to neutralize all sources of disruption. The inability to escape from

negatively arousing situations underscores the importance of EF abilities in educational

contexts; a teacher who is able to remain mentally flexible and resist the impulse to

engage in automatic, over-learned disciplinary tactics is likely to feel less overwhelmed

compared to a peer who is prone to rigidity and impulsivity. Given the

overlap between behaviors and situations that rely on EF for successful execution (e.g.

creating and maintaining a classroom environment conducive to academic instruction and

learning) and sources of stress (e.g. student misbehavior, large workload), the study of

teachers' EF abilities could potentially deepen our current knowledge of teacher

characteristics and their role in development and management of stress.

In addition to internal teacher characteristics such as EF, evidence from extant research suggests that teachers' years of service and the setting in which they teach (elementary or secondary) may also be related to teachers' levels of stress, job satisfaction, and sense of wellbeing (e.g. Antoniou, Ploumpi, & Ntalla, 2013; Klassen & Chiu, 2010; Reilly, Dhingra, & Boduszek, 2014). Kyriacou (2007) identified key differences between a novice and experienced teacher – (a) experienced teachers have often "developed sets of well-organized actions that they can apply flexibly and adapt with little mental effort" (p. 3), and (b) in contrast, "for a novice teacher, each new demand seems to require careful attention and thought" (p. 3). Therefore, a teacher's breadth of experience, measured by years of service, may moderate the association between internal characteristics and level of stress, such that teachers with poor EF abilities may have learned to positively compensate for these deficits over time and, as a result, are not as prone to feeling overwhelmed compared to their early years in the profession.

Similarly, the educational setting may also alter the relationship between a teacher's internal attributes and level of stress. As suggested by Klassen (2010), primary and secondary educational settings are likely to differ from each other in terms of organizational structure, student characteristics, and overall academic climate. For example, organizational structure of secondary schools may differ from that of elementary schools and may impact the quality of relationships between teachers and school staff. At lower grade levels, students are not expected to transition from one classroom to another for different subject areas, but require adult supervision during group transition periods at different points during the school day. In contrast, students at the secondary level are typically required to transition independently from one classroom

to the next, to access restrooms as needed and to generally meet their own basic needs. Because of the inherent developmental differences between students across academic, behavioral, and social domains in each setting, it is likely that there is a different set of challenges and stressors for teachers in one educational setting compared to another. Differences in accountability policies, amount of standardized testing, and several other types of school-level factors, may also play a role in moderating a teacher's level of stress.

Statement of Purpose

The purpose of this study was to better understand the association between teachers' EF abilities and teacher stress. Specifically, this study examined the separate relationships between cognitive flexibility and response inhibition, and teacher stress. Furthermore, this study was designed to understand the influence of years of service and educational setting on the relationship between teacher cognitive flexibility and teacher stress and on the relationship between inhibition and teacher stress. The research on individual EF characteristics of teachers and their levels of stress is scarce, and findings regarding the role of experience and educational setting on teachers' EF abilities and teacher stress do not appear in current literature. This study explored these links in an effort to add to the existing knowledge base. Findings from this study may inform future research and guide potential interventions toward lowering levels of stress and increasing these core EF processes. Improvement in teachers' EF abilities through aerobic exercise, mindfulness training, computerized cognitive training programs, or other methods may serve as simple, yet effective methods for lowering teacher stress and increasing their ability to address work challenges. Additionally, findings from this study may also

generate insight into teachers' EF abilities and the degree to which they are able to successfully participate in or facilitate implementation of interventions in their classrooms.

School psychologists are uniquely positioned as mental health professionals to help teachers understand the connection between their own stress and their experiences or struggles with students. Furthermore, school psychologists may be able to provide whole school programs that address teacher wellness through psychoeducation, social networks, or adapting tiered socioemotional learning curricula to provide mindfulness programming in the school setting, as recently suggested by some professionals (e.g. Felver, Doerner, Jones, Kaye, & Merrell, 2013). Although this study focuses on stress in teachers only, it is possible that organizational stressors mentioned above could also affect other staff members serving in a variety of roles within a school. Findings from this study may guide changes in the way school psychologists collaborate and consult with highly stressed teachers and other school professionals.

Research Questions

Q1   What is the relationship between EF and Total Teacher Stress?

Q2   To what extent do years of service and educational setting moderate the relationship between EF and Teacher Stress?

Q3   What portion of the variance in Teacher Stress is explained by EF, together and separately, when accounting for years of service and educational setting?

A quantitative design in which teachers completed surveys and brief measures of EF was used to provide answers to these questions. Because teachers across settings were expected to experience differing levels of stress based on their site demands, participants

were drawn from a variety of educational and geographical settings. The scarcity of

extant research in this specific area accounts for the exploratory nature of this study and,

as a result, prompted a simplified research design.

Definitions

Cognitive Flexibility: Cognitive flexibility is defined as "…shifting back and forth

between multiple tasks, operations, or mental sets" (Miyake, et al., 2000, p. 55)

Educational Setting: Educational setting is defined as the type of school in which a

teacher performs the majority of her job duties. An elementary setting is defined

as the collection of grade levels spanning from Kindergarten to Grade 5. A

secondary setting is defined as including Grades 6 through 12.

Executive Functioning: Executive functioning is defined as a collection of separate, but

highly related cognitive processes implicated in purposeful, organized, goal-

directed, problem-solving behaviors.

Response Inhibition: Response inhibition is defined as one's ability to deliberately inhibit

dominant, automatic, or prepotent responses when necessary" (Miyake et al.,

2000, p. 57).

Teacher Stress: Teacher stress is defined as "the experience by a teacher of unpleasant,

negative emotions, such as anger, anxiety, tension, frustration or depression,

resulting from some aspect of work as a teacher." (Kyriacou, 2001, p. 28).

Years of service: A teacher's years of service refers to the level of professional

experience and is defined as the number of complete academic years spent

working as a full-time teacher.

CHAPTER II

REVIEW OF THE LITERATURE

The negative impact of stress on teachers has been a focus of research for decades (Johnson et al., 2005; Kyriacou, 2001). In fact, teacher stress has been linked to rates of teacher attrition, levels of job satisfaction, teachers' health and wellbeing, and many other important issues currently facing the field of education in the United States and abroad. Of greater concern is evidence suggesting that high levels of teacher stress can negatively impact student behavior and socioemotional health. Although much is known about the variables that affect teacher stress and variables affected by teachers' stress, the study of individual characteristics of teachers, particularly cognitive abilities, has enjoyed less attention. Characteristics of individual teachers may serve as risk or protective factors in the development of job-related stress. Current literature in the fields of psychology and neuroscience has shown a bidirectional relationship between EF and stress (e.g. Homaifar, Gibian, & Petrik, 2014), and recent studies have asserted that core facets of a teacher's daily job duties rely on one or more EF abilities for successful execution (Raver et al., 2012). Yet, very little research has examined the relationship between teachers' EF abilities, their levels of stress, or the outcomes that follow (Friedman-Krauss et al., 2014).

Historical Perspectives of Stress

The term stress, widely used as a generic description for a plethora of human experiences that are considered disruptive in some manner, has achieved its ubiquitous status after decades of research from various related and unrelated fields of study.

However, despite the colloquial popularity of the term and the ease with which it is used and understood in our daily interactions with others, a review of the literature indicates a lack of consensus regarding a singular, unified definition or theoretical model of stress as it relates to human behavior. Historically, stress has been conceptualized either as a physiological response to the environment, an environmental stimulus that results in physiological changes, or as a transaction between different individual and environmental variables.

Some early theories viewed stress as the collective physiological response to changes in the basic level of arousal of an organism. Hans Selye (1956) defined stress as the "nonspecific response of the body to noxious stimuli" (p. 12). He is believed to be the first to use the term 'stress' to describe the impact of environmental variables, such as extreme temperatures or deprivation of food, on physiological functioning. Selye proposed a theoretical framework he called the General Adaptation Syndrome (GAS), conceptualized as a pattern of physiological responses to external stimuli designed to maintain or reestablish homeostasis within an organism. This framework relies on the following premises: (a) the stress response remains the same regardless of the nature of the stressor; (b) GAS is a defensive reaction and is comprised of three distinct stages - alarm, resistance, and exhaustion; and (c) the severity and duration of GAS could eventually result in death or formation of diseases of adaptation. In other words, Selye hypothesized that the strength and length of the stress response influenced the severity of adverse physical outcomes. According to the framework, the body enters the alarm stage when exposed to noxious external stimuli. Resistance refers to the harnessing of physiological functions to resist the damage of noxious stimuli. The exhaustion phase represents the depletion of physiological resources as a result of the strength and/or

prolonged nature of the noxious stimuli. Notably, Selye believed that an individual's physiological resources were capped by hereditary factors (e.g., genetics), were finite in nature, and could not be replenished. Based on this belief, Selye posited that when the body reached the exhaustion stage and physiological resources were depleted, the stress response would ultimately result in death.

Although considered pioneering, the GAS was criticized as incomplete for its failure to consider differences between stressors and individual characteristics as moderators of the stress response. Additionally, since Selye's model was derived from animal studies, it proved difficult to study the model within the context of human behavior. These limitations spurred others to consider the inclusion of additional variables in order to gain a more detailed understanding of the response(s) to stress.

In contrast to Selye's physiological model, advocates of stimulus-based models proposed that stress be viewed as the degree of adaptation in response to an environmental stimulus. Holmes and Rahe (1967), intrigued by questions about individual responses to changes in life circumstances, proposed a conceptualization of life events as potential stressors. Unlike Selye's conceptualization of stress as a dependent variable in research, the stimulus-based approach regarded stress as an independent variable. In this conceptualization, stress was defined as the degree to which one must adjust or adapt as determined by major life changes or events. They posited that one's vulnerability to illness increased in the face of excessive life changes in a brief period of time. They theorized that (a) life experiences result in a relatively equal amount of adjustment demands on all people, (b) change is inevitable and equally disruptive to all, regardless of the individual's desire for the change, and (c) there is a threshold

beyond which the demand placed on adaptive resources would result in illness in all those who reached or surpassed it, regardless of their individual qualities.

As with the GAS and other models prevalent at the time, this approach failed to account for individual differences as an influential factor. Furthermore, the original framework did not allow for self-reporting of severity and importance of life events (i.e., the severity levels for each stressful event were pre-determined), and relied on examiner measurement alone, thus negating the influence of any individual characteristics or perceptions on the level of readjustment and adaptation required to maintain balance in the face of external stressors. As a result, the stimulus-based view of stress, in spite of its contributions to the literature, was deemed incomplete as well (Lyon, 2000).

The insufficiency of the response-based and stimulus-based frameworks of stress naturally led to the birth of transactional models of stress. Although several researchers presented theories arguing for a more interactional view, the transactional model of stress and coping proposed by Lazarus and Folkman (1984) is considered one of the most extensively researched and widely accepted theories of stress and has served as a springboard for future research in the areas of cognition, health and wellbeing, education, job performance, among others. The transactional model theorized stress as the product of complex interactions, or transactions, between individual and environmental variables. Two key concepts of this model; *appraisal* of environmental stimuli and the corresponding *coping* response, are necessary in determining how an individual evaluates and reacts to environmental stimuli. In this framework, appraisal is thought to occur at conscious or unconscious levels of processing, and varies depending on many internal and external factors, such as number and complexity of threats, intensity and duration of threats, individual values and goals, self-esteem, and controllability of the threat. Two

forms of appraisal are theorized – *primary* appraisal, which refers to an individual's evaluation of the nature of the threat, and *secondary* appraisal, which refers to an individual's appraisal of personal resources and abilities to adequately respond to the threat. A disparity between primary and secondary appraisal where one's resources and abilities were judged to be inadequate in relation to the threat, the individual would experience negative stress. In contrast, if an individual's ability to react appropriately to an existing threat was judged to be stronger than the threat itself, or if the threat was viewed positively, the individual was likely to experience eustress, or positive stress that was thought to enhance cognitive and affective performance (Lazarus & Folkman, 1984).

In this model, coping is generally defined as cognitive and behavioral efforts to manage externally and internally demanding situations that impose on one's resources (Lazarus & Folkman, 1984). Coping could take the form of direct actions (problem-focused) and palliative (emotion-focused) actions. Problem-focused coping strategies were hypothesized as cognitive in nature and more likely to be used when individuals viewed their stress as the product of internal inadequacies in generating an appropriate response to the stressor. On the other hand, emotion-focused strategies were thought to be more likely to be used when individuals viewed the stressor to be more powerful and overwhelming than the combination of their personal resources and abilities. Therefore, Lazarus and Folkman (1984) argued that stress could not be viewed as a single factor (as argued by response-based and stimulus-based approaches), but rather as a construct that encompassed cognitive, emotional, and coping factors. In addition to establishing a sound theoretical basis for the inclusion of individual characteristics in the study and conceptualization of stress and its impact on human behavior, they also proposed a link between stress and health outcomes in the following areas: (a) social and occupational

functioning, (b) level of life satisfaction, and (c) physical health. As theorized here, the concept of health includes physical (e.g., illness, somatic issues), psychological (e.g., cognitive processes, self-esteem, life satisfaction and outlook) and social functioning (Lazarus & Folkman, 1984).

Although the transactional model remains highly regarded and is regularly used as the theoretical foundation for a majority of stress research even today, it is not without flaws. Although lauded by many as groundbreaking and as having immense utility, the nebulous nature of its key concepts and the lack of attention given to more basic mental processes that influence appraisal and coping, the model proved to be difficult to validate. However, regardless of its flaws, the work of Lazarus and colleagues is considered instrumental for its hallmark feature – the assertion that individual characteristics play a critical role in moderating the stress response. Subsequent research relied on this theoretical framework as it branched out to study the relationship between stress and human functioning across physical, psychological, social, and occupational domains and settings. Today, the knowledge base of stress and its effects on human functioning is rich and diverse. The literature continues to be updated by inclusion of studies that incorporate previously untested variables that may mediate or moderate the relationship between stress and functioning (Williams et al., 2009). Specialized theories and models of stress now exist for understanding the issue through biopsychosocial, medical, occupational, and other lenses. Due to the decades long, sustained, and heavy interest in stress research, and based on longitudinal and cross-sectional data, researchers have been able to identify both common and unique ways in which stress impacts performance within and across individuals and groups.

Interestingly, while early theories of stress were eventually rejected for suggesting uniformity of the stress response, current literature contains ample evidence that recognizes commonalities in how individuals are affected by stress (National Institute of Mental Health, 2016). The human body is known to display a relatively common set of physical and psychological responses when exposed to stress. For example, increased nervous system arousal, manifested in the form of increases in heart rate, blood pressure, and respiratory rate, is often associated with exposure to stress. These reactions are commonplace and do not differ across groups of people. Similarly, consistent exposure to stress for a prolonged period has also been linked to weight loss, atrophy in muscles and tissues (including areas of the brain), changes in digestive health, and sleep difficulties (American Psychological Association, 2013). Psychosomatic and psychological effects of acute and prolonged exposure to stress, while more variable than physical effects, also appeared to show common themes - adverse outcomes such as depression, anxiety, and other mental health disorders, complaints of mysterious aches and pain throughout the body, irritability, and reduced cognitive power are a few examples of the cascade of symptoms that are known to occur in response to psychological stressors. Research on personality traits and stress also reveals varying levels of associations between different traits such as neuroticism, extraversion, openness, and others, and stress response (e.g. Williams, Smith, Gunn, & Uchino, 2011). Even less is known about the exact mechanisms of basic neurocognitive processes that collectively form the basis for the formation of personality traits and other discerning qualities for all individuals such as executive functioning.

Executive Functioning

Executive functioning (EF) is an umbrella term used to describe the cognitive processes implicated in purposeful, goal-directed, and problem-solving behaviors. Generally viewed as a multifaceted construct, EF involves processes like working memory, cognitive flexibility, response selection and inhibition, initiation, set shifting and set maintenance, planning and organization of thoughts and behavior, self-monitoring, and others. Together, these have been hypothesized as higher-order processes that assert top-down control over other cognitive mechanisms to aid in the generation of goals and plans, modification of behavior in response to the environment, and in following through on tasks until completion. In very general terms, and using an evolutionary lens, EF processes can be thought of as the cognitive mechanisms that allow for control of behavior beyond basic, hard-wired drives or overly learned and automatic behaviors (Suchy, 2009).

The historical roots of EF research can be traced back to the study of development of various cognitive and emotional problems following damage to the brain via either atypical development, onset of pathology, or actual physical damage to one or more regions. The most famous case is that of Phineas Gage, a railroad worker who sustained an open head injury when an iron rod pierced his skull and damaged substantial portions of his frontal lobes. He survived the injury, and recovered his physical strength and stamina, but he displayed significant changes in behavior – his previously thoughtful and mild-mannered demeanor had been replaced with a tendency to be explosive, arrogant, and to demonstrate other negative behaviors that ultimately interfered with his ability to fulfill the duties of his job. According to Suchy (2009), the first mention of EF

difficulties following brain injury was found in 1835 – thirteen years before Mr. Gage's

infamous injury. Since then, several researchers have taken interest in the study of

behavioral problems following brain injury. The work of Alexander Luria, a Russian

neuropsychologist, is often cited as groundbreaking in regard to our understanding of EF

today (Goldstein, Naglieri, Princiotta, & Otero, 2014). Luria's systematic study of lesions

in the frontal lobes and the resulting deficits in cognitive and socioemotional functioning

has been bolstered by the advent of neuroimaging and other medical technologies. Such

technological advances have led to a deeper understanding of the structure and functions

of different brain regions, and suggest that the behaviors described by Luria and others

did not always occur following damage to the frontal lobes (specifically, the prefrontal

cortex [PFC]), but sometimes manifested following injuries to other areas of the brain,

thus deeming a syndromic explanation of behavior changes exclusively as a function of

frontal lobe damage as inadequate. Our current understanding of neuroanatomy shows

differentiation between regions of the brain implicated in EF. Different regions of the

prefrontal cortex (PFC) - dorsolateral, superomedial, and orbitofrontal – have been

associated with different types of EF processes. Furthermore, now it is also clear that the

PFC is richly connected to other posterior and subcortical regions (Chung, Weyandt, &

Swentosky, 2014) and that EF abilities depend on the integrity of these complex neural

networks, rather than individual regions (Suchy, 2009). Neuroanatomical correlates of EF

are not the focus of this study, but this brief account of the history of EF research

highlights the ever-evolving nature of this construct and our understanding of it.

  The diversity of sources from which knowledge of EF has been derived has

impeded the field's ability to reach a consensus on one unifying theory, model, or

definition of this construct. Suchy (2009) suggested as many as seven different lenses through which researchers have viewed EF. Over the years, the literature has grown to include theoretical perspectives that consider EF from evolutionary to neuroanatomical to atheoretical standpoints, with other approaches falling somewhere in between. To add to the confusion, the field also lacks true consensus regarding the direction of influence exerted by EF. While a majority of theorists consider EF's influence to extend downward, (i.e., EF processes exert control over other subprocesses in service of goal-directed behavior), some researchers have professed a bottom-up view of EF processes, (e.g., in the context of self-regulation). Barkley's (2001) review of EF and self-regulation from an evolutionary neuropsychological perspective suggested that EF processes such as response inhibition are prerequisites of self-regulation, rather than enforcer(s) of top-down control (e.g. inhibitory control) of regulatory processes. In the conceptualization put forth by Barkley (2001), "an executive act is any act toward oneself that functions to modify one's own behavior so as to change the future outcomes for that individual" (p. 5). In addition to a lack of agreement about the fundamental nature of the construct and how it is organized, the field also lacks consensus about the exact processes that fall under the EF umbrella. In other words, EF may denote a complex, well-reasoned, and empirically supported construct to some, while indicating something loose and general to others, depending on their field of study.

Major theories and models of EF have varied in their conceptualization of this construct in two fundamental ways - some theories viewed EF as a unitary, hierarchical construct responsible for supervision and control of cognitive processes (e.g. Miller & Cohen, 2001; Shallice, 2002), while others preferred a more fractionalized view where

EF was conceptualized as a collection of several distinct, but highly interrelated processes that are activated as and when needed, usually in response to demands emanating from novel situations. For example, Miyake et al. (2000) support an individual differences approach and presented an empirically supported three-factor model of EF comprised of the three cognitive processes most commonly found in EF literature, namely *shifting, updating,* and *inhibition.*

Earlier work had already alluded to the separateness of different cognitive processes associated with EF across different target populations ranging from young to old and healthy to impaired, but Miyake et al. (2000) questioned this interpretation, citing several limitations to the measures and statistical analyses used in these studies. Neuropsychological tasks like the Wisconsin Card Sorting Test (WCST) and Tower of Hanoi (TOH), although considered the gold standard of EF assessment, were shown to have poor construct validities, which in turn cast doubt on the accuracy of results from regression and exploratory factory analysis (EFA) procedures employed to determine independence among EF processes. To account for this impurity, they chose to focus on latent processes that were shared by various popular tasks of EF. In addition, they attempted to determine the extent to which each process related to performance on the WCST, TOH, and other complex EF tasks. The basis for choosing cognitive flexibility, working memory, and inhibition, rests upon three points: (a) these processes were assumed to function at a lower level compared to other processes (e.g. planning), thus allowing for a more precise operational definition, (b) they could be measured relatively cleanly using preexisting, simple and well-studied tasks, and (c) these processes were likely to be implicated in performance on more complex tasks of EF, such as the WCST and TOH (Miyake et al., 2000).

Empirical support for this model comes from the results of testing these assumptions by studying the performance of college students (n = 137) on nine different tasks, three for each represented selected EF process. The tasks were selected for their simplicity and because they correlated strongly with only one or two EF processes, thus making it easier to determine which specific component was being measured. Data analyses showed that cognitive flexibility (shifting), working memory (updating), and inhibition were separate processes, but were also linked by a certain "family resemblance" (p. 88). In fact, the three processes, while separate entities, also tapped some type of single core process or ability. These results provide empirical support for previous theories that the EF construct is fractionated, but also gives credence to the idea that a common process also exists (Miyake et al., 2000).

The unity/diversity framework of EF has been confirmed in populations other than the original sample upon which the theory was devised. For example, a longitudinal study of the role of processing speed and EF on academic achievement within a combined sample of 203 pre-adolescent children, born pre-term (n = 59) or at full-term (n = 144), revealed that the three latent EF abilities of the tripartite model were correlated, but separate from each other and from processing speed (Rose, Feldman, & Jankowski, 2011). Similar evidence for the unity/diversity framework was found in a study of older adults. Vaughan and Giovanello (2010) studied the relationship between EF and individual activities of daily living (IADLs) in older adults aged 60-90 (N=95). Using structural equation modeling, they found that latent EF variables were separable, yet distinct, and that EF processes can significantly predict IADLs in older adults. Thus, this

model has been shown to be a viable model of EF for use in empirical research across populations.

This tripartite model served as the theoretical foundation for the two EF processes chosen in this study, cognitive flexibility and inhibition. Although overwhelming evidence exists for the utility of working memory as a critical component of EF, even in the model described above, this particular process was not included because of the lack of congruence between theories and models of EF. In fact, Suchy (2009) outlined a four-point approach that provides researchers with a certain degree of freedom to choose aspects of EF that align with the intended population of the study and the nature of clinical and theoretical questions of interest. These suggestions as well as the dearth of empirical support between working memory and core and peripheral factors of the dependent variable in this study (teacher stress) formed the rationale behind its exclusion.

Individual Differences in Executive Functioning

It appears that the biodiversity within our species that accounts for different individual characteristics such as height, weight, skin pigmentation, and intelligence, also seems to apply to our general EF abilities. Recent findings suggest that individual differences in performance on tasks of EF can be attributed almost entirely to specific genetic polymorphisms. In fact, genetic differences account for almost all the variance in performance on tasks that are associated with the three latent EF components of the tripartite model (e.g., Engelhardt, Briley, Mann, Harden, & Tucker-Drob, 2015; Friedman et al., 2008; Friedman, Miyake, Robinson, & Hewitt, 2011). Over time, interactions between individuals (including their genetic makeup) and their environments, increase differentiation between each person. These individual differences may manifest as

observable characteristics, such as temperament or personality attributes (Williams et al., 2009).

Stress and Executive Functioning

As noted above, the constructs of stress and EF are somewhat nebulous in nature; they have broad implications on human health and performance, but are difficult to fully understand. Yet, given that stress and EF are highly variable across individuals, the study of the relationship between the two constructs warrants attention. The prefrontal cortex, originally thought to be the seat of all EF processes, has now been linked with posterior and subcortical areas of the brain responsible for processing of emotion, as well as those that govern complex autonomic responses that are considered primitive and hard wired. Additionally, given the highly-connected nature of the brain and its reliance on other systems of the body (e.g. the endocrine system), the same structures of the brain responsible for higher-order, top-down, powerful processes are extremely vulnerable to the effects of stress. Neuroendocrine chemicals are implicated in activation of PFC circuitry following exposure to a stressor, thereby increasing the likelihood of a scenario where stressful stimuli and the brain's mission of coping with it may overload EF processes during the stress regulation process. Because EF is so deeply integrated with cognitive and emotional processes, and plays a role in the adaptation to environmental stimuli, its role in stress regulation is critical (Williams, et al., 2009). Furthermore, extant research has shown a curvilinear, bidirectional relationship between stress and EF processes, such that very low or very high levels of stress negatively affect activation and deployment of EF, but moderate levels of stress can enhance such cognitive abilities and increase the likelihood of optimal performance. This inverted U-shaped curve adds a

subtle, but significant and practical dimension to our understanding of the human stress response.

Teacher Stress

Teacher stress has been a staple of research inquiry for decades. Kyriacou and Sutcliffe (as cited in Kyriacou, 2001) are believed to be the originators of the term 'teacher stress' and also the first to propose a model of this construct. The original model presented teachers' stress as a negative emotional experience brought on by their own perception that work-related stressors were a threat to their self-esteem. The notion that teaching was a stressful experience was not new; evidence from the literature suggests that teaching is stressful not just here in the United States, but also abroad. Past and present studies of teacher stress and burnout have come from Iran (e.g. Khani & Mirzaee, 2015), Poland (e.g. Mojsa-Kaja, Golonka, & Marek, 2015), Norway (e.g. Skaalvik & Skaalvik, 2015), Pakistan (e.g. Hanif & Pervez, 2003), India (Dubey, 2011), Turkey (e.g. Erdiller & Dogan, 2015), Australia (e.g. Gardner, 2010), and several other countries from around the globe, thereby suggesting that teaching is an inherently stressful profession regardless of the country or culture. Of course, it also goes without saying that inherent disparities between aspects of the profession such as status, role definitions, and educational policies are likely to produce varying profiles of teacher stress across different countries. For example, in the United Kingdom, teaching was rated as the second most stressful career among 25 common professions (Johnson et al., 2005), but the same may not hold true for teachers in the United States or in other countries. Interestingly, the topic of teacher stress was more readily available in international

studies rather than those generated in the United States, suggesting that this type of research may not have yet caught on as a key area of study.

Nevertheless, high levels of stress within the profession have resulted in an ongoing and worsening problem of teacher mobility (moving to other schools) and teacher attrition (leaving the profession entirely) in the United States. Smith and Ingersoll (2004) have identified high levels of stress as one of the reasons why teachers leave the profession. Several recent surveys of nationally representative samples indicate that the problem could very well be worsening, given that rates of attrition have increased by 41% in the past thirty years (Ingersoll et al., 2014) and job satisfaction among teachers is at its lowest point in the past 25 years (Markow & Pieters, 2012).

Kyriacou (2001) defined teacher stress as "the ways in which stress impacts teachers' physical and psychological health, the experience by a teacher of unpleasant, negative emotions, such as anger, anxiety, tension, frustration or depression, resulting from some aspect of work as a teacher" (Kyriacou, 2001, p. 28). Teaching unmotivated students, managing discipline problems, negotiating time constraints and workload, being evaluated by others, building relationships with colleagues and school administrators, enduring poor working conditions, addressing role conflict and ambiguity, and coping with change have all been identified as stressors for teachers. Findings from several studies corroborate these sources of stress and add others, such as pressure of accountability, levels of paperwork, diversity of tasks, lack of resources, and lack of professional recognition (Kokkinos, 2007; Richards, 2012).

In addition to the sources of stress, it is important to identify the ways in which teachers are affected by high levels of stress. According to Richards (2012), teachers

report feeling physically exhausted, less idealistic, and less enthusiastic. Furthermore, they experience decreased self-efficacy, increased psychosomatic symptoms, and greater levels of deterioration in their personal lives. Burnout, on the other hand, is a syndrome of emotional exhaustion, depersonalization and/or cynicism, and decreased personal accomplishment (Jennings & Greenberg, 2009) and is the result of long-term job stress (Jennett, Harris, & Meisbov, 2003). The difference between stress and burnout, while subtle, is nevertheless significant in terms of the timing, modality, and intensity of any interventions aimed to reduce levels of stress and/or burnout. Given that burnout is the result of a long chain of stressors, it is imperative that researchers and practitioners identify elevated levels of stress among teachers and intervene at a time and in a manner that slows the trajectory of stress-related health impairments. Therefore, this study focused on *teacher stress* rather than burnout.

Seeing that teachers reacted differently to external causes of teacher stress mentioned above, Kyriacou (2001) emphasized the need to include individual factors such as personality characteristics, skills, circumstances, and values to understand the unique features of stress experienced by individual teachers. For example, Mearns and Cain (2003) studied individual characteristics of teachers through the lens of negative mood regulation (NMR) expectancies as a potential mediator of the relationship between levels of teachers' occupational stress and resulting feelings of distress and burnout. In their study, NMR was conceptualized as the degree to which individuals believed that they could adjust negative moods (i.e., a measure of one's self-efficacy in regulating negative moods). A sample of 86 elementary and secondary teachers were asked to complete several questionnaires including the Teacher Stress Inventory (TSI; Fimian, 1988), Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990), COPE

(Carver, Scheier, & Weintraub, 1989), a measure of coping styles, Maslach Burnout Inventory Educators Survey (MBI; Maslach, Jackson, & Leiter, 1996), and the Behavior Symptom Index (BSI; Derogatis & Melisaratos, 1983), a measure of distress. Additionally, the second half of the TSI, which measures manifestations of stress, was used as a measure of distress. A multivariate analysis of variance (MANOVA) conducted to determine differences between men and women revealed statistically significant differences between the two groups in terms of coping styles. Women showed higher scores for emotion-focused coping and males scored higher on depersonalization, a feature of burnout. All variables except active coping were significantly correlated with teachers' levels of stress. Stress was also shown to explain variance in emotion-focused and avoidant coping, above and beyond other variables included in the study. In terms of individual differences as predictors of burnout and distress, high scores on NMR predicted greater use of adaptive coping strategies and were correlated with lower levels of physical and emotional distress. Stress and NMR scores were associated with different aspects of burnout – stress was associated with emotional exhaustion and depersonalization, but NMR was associated with feelings of lack of personal accomplishment. Based on the results of this study, Mearns and Cain (2003) believed that they were able to successfully demonstrate the utility of including personal characteristics as predictors of stress, burnout, and distress in teachers.

Teachers' self-efficacy beliefs regarding various aspects of their jobs has also been studied and shown to be a strong predictor of teacher stress and outcomes. For example, Yoon (2002) examined teacher characteristics such as stress, negative affect, and self-efficacy as predictors of teacher-student relationships. In this study, participants included teachers from Kindergarten through 5th grade (N = 113) who taught in a

metropolitan area of the United States. Using participant responses to researcher-generated scales that measured teacher stress, self-efficacy in building relationships and behavioral management, negative affect, and student-teacher relationships, two separate hierarchical regression analyses were performed to determine the predictive ability of these factors on 'good' relationships and 'bad' relationships with students. Regression analyses revealed that teacher stress was significantly correlated with negative affect, lower self-efficacy, and negative student-teacher relationships. Negative affect was found to be significantly related to lower levels of self-efficacy and to negative relationships with students. Teacher stress was regressed onto the dependent variable first in both regression models, followed by negative affect and self-efficacy scores. In either case, teacher variables failed to predict the number of students with whom the teacher shared good relationships or bad relationships. In the first model, teacher stress, negative affect, and self-efficacy only accounted for 2% of the variance in the student-teacher relationship score for good relationships. In the second model, the variables combined to explain 10% of the variance, which was statistically significant, however, negative affect and self-efficacy did not contribute to the variance independent of teacher stress.

The findings from this study indicated that while elevated levels of teacher stress were able to predict negative affect, self-efficacy, and negative student-teacher relationships; teachers with low levels of stress were not necessarily more likely to experience good relationships with their students. Additionally, given the relationship between stress and negative affect, it can be surmised that teachers with high levels of stress are likely to demonstrate negative affect more frequently, such that it eventually affects the quality of relationships between themselves and their students. The results

provide further empirical support for the inclusion of teacher characteristics as variables in future research; however, the exact nature of the type of individual teacher characteristic most predictive of stress remains elusive.

Although the literature contains ample evidence about individual characteristics like self-efficacy and negative affect, research on the cognitive characteristics of teachers appears to lag behind, and research specific to EF of teachers is especially scarce. Although several peripheral and related features of EF, such as emotional regulation (e.g. Sutton, Mudrey-Camino, & Knight, 2009), self-regulation (e.g. Capa-Aydin, Sungur, & Uzuntiryaki, 2009), and information processing (Feldon, 2007), have been studied, these aspects of cognition differ from EF in terms of theory and scope. The contributions from such research serve as an incomplete, albeit valuable, foundation for the study of EF processes in teachers.

Executive Functioning and Teacher Stress

Based on extant research in the field of neuropsychology and health psychology, EF processes have been implicated in the regulation of stress, such that individuals with different levels of EF demonstrate varying levels of susceptibility to stress and burnout. The rationale for the study of teachers' EF abilities can be found in the ways specific processes inform and impact teacher behavior in real-life teaching situations. The ability to harness attention and executive abilities like working memory, inhibition, cognitive flexibility, may prove beneficial in dealing with several tasks of teaching and managing behavior problems in children.

In their work on emotional regulation in classroom settings, Raver et al., (2012) provided a salient rationale for studying the self-regulatory mechanisms of teachers'

emotions and behaviors as they attempt to balance their duties of providing instruction of academic content and management of student behavior in the classroom. Although Raver and colleagues focused primarily on emotional regulation, and did not include other EF processes, their work can be expanded to include inhibition and cognitive flexibility abilities as well.

Drawing from previous research on parent-child and teacher-student relationships, Raver et al. (2012) described attributional biases of teachers in relation to children's behavior. Teachers may be susceptible to harboring negative attributional biases that place undue weight on surface level features of student behavior which, in turn, leads to selection of ineffective disciplinary strategies. Under high levels of negative emotional arousal, a teacher's ability to process information may deteriorate, thereby reducing their ability to attend to more neutral stimuli, i.e. states of emotional dysregulation may prevent a teacher from paying equal attention to students who are behaving appropriately and focus more intently on the student(s) deemed responsible for classroom disruptions that heightened the teacher's emotions (Raver et al., 2012). Previously mentioned research on stress, as well as research on the neurobiology of EF, is particularly relevant in understanding the cognitive underpinnings of the largely automatic processes that govern one's appraisal of others' behaviors within the context of a classroom. When stressed, teachers may be unable to maintain control over their own behaviors and emotions, such that the most appropriate strategies to address/resolve conflicts may escape them at the point in time when they are most needed. Difficulty in flexibly deploying the relevant cognitive processes that assist in maintaining one's composure is likely to increase feelings of being "thrown off course." That is to say, the interaction

between stress and EF processes produce a disparity between teachers' knowledge and actions when trying to address stressful situations in the classroom.

In the context of classroom management, a teacher's ability to resist the impulse to engage in a negative classroom management strategy (e.g. angrily redirecting a student who is continually off-task) and choose a less automatic, but more appropriate strategy (e.g. covert, emotionally-neutral redirection of the same behavior) for a particular situation is likely to allow for better overall outcomes in instruction and behavior management. The extent of a teacher's cognitive flexibility ability is also likely to be beneficial by allowing the teacher to be mentally flexible and 'stretch' the list of available options for addressing a particular classroom event. In a dynamic environment, full of numerous moving parts, such as a classroom, higher levels of cognitive flexibility may also be important for maintaining control of student behaviors by allowing teachers to scan the classroom without getting stuck on certain students or behaviors, thereby allowing for a smoother continuation of a lesson or activity.

Although not included in this study, a teacher's working memory has also been hypothesized as essential to retaining and updating of relevant information, e.g. within a response-cost context, that can be recalled in order to provide appropriate positive or negative consequences for a particular behavior. Because classroom management has often been identified as a significant source of teacher stress (e.g. Evertson & Weinstein, 2006), and teachers' EF may affect the effectiveness with which teachers are able to monitor and manage student behavior suggests that the topic of teachers' EF abilities as indicators of risk or protective factors against stress is worthy of inquiry.

Drawing from extant research in prevention and educational interventions, Raver et al. (2012) suggested the need to focus on teachers' emotional and behavioral regulation as important factors that may influence the extent to which new programs and strategies can be implemented into their teaching. As mentioned earlier, a curvilinear relationship exists between stress and EF, such that very high and low levels of stress inhibit optimal EF, but moderate levels of stress can actually promote and enhance these processes. Teachers who are experiencing high levels of stress may not be able to implement new programs meant to improve classroom instructional and management practices with fidelity and efficacy. For example, some researchers (e.g., Jennings & Greenberg, 2009) have pointed out that socioemotional learning curricula and interventions often rely on teachers as models of socially appropriate behaviors to students, thus underscoring the need for teachers to themselves maintain and/or strengthen their own emotional and behavioral regulation. However, teachers' style of self-regulation has enjoyed less attention in research than other, more general psychosocial characteristics. It is possible that the degree to which teachers are receptive to implementing new classroom practices is viewed as a function of their willingness or readiness for change. In other words, a teacher who is open to implementing new interventions is thought of as one who is willing to change, but a teacher who balks, even slightly, at such ideas is at risk of being considered unwilling or resistant to change. Such a tendency to personalize a teacher's receptivity towards new programs and procedures may unfairly taint the views of peers and other staff members, such as school psychologists, who must collaborate with the particular teacher to successfully address and resolve classroom issues. More importantly, by unfairly labeling teachers as unwilling or resistant, one fails to incorporate the

contributions of stress and EF processes that govern the extent to which personal capacities and resources can be engaged in successful and meaningful implementation of new practices.

To date, only two studies were found that explicitly attempted to study teachers' EF abilities, and while their contributions to the literature are a step in the right direction, our knowledge of individual teachers' EF abilities and their relationship to teacher stress remains unclear. Most recently, Friedman-Krauss et al., (2014) explored the relationship between teachers' EF abilities, child behavior problems, and teacher stress in a sample of 69 teachers and staff members from four Head Start centers in the Midwestern United States. The questionnaires included a modified, five-item inventory of job stress; a six-item self-report questionnaire of EF abilities; and a modified, eleven-item measure of child behavior problems derived from items on the Child Care Worker Job Stress Inventory and Behavior Symptoms Index. In addition to the self-report questionnaire, general EF ability was measured using performance tasks that had been modified for computerized administration. The Backwards Letter Span Task and Part B of the Trail Making task were chosen as measures of EF. Part A of the Trail Making task was used as a measure of general cognitive ability.

Demographic variables included sex, race/ethnicity, highest degree earned, and teaching status, i.e. lead teacher, assistant, or teacher aide. Participants also provided the total number of children in each classroom and whether the classroom was a Head Start or Early Head Start room (this was used as an indicator of the age of children in the classroom). A multilevel model technique was used to calculate associations between teachers' perceptions of child behavior problems and job stress. Next, the association

between teacher EF and teacher stress was tested, followed by the association between teacher EF and child behavior problems. Teacher and classroom level covariates were then added to the model. Lastly, the model included an interaction between child behavior problems and teacher EF. A second multilevel model was used where teachers were nested within classroom and relationships between child behavior problems and teacher EF, and teacher stress.

The study hypothesized that teacher stress would be positively correlated with child behavior problems and that high EF abilities would moderate the relationship between teacher stress and child behavior problems, with the opposite for teachers with low EF ability. Statistical analyses found a significant positive correlation between teacher stress and child behavior problems. In the second model where teachers were nested within classrooms, the teacher's classroom was shown to account for 32% of the variance in teacher stress; however, even after accounting for classroom and center, child behavior problems were positively and significantly correlated with teacher stress. The same relationship held when accounting for teacher and classroom covariates. The second hypothesis was also supported. Higher scores on Part B of the Trail Making task were shown to be associated with lower levels of stress. The authors suggested that since this particular instrument measured working memory, response inhibition, and cognitive flexibility, scores on this task were an appropriate indicator of EF ability. Furthermore, since performance on the Backwards Letter Span Task did not correlate significantly with teacher stress, Friedman-Krauss et al. (2014) suggested that response inhibition and cognitive flexibility may be more suited for the types of behaviors required for successful classroom management. So, even though EF scores did not significantly moderate the

relationship between teacher stress and child behavior problem, the researchers found

evidence to support the hypothesis that higher levels of EF were correlated with lower

levels of stress among teachers.

Another study by Feuerhahn et al., (2013) also studied EF performance in relation

to emotional exhaustion (a core component of burnout syndrome) in a sample of 100

school teachers in Germany. Participant data were collected using self-report

questionnaires of emotional exhaustion and cognitive functioning, informant report of

cognitive functioning, as reported by a spouse or another closely related peer, and via

performance on a German neuropsychological task. Job performance and physical health

were also measured by self-report. Findings from this study showed a direct, statistically

significant relationship between emotional exhaustion and both, self-reported and

performance-based cognitive impairments. Higher levels of emotional exhaustion were

correlated with higher levels of cognitive impairment in the participants of this study.

Although findings from both studies show significant effects between teachers' levels of

stress and EF abilities, several significant limitations exist which suggest a cautious

interpretation of findings. The cross-sectional design of the study by Friedman-Krauss et

al., (2014) did not allow for an analysis of potential changes to the link between EF and

teacher stress over time. Feuerhahn et al. (2013) employed a longitudinal design (data

were collected twice, 6 months apart), but their focus on emotional exhaustion, a

component of burnout, and therefore different from stress, limits the degree to which

findings can be generalized to a study of teachers' occupational stress. Nevertheless,

these two studies suggest that aspects of EF may be important to our understanding of

why some teachers become overly stressed and burned out in their chosen profession and others seem to weather the stressful nature of teaching.

Summary

To summarize, research on teachers' EF abilities and associations with stress, job satisfaction, and other aspects of teaching has only recently emerged. Although there is a lack of sufficient empirical data to fully understand the role of EF in the generation and management of stress in teachers, the theoretical basis for such an argument appears strong. The current literature in the field of EF and stress suggests a bi-directional, inverted U-shaped relationship between one's level of stress and EF abilities. Such a relationship suggests that low and high levels of stress hinder activation of brain regions implicated in several EF processes, however, a moderate level of stress appears to result in optimal activation of the same regions in order to allow for efficient deployment of EF. It is possible that like self-efficacy, individual EF abilities can be viewed as a personal resource that may alter the degree of exposure and subsequent recovery from stressors. Individuals with poor EF inhibition and cognitive flexibility may struggle to appraise and cope successfully when faced with stressors, therefore increasing the likelihood of amplifying the stressful event, either by prolonging, strengthening, or inviting reoccurrences. Over time, patterns of behavior typically used to address stressful situations become automatic, such that future exposure to stress forces the individual to rely on these inefficient strategies, thereby perpetuating the stress response cycle.

CHAPTER III

METHODOLOGY

Participants

The sample for this study was recruited using convenience sampling and was comprised of public school teachers working in the Rocky Mountain region of the United States. A total of 62 general education teachers, 12 male (19.4%) and 50 female (80.6%), participated in the study. Participants ranged from 25-64 years of age, with a median age of 37 years. Years of service (not including the very first year in the profession) for this sample ranged from 1-40 years, with a median of 9.5 years of service. Specifically, 21 participants (33.9%) had between 1-5 years of service, 13 (21%) had between 6-10 years, 17 (27.4%) had between 11-15 years, and 11 participants (17.7%) had more than 16 years of teaching experience. The sample was evenly distributed across educational settings with 31 elementary teachers and 31 secondary teachers. Long-term substitute teachers, special education teachers, academic and behavior interventionists, and other school staff members not directly involved in daily teaching duties in a general educational classroom were excluded from participation in this study.

The most recent data from 2016 provided by the Colorado Department of Education suggest that the overall teacher population was comprised of 75.71% female and 24.29% male teachers. Per data gathered from the 2011 School and Staffing Survey, the mean age was 41.1 years (Goldring, Gray, & Bitterman, 2013). Therefore, the study

sample, although considered small, was demographically similar to the overall teacher population in the state of Colorado, especially in regard to sex and age.

To achieve a relatively homogeneous sample, it was important that participants were chosen from schools with similar characteristics, specifically in regard to the overall socioeconomic level (SES) of the student body. Although an imperfect measure, the percentage of the student body receiving free or reduced lunch has historically been considered a reasonable indicator of overall SES of a school. As SES level was not considered a part of the exclusionary criteria, all qualified volunteers were invited to participate in the study, regardless of the SES of their school districts, but only data gathered from participants who taught in schools with relatively similar levels of SES were retained. Responses from participants who were employed at schools with very high or very low percentages of free and reduced lunch were to be examined and potentially excluded if they deviated significantly from the rest of the sample. A small portion of the final sample (n= 6) was found to have originated from a school with higher SES (25.8% of students receiving free and reduced lunch) compared to the rest of the sample, which ranged from 41.3% to 80.2% of students receiving free and reduced lunch. However, preliminary examination of the data found no discernible differences between responses from this small subset and the rest of the sample. Thus, all 62 observations were retained for data analysis.

Due to the preliminary nature of this study as well as the anticipated logistical challenges of collecting data from teachers during the school year, the researcher used the rules of thumb outlined by VanVoorhis and Morgan (2007) to determine the minimum number of participants required to maintain adequate power for correlation and

regression analyses. One rule of thumb for regression equations suggests a minimum sample size as $N > 50 + 8m$, where m refers to the number of independent variables. This study included four independent variables as predictors, thereby suggesting a minimum of 82 participants. A second rule of thumb set the absolute minimum sample size at the number of predictors plus 50, i.e. $N > 50 + m$, where m again refers to the number of independent variables. For this study, this rule of thumb would require a minimum of 54 participants. After considering these rules, the researcher chose to set a minimum sample size at 60 participants, roughly halfway between the numbers suggested above.

Instrumentation

Demographic information about the participants, such as age and sex, as well as two variables of interest - years of teaching experience and educational setting (elementary or secondary), were gathered using a survey designed by the examiner. Three instruments were used to assess teacher stress and executive functioning including: one self-report questionnaire of teacher stress, and two performance-based measures of executive functioning. All participants completed all measures in one sitting. The demographic survey was administered first and the other instruments were presented in a counterbalanced order across participants.

Demographics Survey

The demographic survey for this study was incorporated into the Teacher Stress Inventory (TSI; Fimian, 1988), described below. The TSI terms of use encourage researchers to alter the document to fit the specific needs of their respective studies, without making any changes to the way items are worded. Specifically, document formatting, copying and pasting of item stems, and alterations to the preexisting demographics section are permitted. Therefore, rather than creating a separate document,

the demographic variables already present in the TSI were reworded, reordered, and reformatted to fit the needs of this study.

The survey asked participants to provide personal information in the following areas: age, sex, grade level taught, educational setting, and years of service as a teacher. Participants were asked to circle "Elementary (K-5th grade)" or "Secondary (6th – 12th grade)" in response to the educational setting item of the survey. Years of service referred to the total number of years spent working as a teacher. Instructions accompanying this item specified that participants should not include the current academic year in their calculations. For example, a teacher who was in her fifth year was deemed to have completed four *full* years of service in the teaching profession.

Lastly, participants were asked to endorse the presence of any significant non-occupational stressors that they believed may negatively affect their work in the form of a 5-point Likert scale were '1' referred to "Minor Stress" and '5' referred to "Severe Stress." Self-reports of high levels of additional stress, i.e. ratings of 4 or more, from settings other than work (e.g. bereavement, divorce, or loss of a significant relationship, health conditions, etc.) were reviewed to determine whether these data should be excluded (e.g., whether they were outliers). Although 13 participants rated non-occupational stress levels as '4' or higher, their overall TSI scores were not significantly higher than other raters who did not endorse similar levels of non-occupational stress. Hence, all participants were included in the final sample. Levels of external stress did not appear to differ significantly between elementary and secondary school teachers at the .05 level; $t(58) = -1.52$, $p < .10$.

To avoid collecting data from non-eligible participants (e.g., special education teachers, substitute teachers), the demographics survey was administered and reviewed

by the researcher prior to administration of other instruments. A copy of the specific

demographic survey can be found in Appendix C.

Teacher Stress Inventory

The Teacher Stress Index (TSI; Fimian, 1988) is a norm-referenced, 49-item, 10-

factor, self-report questionnaire of occupational stress endorsed by teachers in American,

K-12 public schools. The normative sample of the TSI contained 3,401 teachers (962

general education and 2,352 special education teachers). Efforts were made to represent

an adequate sample based on sex and grade level (i.e., 726 male and 2,561 female

teachers; 791 teachers from elementary school, 499 from middle school, and 1,420 from

secondary school settings). The sample was aggregated over several years and consisted

of teachers from different schools across the United States.

The ten factors that comprise the TSI are evenly split across two categories –

sources of stress and manifestations of stress – with each individual factor responsible for

a certain amount of impact on teacher stress (as determined by the overall score). The

five factors considered sources of stress for teachers are: Time Management, Work-

Related Stressors, Professional Distress, Discipline and Motivation, and Professional

Investment. Stress manifestation factors are: Emotional Manifestations, Fatigue

Manifestations, Cardiovascular Manifestations, Gastronomic Manifestations, and

Behavioral Manifestations. Each individual factor is comprised of three to eight

individual items. Items such as "There isn't enough time to get things done." and "There

is too much work to do." are examples from the Time Management and Work-Related

Stressors factors, respectively. Similarly, items such as "I respond to stress by feeling

depressed." and "I respond to stress by calling in sick." are examples of Emotional

Manifestations and Behavioral Manifestations factors. Participants are asked to indicate how strongly they relate to an item using a five point Likert scale. For each item, the teacher must choose from one of the following: No Strength; Not Noticeable (1), Mild Strength; Barely Noticeable (2); Medium Strength; Moderately Noticeable (3); Great Strength, Very Noticeable (4); and Major Strength; Extremely Noticeable (5). As an example, a teacher who does not consider time constraints to be a strong stressor would be expected to provide a low rating for the item "There isn't enough time to get things done."

The authors provided different methods for evaluating scores to compare teachers' reported levels of stress. For example, comparisons of overall stress scores across individuals can be done by utilizing cutoff scores derived from the normative data where cutoff points are set at one standard deviation above and below the mean. However, as this study did not compare participants' levels of stress to the normative TSI sample, only the overall stress score was utilized. A Total Stress score was calculated by summing responses to individual items and dividing by the total number of items. In other words, the Total Stress score was the mean level of stress reported across all 49 items.

The normative sample of the TSI produced adequate psychometric properties. Internal consistency calculations for the entire sample, the regular teacher, and special teacher subgroups were in the excellent range, with Cronbach's alpha estimates ranging from .92-.93 (Fimian, 1988). Data from the sample of this current study also suggested a high degree of internal consistency (Cronbach's alpha = .91). This degree of reliability suggests that, as a whole, the instrument measures stress across individuals and groups with great consistency. Estimates of internal consistency for individual factors were

calculated for the entire sample, as well as for the regular and special education teacher subgroups. Across all samples, estimates of all the individual factors indicated adequate to good levels of internal consistency. Only one factor, the Professional Involvement factor in the special education teachers subgroup, was found to have poor internal consistency (Cronbach's alpha = .67). Test-retest reliability for this instrument was also very high when assessed two weeks apart ($r = .99$). Convergent validity was determined by correlations between an individual's Total Stress score and informant ratings by the individual's significant other, or someone who knows him/her well. Significant correlations were found between participant's self-ratings and informer ratings in terms of individual factors (r range = .46 to .69, $p = .001$) and overall score ($r = .65$, $p = .001$). Furthermore, the full 10 factor model explained 58% of the variance within the Total Stress score, and was used as a measure of factorial validity for this version of the TSI. Reanalysis of aggregate data confirmed initial findings of reliability and validity (Fimian & Fastenau, 1990). Although this version of the instrument has not been revised in quite some time, several studies conducted in the United States and abroad have continued to support the use of this measure (e.g. Collie, Shapka, & Perry, 2012; Erdiller & Dogan, 2015; Hanif & Pervez, 2003; Kourmousi, Darviri, Varvogli, & Alexopoulos, 2015), suggesting that the TSI remains a popular and widely accepted tool for measuring occupational stress in teachers.

National Institutes for Health Toolbox:
Executive Functioning Subdomain

The National Institute of Health (NIH) Toolbox is a norm-referenced collection of brief tasks that assess cognitive, motor, emotional, and sensory function across the lifespan. The battery, based on a nationally representative normative sample of 4,859

individuals between the ages of 3 and 85, was designed to provide a low cost, brief, yet comprehensive assessment tool that can be used to conduct assessments in a variety of settings for individuals at different points on the developmental spectrum (Weintraub et al., 2014). Two specific subtests from the NIH Toolbox were selected for this study: the Dimensional Change Card Sort Test and the Flanker Inhibitory Control Test. Tasks from the Executive Functioning subdomain of the NIH Toolbox were chosen based on criteria that (a) they were available in the public domain and that (b) they were brief, relatively immune to practice effects, and could be modified in order to be administered on a computer. Both tasks described below have been validated against the Color-Word Interference Test of the Delis Kaplan Executive Functioning System (DKEFS) and have shown good convergent validity to this well-established, highly respected, and widely used measure of EF. Discriminant validity was established by comparing performance on the two EF tasks of the NIH Toolbox to the Peabody Picture Vocabulary Test – 4th Edition (PPVT-4) – a task that is widely viewed as a gold standard in assessing receptive vocabulary and, more importantly, measures a significantly distinct construct compared to EF (Zelazo et al., 2014). More details about reliability and validity properties for both tasks are provided later in the section.

   National Institute of Health Toolbox Dimensional Change Card Sort Test.
The Dimensional Change Card Sort Test (DCCS) of the NIH Toolbox Cognition Battery (EF subdomain) is a measure of cognitive flexibility. The test contains four blocks – practice, pre-switch, post-switch, and mixed. Instructions are provided visually (on a computer monitor) and spoken aloud by the examiner. In keeping with the instructions for this subtest, the following process was used to administer the items. In the practice

block, participants were shown a stimulus (either a green rabbit or a white boat) and asked to match it to one of two target stimuli (white rabbit and green boat) by color or shape. For practice trials, the sorting dimension, i.e. either color or shape is identified by the word 'color' or 'shape' presented visually (on the screen) and aurally (via a recording), followed by presentation of the test stimulus on the screen. Participants were asked to respond and then received feedback regarding the accuracy of their responses. The practice block contains four practice items, three of which must be successfully passed in order to proceed. When the participant successfully completed at least three items for one sorting dimension, the steps were repeated for the other dimension with another set of four practice items. Although no participant failed to move on from the practice block in the validation study, the DCCS does allow for administration of two additional four-item sets to give participants two more attempts at passing this block.

After passing the practice items for both sorting dimensions, participants were presented with stimuli from the pre-switch block of the test. The sorting dimension for this block of five trials is the same as the dimension used in practice items that immediately preceded the pre-switch block (e.g. color). After successfully completing four out of five trials in this block, participants moved on to the post-switch block where they were asked to sort another five trials by the second dimension (e.g. shape). Failure to pass four out of five trials in either the pre-switch or post-switch blocks terminated the test. Success on both pre- and post-switch blocks was followed by presentation of a set of 50 trials from the mixed block of the test. During these trials, the participant was asked to switch back and forth between the two dimensions, such that 40 items required the use of the "dominant" sorting dimension, i.e. the one used in the post-switch block, and 10 items

of the "non-dominant" sorting dimension used in the pre-switch block. The trials were presented in a somewhat random order, such that two to five dominant trials preceded each non-dominant trial.

The DCCS provides accuracy and reaction time (RT) scores that can be viewed separately or as one combined score. A focus on accuracy often results in slower reaction times (seen in adults) and vice versa, where a focus on speedy performance often results in poorer accuracy (seen in young children), thereby indicating a degree of EF cost associated with different response patterns. However, in the event that accuracy is less than 80%, only accuracy scores are used.

Based on the validation study of 268 adults, the DCCS scores were found to be positively correlated with scores on the DKEFS Color-Word Interference Task (r (237) = .55; $p < .0001$). In addition, a strong, positive correlation was found between scores on the DCCS and Flanker tasks (r (226) = .71; $p < .0001$) of the NIH Toolbox battery (Zelazo et al., 2014). These scores have been cited as evidence for convergent validity for the DCCS task. Discriminant validity, as determined by correlations between the DCCS and PPVT tasks, was much lower compared to convergent validity (r (242) = .06, $p = .37$), and was deemed as satisfactory. However, Zelazo et al., (2014) stated that "a complete and comprehensive assessment of validity was not possible," (p. 628), and acknowledged the limitations of validating the instrument against a single EF task. With this limitation in mind, the DCCS task of the NIH Toolbox was used because of its strong theoretical roots, its previous use with healthy, non-brain-injured individuals, and because it required very little time to administer.

Preliminary analyses of data gathered from the normative sample indicated a high degree of variability in performance during the end of the task, so only 30 trials from the mixed block were included in scoring in order to maintain short administration times and to preserve reliability of the instrument. Each correct response is awarded 0.125 points and the overall accuracy is scored on a scale from 0 to 5 (0.125 multiplied by 40 trials – 5 trials from pre-switch, 5 trials from post-switch, and 30 trials from mixed blocks). For participants whose accuracy exceeded 80%, RT scores were calculated using median RTs from correct non-dominant trials from the mixed block. Since RT score distributions often appear to be positively skewed, a logarithmic transformation was used to convert participants' scores in order to create a more normal distribution. Values from log transformations were rescaled to a range of 0 to 5. These rescaled RT scores were added to accuracy scores of participants who responded with more than 80% accuracy on trials across different blocks. These combined scores were then converted into standard scores with a mean of 100, and a standard deviation of 15.

For the sample in this study, none of these calculations were necessary as all participants had greater than 80% accuracy. Furthermore, this subtest was administered via a tablet computer and all calculations and reports were generated by the software, thereby eliminating the need for the calculations mentioned above.

National Institute of Health Toolbox Flanker Inhibitory Control Test. The Flanker task of the NIH Toolbox is a measure of inhibition and visual attention. It requires an individual to focus on a particular stimulus located in the middle of the screen, while inhibiting attention towards stimuli that appear laterally, in relation to the middle stimulus, i.e. stimuli flanking the middle stimulus. As per the test developer's

directions, participants were first asked to complete a practice block followed by a fish

block and an arrow block. During each block, participants were asked to touch one of two

directional arrows to indicate the direction the middle stimulus was facing. For example,

during the practice block, which uses fish stimuli, the participant judged the direction in

which the middle fish was pointing and then touched the corresponding arrow to indicate

their response. The practice block consists of four trials in all – two congruent (i.e.,

matches stimulus) and two incongruent (i.e., does not match stimulus) trials. Similar to

the DCCS task, participants were required to pass 3 out of 4 practice trials in order to

proceed. Again, while no participant failed the practice block during validation studies,

the task allows for two additional sets of practice trials, thereby allowing three attempts

to pass and move on from the practice block. Following the practice block, participants

were presented with a set of 25 fish trials – 16 congruent and 9 incongruent, which were

presented in a somewhat random order (one to three congruent trials precede an

incongruent trial). Success on five out of nine incongruent trials allowed participants to

proceed to the arrow block which also consisted of 25 trials, split into 16 congruent and 9

incongruent trials.

Scores on the Flanker task were derived using the same methods as described for

the DCCS task. High accuracy scores (greater than 80% correct) were combined with RT

scores, but performances of less than 80% accuracy were viewed as standalone scores.

Similar to the DCCS task, no participants had performances of less than 80% accuracy.

Preliminary analyses during validation of the Flanker task revealed a high degree of

variability towards the end of the task, so only the first 20 trials from the fish and arrow

blocks were used for determining scores. Accuracy and RT scores were scaled from 0 to

5 using the same methods used in the DCCS task. Further conversions of data resulted in the creation of standard scores for this task.

As noted above, convergent validity for the Flanker task was derived by measuring the relationship between scores on the Flanker and another measure of EF. In adults, scores on the Flanker task appeared to be positively correlated with performance on the DKEFS Color-Word Interference Task (r (229) = .52; p < .0001), and with scores on the DCCS task (r (226) = .71; p < .0001). Divergent validity, calculated based on correlations between Flanker scores and PPVT scores, appeared quite low (r (234) = .06; p < .35), therefore suggesting that, when assessing adults, Flanker task scores contributed uniquely to aspects of cognition. The Flanker task was selected for this study because it was easy to use, could be administered quickly, and was positively correlated with a gold standard assessment of inhibition.

Procedures

Approval was obtained from the university Institutional Review Boards (IRB) prior to data collection. Participants for this study were recruited via a two-step process. First, the researcher emailed a description of the study to school principals to seek permission for recruiting teachers from their schools. When permission had been granted by school principals, the researcher, with the assistance of a point person in the school (e.g., school psychologist), distributed a similar email to teaching staff. Teachers who were interested in participating were asked to contact the researcher directly to clarify concerns and to concretize participation details. Flyers and sign-up sheets were also posted in these schools, but most participants were recruited via emails.

To compensate participants for their time, they were given the option to be included in a raffle drawing for one of three $50 Visa gift cards. Winners were determined by random selection of three identification numbers from the pool of all participants who chose to enroll in the drawing. Additionally, at the conclusion of the study, teachers were provided with a list of resources aimed at aiding stress management, including those that address stress from an executive functioning perspective. .

Although this study did not require participants to be blinded to the nature of the study, TSI administration guidelines emphasized the need to actively avoid any mention of the term 'teacher stress' prior to completion of the instrument. This policy was meant to prevent participants from becoming sensitized to their individual attitudes/beliefs about job related stress, thereby serving as an attempt to minimize, to whatever degree, the impact of participants' internal biases on responses to TSI items. Therefore, as recommended by the author of the instrument, the researcher made reasonable attempts to ensure that all study-related communications between the researcher and participants during the recruitment phase used the more generic term 'work-related problems' instead of 'teacher stress' when discussing the study.

All data for the study were collected by the researcher. All measures were administered in a one-on-one setting, in a quiet and private environment on school grounds. Most participants agreed to complete the measures in their classrooms. The two EF tasks were administered via an Apple iPad tablet computer provided by the examiner and preloaded with the necessary materials, and the Demographic Survey and the TSI items were provided in paper format. The average administration time was between 15 and 30 minutes. To guard against threats to internal validity, all relevant data were

gathered in one sitting and the order of administration was counter-balanced such that

certain participants completed the TSI first followed by the NIH subtests, while other

participants completed the measures in the opposite order. Data collection was completed

within a three-month period during the fall semester of the 2016-17 academic year from

eight schools across three different school districts located in suburban locales in the

Rocky Mountain region.

Special care was taken to protect participants' confidentiality. Apart from their

signature on the informed consent form, participants did not provide identifying

information on any study related materials. The researcher pre-coded all paper forms

(informed consent form and questionnaires) with an identification number in order to

ensure confidentiality of records and to match the TSI with measures of EF. After all data

were collected, permission forms were returned to UNC for storage in a locked file

cabinet for three years.

Variables

In this study, individual scores on tasks of cognitive flexibility (DCCS) and

inhibition (Flanker task) served as independent variables. Data from previous research

that used the two measures of EF suggested a high degree of correlation between the two

instruments ($r = .71$; $p < .0001$), thereby increasing the risk of violating the assumption of

multicollinearity. For this reason, the original data analysis plan was to combine the

results of these two subtest to create a single measure of participant EF. However, there

was not a high correlation between these tests with study participants and the two scores

were ultimately treated as separate independent variables of cognitive flexibility and

response inhibition in the model. The overall Teacher Stress score (TSS) derived from the

TSI served as the dependent variable in this study. Teacher stress was operationally defined as the severity of occupational stress in teachers as represented by five sources of stress and five manifestations of stress.

Demographic indicators, such as years of service (YOS) and educational setting (SET), were considered moderator variables and were used to measure alterations in the relationship between the independent and dependent variables. YOS was operationally defined as the number of complete academic years spent as a teacher, excluding their current year. Educational setting (SET) was operationally defined as the type of setting in which the teacher participant worked. In this study, the elementary setting was defined as Kindergarten until the end of 5th grade. Secondary settings were defined as grades 6 through 12.

Data Analysis

Data collected via aforementioned instruments were analyzed using descriptive statistics as well as multiple linear regression using a $p < .05$ level of significance.

Q1   What is the relationship between EF and Total Teacher Stress?

It was hypothesized that significant, negative correlations would exist between EF performance and Total Stress score. A Pearson correlation coefficient was used to determine the relationship between EF and TSS without inclusion of any other variables. Although this relationship has been presented in other studies, it was deemed important to establish this relationship in the current study prior to completing subsequent analyses.

Q2   To what extent do years of service and educational setting moderate the
          relationship between EF and Teacher Stress?

It was hypothesized that moderation of the EF and TSS relationship as a function of single unit change in YOS would be statistically significant. In addition, it was

hypothesized that the relationship between EF and TSS would be significantly moderated by SET conditions. In this regression model, the EF scores were considered as IVs, while YOS and SET were moderator variables, and TSS was the DV. Interactions between the IVs and moderator variables were also included in the model - interaction between cognitive flexibility (CF) and response inhibition (RI) scores and years of service (CF*YOS and RI*YOS) and the interaction between CF and RI scores and educational setting (CF*SET and RI*SET). The interaction between YOS and SET was not considered of value in this particular analysis and were not included in the model. The following equation was used as a visual representation of the model.

$$TSS = \beta o + \beta 1(CF) + \beta 2(RI) + \beta 3(YOS) + \beta 4(SET) + \beta 5(CF*YOS) + \beta 6(RI*YOS) +$$
$$\beta 7(CF*SET) + \beta 8(RI*SET) + \varepsilon$$

Q3   What portion of the variance in Teacher Stress is explained by EF, together and separately, when accounting for years of service and educational setting?

Hierarchical regression analysis (HRA) has successfully been used in prior studies on teacher stress (e.g., Yoon, 2002). HRA is often used in psychological research to test theoretical assumptions and assess the influence of predictor variables in a step by step manner, i.e. pre-identified, theoretically supported predictors of the dependent variables are included in the model and variance explained is determined first, followed by addition of independent variables into the model. In this study, demographic variables of years of service and educational setting were added to the model first in order to understand the variance in teacher stress explained by these variables. In step two, scores from EF tasks were added to the model to determine if additional variance in teacher stress is explained by addition of EF variables. Hierarchical regression relies on fulfillment of certain statistical assumptions, namely assumptions of independence of observations and

normality of data. Prior to conducting any statistical analyses, assumptions were tested

and appropriate measures taken to account for any violations.

CHAPTER IV

RESULTS

The purpose of this study was to explore the association between teachers'
executive functioning (EF) abilities and their reported levels of occupational stress.
Specifically, the relationships between teacher stress and two EF processes, cognitive
flexibility and inhibition, were explored. In addition, the researcher evaluated whether
teacher-specific variables such as years of service (YOS) and educational setting (SET)
exerted any influence on the relationship between teacher stress and EF processes. Lastly,
this study was designed to measure the unique impact of EF on teacher stress while
controlling for moderator variables.

Data were collected from teachers at eight different schools in the Northern
Colorado region between October 2016 and December 2016. A total of 62 participants
completed a survey of teacher stress, two EF tests administered via iPad, and a brief
demographic questionnaire embedded within the teacher stress survey. Participants were
asked to report their years of service and educational setting (i.e., elementary, secondary),
as well as provide a rating of their external stress as measured on a 5-point Likert-type
scale, with a higher scoring indicating more stress. This chapter presents demographic
data about the sample and results from statistical analyses pertaining to each research
hypothesis.

Demographics

As noted, the sample consisted of a total of 62 teachers from the region of Northern Colorado. The sample included 12 male teachers (19.4%) and 50 female teachers (80.6%). Participants ranged from 25-64 years of age and were split evenly between elementary and secondary settings. Years of service (not including the very first year in the profession) for this sample ranged from 1-40 years, with the median of 9.5 years of service. Overall, the sample characteristics closely resembled the teacher population in the state of Colorado, particularly in regards to sex and age. Therefore, although the sample was small, it appeared to be generally representative of the broader population of teachers in this state.

Teacher Stress

Teacher stress was measured using the Teacher Stress Inventory (TSI). With this sample, internal consistency reliability was considered to be high (Cronbach's alpha = 0.91). Average scores on the TSI as indicated by participants based on sex, years of experience, and setting are presented in Table 1 below. On the TSI, participants used a five point Likert scale to rate the level or strength of occupational stress that they associated with each of the 49 items on the questionnaire, with '1' indicating "No Strength or Not Noticeable" and '5' indicating "Major Strength or Extremely Noticeable." With this sample, the average degree of teacher stress, as measured by the Total Stress Score (TSS), was 2.60 with a standard deviation of 0.51. In other words, the average rating of occupational stress provided by teachers in this sample was between "Mild strength, barely noticeable" and "Moderate strength, moderately noticeable" levels.

Table 1

Overall Teacher Stress Ratings for the Total Sample

Total Stress Score (TSS)	Mean	SD
Sex		
Males (n=12)	2.53	0.62
Females (n=50)	2.62	0.48
Educational Setting		
Elementary (n=31)	2.70**	0.49
Secondary (n=31)	2.50	0.51
Years of Service		
1-5 (n=21)	2.47	0.41
6-10 (n=13)	2.75	0.55
11-15 (n=17)	2.70	0.43
16+ (n=11)	2.52	0.70

Note: T-tests conducted between groups did not reveal any significant differences between males and females or between different levels of years of service. T-test revealed a significant difference between mean TSS scores across elementary and secondary settings at the p <.15 level.

The TSI is comprised of 10 subscales; five scales provide information on sources of stress and five scales provide information on manifestations of stress. Time Management, Work Related Stressors, Professional Distress, Discipline & Motivation, and Professional Involvement were used to determine sources of stress. Emotional Manifestations, Fatigue Manifestations, Cardiovascular Manifestations, Gastrointestinal Manifestations, and Behavioral Manifestations were used to determine the ways in which stress manifests in teachers' lives in accordance with the guidelines provided the authors of this instrument (Fimian, 1988). Subscale and overall means are provided in Table 2 below. Participants also provided ratings of external stress by indicating their responses

on a five point Likert scale ranging from a '1' indicating "Minor Stress" and '5'

indicating "Severe Stress." The sample mean was 2.6 with a standard deviation of 1.14.

The mean external stress rating provided by elementary teachers was 2.37 while

secondary teachers rated their external stress as an average of 2.81. Thirteen participants

provided high ratings of external stress, i.e. a score of 4 or higher on the Likert scale.

However, their TSI scores were not found to be significantly elevated, therefore no

participants were excluded on the basis of high ratings of external stress.

Table 2

Subscale and Total Stress Scores for the Entire Sample

	Mean	SD
Sources of Stress		
Time Management	3.22	0.63
Work Related Stressors	3.15	0.88
Professional Distress	2.57	0.79
Discipline & Motivation	2.80	0.92
Professional Involvement	2.13	0.71
Manifestations of Stress		
Emotional Manifestations	2.68	0.92
Fatigue Manifestations	2.62	0.80
Cardiovascular Manifestations	2.26	1.05
Gastrointestinal Manifestations	1.70	0.92
Behavioral Manifestations	1.55	0.50
Total Stress Score (TSS)	2.60	0.51

Executive Functioning

Executive functioning (EF) data were derived from participant performance on

the Dimensional Change Card Sorting Test (DCCS) and Flanker Inhibitory Control and

Attention Test (Flanker) – two tasks found within the National Institutes of Health (NIH)

Toolbox Cognition battery. Participants' performances on the DCCS and Flanker tasks were calculated as standard scores (DCCS: $M = 113$, $SD = 18$; Flanker: $M = 97$, $SD = 13$). These scores were then averaged to create an overall EF score. The mean age-corrected EF score for the sample was calculated as a standard score ($M = 105$, $SD = 13$). The DCCS task is a measure of cognitive flexibility, while the Flanker task is considered a measure of response inhibition. Cognitive flexibility and response inhibition are considered related, but distinct processes within the EF domain, and are often treated as separate variables in research.

In previous validation studies, a significant, positive correlation ($r = .71$; $p < .0001$) has been indicated between the DCCS and Flanker tasks. Such a high degree of correlation between two independent variables is considered undesirable as it increases the likelihood of violating assumptions associated with certain statistical analyses. To account for any potential assumption violations, it was originally planned that scores from the two different EF measures would be averaged to create an overall EF score, which was expected to serve as the primary independent variable for all statistical analyses in this study. However, data gathered from the sample in this study did not reveal the same degree of correlation between DCCS and Flanker scores ($r = .37$; $p < .005$). The relatively modest correlation between these two tasks indicated that the two measures were significantly correlated, but not too highly (i.e., more than .80) to violate relevant assumptions for the proposed statistical techniques. Therefore, they were entered in to the model as separate independent variables.

The NIH Toolbox performance reports provided uncorrected standard scores and age-corrected standard scores. Uncorrected standard scores represent individual

performances compared to the entire normative sample, regardless of age, sex, or other demographic characteristics. On the other hand, age-corrected standard scores represent an individual's performance in relation to same-aged peers from the normative sample. Given that the normative sample ranged from 3-85 years of age, using uncorrected scores would likely provide a contextually inaccurate estimate of EF ability. Therefore, age-corrected standard scores were chosen as more valid indicators of cognitive flexibility and response inhibition for participants in this study. Average age-corrected standard scores and standard deviations for the study sample are presented in Table 3 below.

Table 3

Individual and Combined EF Age-Corrected Scores for Total Sample

	Mean	SD
Overall EF	105	13
Males	104	12
Females	105	14
Elementary	103	12
Secondary	107	14
Cognitive Flexibility (DCCS)	113	18
Males	112	22
Females	113	18
Elementary	110	18
Secondary	115	18
Response Inhibition (Flanker)	97	13
Males	96	11
Females	97	14
Elementary	95	14
Secondary	99	13

Note: T-tests conducted between groups did not reveal any significant differences between males and females.

Data Analysis

Data were reviewed for typographic errors, missing observations, extreme outliers, and other properties that may exert undue influence on statistical analyses. Based on visual analysis of raw data, scatter plots and standardized residual plots, four observations were identified as potential outliers. To rule out the impact of these outliers on the overall findings, analyses were conducted with and without these observations. Statistical analyses using the truncated data set (N=58) revealed no significant differences compared to analyses conducted using data from the entire sample. Prompted by the lack of discernible differences in the outcomes of statistical analyses, the researcher chose to utilize the larger data set (including outliers) for all analyses. Subsequently, the findings discussed in this chapter pertain to the full sample of 62 participants.

Assumptions associated with multiple linear regression (MLR) were first tested using visual analysis of scatter plots and Q-Q-Plots, followed by additional statistical tests, as needed. For the assumption of multivariate normality, visual analysis indicated that the distribution of observations for teacher stress appeared to be normally distributed. Visually speaking, the normality distributions for CF and RI appeared questionable, but results of a formal test of normality, such as the Kolmogorov-Smirnov test, showed $p <$ .05 for all variables, thereby suggesting that all independent and dependent variables were normally distributed. As IVs were not highly correlated, i.e. $r < .80$, and Variance Inflation Factor (VIF) levels were less than 10 for each predictor, the assumption of multicollinearity was considered met. A visual analysis of scatter plots did not reveal glaring evidence of a non-linear relationship between IVs and DV, but the lack of a

significant correlation between predictors and response variables may suggest a non-linear relationship and a possible violation of the assumption of linearity.

Research Question 1

Q1   What is the relationship between EF and Total Teacher Stress?

Pearson correlation coefficients for individual measures of EF and teacher stress are presented in Table 4. As mentioned above, a moderate positive, statistically significant correlation ($r = .37$; $p < .005$) was found between DCCS and Flanker scores and as the two instruments did not appear to be highly intercorrelated for this sample, analyses were conducted using cognitive flexibility (CF) and response inhibition (RI) as individual variables, rather than an overall EF score.

Data presented in Table 4 below show no significant correlations between the predictor variables cognitive flexibility and response inhibition, and the dependent variable, teacher stress. The correlation between overall EF and teacher stress was also not statistically significant, but was in the expected direction. That is, higher levels of teacher stress were negatively correlated with aspects of EF. A larger correlation matrix containing all demographic and research variables is presented in Appendix C.

Table 4

Pearson Correlation Coefficients for Teacher Stress, Cognitive Flexibility, Response Inhibition, and overall EF.

	TSS	CF	RI	EF
TSS	1.00000	-0.13	-0.12	-0.15
CF		1.00000	0.37**	0.88**
RI			1.00000	0.76**
EF				1.00000

Note. TSS = Teacher Stress (TSI score); CF = Cognitive Flexibility (DCCS Score); RI = Response Inhibition (Flanker score); EF = Executive Functioning (mean of DCCS and Flanker scores). * = Significant at .05 alpha level. ** = Significant at .01 alpha level.

Research Question 2

Q2   To what extent do years of service and educational setting moderate the relationship between EF and Teacher Stress?

Multiple linear regression (MLR) is a statistical procedure used to analyze the amount of variance within the dependent variable that can be attributed to multiple predictor variables in a regression model. The model allows the use of continuous as well as categorical variables such as sex or race, for example. For reasons already stated above, the original research question was modified such that the overall EF variable originally intended for use in the regression model was separated into two separate independent variables; CF and RI. Since no order of entry was specified for any predictor variables, a direct MLR model was considered appropriate for answering the research question.

The model used participants' ratings of occupational stress on the TSI as the outcome variable. As noted above, performances on measure of cognitive flexibility and response inhibition were used as predictor variables of interest. Two moderator variables – one continuous variable (YOS) and one bi-level categorical variable (SET) – were also included in the model. Furthermore, interactions between all predictor and moderator variables, except for the interaction between YOS and SET, were included in the model. The full model is represented in statistical notation below:

$$TSS = \beta o + \beta 1(CF) + \beta 2(RI) + \beta 3(YOS) + \beta 4(SET) + \beta 5(CF*YOS) + \beta 6(CF*SET) +$$
$$\beta 7(CF*RI) + \beta 8(RI*YOS) + \beta 9(RI*SET) + \varepsilon$$

Data for the full model are presented in Table 5 below. The model showed no statistically significant results regarding the influence of either predictor variable on the outcome variable of teacher stress; $F_{(9, 52)} = 0.56$, $p = .83$, $R^2 = .09$. This suggests that neither cognitive flexibility nor response inhibition explained any significant amount of variance in teacher stress. Also, years of service and setting (elementary or secondary) did not appear to account for any significant amount of variance in the level of reported stress. Lastly, the predictor and moderator variables did not indicate any significant interactions between each other, thereby suggesting that combinations of these variables also did not account for any significant degree of variance in teacher stress.

Table 5

Multiple Linear Regression Model for Teacher Stress

Parameter	*βSE β*	t Value	p Value
Intercept	4.694.10	1.14	.26
CF	-0.030.03	-0.73	.47
RI	-0.020.04	-0.43	.67
YOS	0.040.06	0.59	.56
SET	0.841.22	0.69	.49
CF*RI	0.000.00	0.65	.52
CF*YOS	0.000.00	0.08	.94
CF*SET	0.000.01	0.12	.90
RI*YOS	-0.000.00	-0.63	.53
RI*SET	-0.010.01	-0.63	.53

Research Question 3

Q3   What portion of the variance in Teacher Stress is explained by EF, together and separately, when accounting for years of service and educational setting?

The third research question was originally intended to be answered by hierarchical moderated regression analysis. This analysis was chosen to elucidate the unique impact of EF on teacher stress when accounting for YOS and SET moderators. Again, for reasons already stated, the EF variable was replaced by CF and RI in the regression model to provide estimates of the unique variance in teacher stress contributed by each IV individually, while accounting for YOS and SET. This modification, while methodologically appropriate and warranted, unexpectedly challenged the validity of hierarchical moderated regression as the analysis of choice for this research question. With two IVs, the rationale for hierarchical moderated regression was less sound,

especially given the lack of theory-based guidance regarding the order of entry of variables for such a model. In the same vein, the lack of statistically meaningful results in the prior MLR model also thinned the rationale for this specific type of regression analysis; a hierarchical analysis using the same variables would most likely fail to produce novel results. Thus, stepwise regression was chosen as a more appropriate statistical analysis for this research question.

According to Menard, stepwise regression is often recommended in exploratory predictive research (as cited in Lewis, 2007). This analysis is used to evaluate the order of importance of variables and to find a model that best explains variance in a dependent variable (Thompson, 1995). The order and number of predictors in a model are generated by a process where IVs are repeatedly regressed upon the DV in step-by-step fashion, with variables included or removed from the model depending on a predetermined significance level, the default value inclusion value being $p = .15$. Variables that fail to reach the pre-established level of significance are removed from the next iteration and so on, until ultimately, the analysis reveals a model that most adequately and parsimoniously explains the amount of variance explained in the DV. Furthermore, given the lack of theory-based guidance regarding the order in which CF and RI should be entered, stepwise regression appeared to be a methodologically sound alternative under these circumstances.

Results from the stepwise regression analysis are presented in Table 6 below. Again, ratings of teacher stress were used as the outcome variable and performance on the two EF tasks were used as predictor variables in the model. YOS and SET were also included as moderator variables. The negligible and statistically insignificant parameter

estimates of interaction terms found in the MLR model suggested that they could be excluded without consequence. Thus, the stepwise regression analysis was performed using CF, RI, YOS, and SET variables only. Unsurprisingly, results indicated that none of the IVs or moderator variables met inclusion criteria at the .05 significance level, thereby leaving the y-intercept, i.e. the mean TSS score, as the only statistically significant predictor of teacher stress for the sample in this study. The analysis was repeated with the default level of significance of .15. The model first regressed the intercept term onto teacher stress, and this time was followed by the SET as it met inclusion criteria by having a p value lower than .15. No other IV met inclusion criteria and were not included in the final model. Results indicated that in addition to the mean TSS score, SET was a statistically significant contributor to the variance in teacher stress; $F(1, 60) = 2.72$, $p = .10$, $R^2 = .0434$. Specifically, the elementary educational setting was associated with a .21 unit increase in teacher stress. These findings suggest that a regression model containing only the y-intercept and SET explained roughly 4% of the variance in teacher stress, with the remaining variance attributed to error and other variables not included in this study.

A priori alpha levels for all analyses were set at .05, however, no predictor or moderator variable, including SET, was found to be significant in accordance with that criteria. However, since SET, a bi-level categorical variable, met the inclusion criteria for the stepwise regression model, a post hoc analysis was performed to identify which level of the variable was implicated as being more stressful for teachers at an alpha level of .15. An independent samples t-test was conducted to compare reported levels of teacher stress between participants from elementary (K-5th grade) and secondary (6th – 12th grade)

settings. All assumptions associated with the procedure, i.e. assumption of independence

of observations, homogeneity of variances, and assumption of normality were met. There

was a statistically significant difference between teacher stress scores reported by

teachers working in elementary schools ($M = 2.71$, $SD = 0.49$) and scores reported by

secondary teachers ($M = 2.50$, $SD = 0.51$); t(60)=1.65, $p < .10$. No *a priori* hypotheses

were generated about either educational setting as being more stressful than the other, but

results from the t-test clearly indicated that there was a trend towards elementary school

teachers reporting higher levels of stress as compared to their peers who taught at the

secondary level.

Table 6

Stepwise Selection Summary (.15 level of significance)

Step	Effect Entered	Effect Removed	SBC	PRESS	ASE	F Value	p Value
0	Intercept	*	-81.08*	16.21	0.25	0.00	1.00
1	SET	*	-79.71	16.02*	0.24	2.72	.10

Note. * = Optimal value of criterion.

Summary

The results of the study suggested no statistically significant relationships

between the predictor (EF) and outcome (TSS) variables. Correlational analyses failed to

show statistically significant relationships between teacher stress and cognitive flexibility

or between teacher stress and response inhibition. Also, measures of cognitive flexibility

and response inhibition were found to be less strongly correlated than hypothesized,

thereby prompting modifications to all research questions. The multiple linear regression

model utilized in the second research question also did not show statistically significant

results at the .05 level of significance; years of service and educational setting did not demonstrate any significant moderating effect on the relationships between the predictor and outcome variables. Lastly, due to the lower-than-expected degree of correlation between the two EF measures, the resulting data did not warrant use of the original analysis of hierarchical moderated regression. Stepwise regression was chosen instead to derive the most parsimonious model that adequately explained a portion of the variance in teacher stress. Results of this analysis suggested that, when using an alpha level of .05, none of the predictor variables accounted for any statistically significant portion of the variance in teacher stress. However, when the procedure was repeated using an alpha level of .15 the stepwise regression analysis results revealed a model comprised of the mean teacher stress score (y-intercept) and educational setting. Inclusion of educational setting to the model accounted for a small amount of variance in teacher stress at .15 level of significance. Results from an independent samples t-test revealed that stress levels were significantly higher among participants who taught in the elementary setting. However most the variance in the dependent variable could not attributed to any other predictor variables used in the model.

CHAPTER V

DISCUSSION

Teaching is a highly stressful profession and high levels of stress are implicated in teacher attrition and retention (Kyriacou, 2001; Smith & Ingersoll, 2004). Teacher stress is also associated with negative outcomes such as lowered self-efficacy (e.g. Klassen & Chiu, 2010), poor student-teacher relationships (e.g. Yoon, 2002), and teacher burnout (Jennings & Greenberg, 2009). On a more intrapersonal level, prolonged exposure to stress is associated with poor outcomes in cognitive functioning, including negative outcomes in executive functioning (Williams et al., 2009). The relationship between teacher stress and executive functioning has only recently become a focus of research. Therefore, the aim of the study was two-fold: (a) to add to the body of research by further exploring the role of cognitive flexibility and response inhibition in levels of occupational stress in teachers and (b) to explore the contributions of years of service and educational setting as moderators of the overall relationship between EF and stress.

This chapter presents an overview of the study, procedures used, results of analyses, discussion of findings, and implications for practice. Limitations of the study and recommendations for future research are presented at the end of the chapter.

Teacher Stress and Executive Functioning

For the first research question, it was hypothesized that a statistically significant indirect relationship would exist between executive functioning and teacher stress. Results from a correlational analysis found no statistically significant correlation between

executive functioning and teacher stress within this sample. The research hypothesis was tested again, this time using cognitive flexibility and response inhibition as separate variables, however, results again failed to indicate any statistically significant relationships between teacher stress and cognitive flexibility, nor between teacher stress and response inhibition.

Although a significant relationship between reported levels of stress and executive functioning was not found, it was noted that the correlational relationship was negative which would be consistent with previous research in this area. As mentioned above, extant research around teacher stress has only recently included executive functioning as a variable of interest; only two studies were found that attempted to study teacher stress specifically in relation to teachers' executive functioning abilities (Feuerhahn et al., 2013; Friedman-Krauss et al., 2014) Results from one study involving pre-school teachers found statistically significant negative correlations between performance on tasks of executive functioning (cognitive flexibility and response inhibition) and teacher stress, however executive functioning did not show statistical significance when utilized as a moderator in relation to teacher stress and student outcomes (Friedman-Krauss et al., 2014). The second study, conducted outside the United States, found a statistically significant direct correlation between emotional exhaustion and impairment in executive functioning (Feuerhahn et al., 2013).

As noted, both studies appeared to have been part of the initial foray into the topic of EF and teacher stress and both works produced encouraging results, thereby serving as building blocks of a fledgling empirical foundation for future investigations. Therefore, this current study was designed to improve upon the methodology and procedures used in the past, in the hopes that the findings could strengthen and expand the body of research.

The scarcity of positive results proved surprising, but as with any scientific inquiry, several possible reasons exist that may help to explain why data gathered in this study failed to show a significant correlation between teacher stress, CF, and RI, as suggested by the studies mentioned above.

For instance, the sample studied by Friedman-Krauss et al. (2014) was comprised of pre-school teachers working in Head Start programs in the Midwestern region of the United States – a setting vastly different from the K-12 public school setting chosen for this study. In the same vein, the second study referenced above was conducted outside the United States. Given that that the level of occupational stress experienced by participants in that study is likely to be predicated on features of educational system(s) influenced by different legal, cultural, and political factors than those found in the United States, results from the study cannot be immediately generalized to teachers in this country. Plus, the nebulous nature of stress and EF constructs pose unique challenge in terms of variable selection, and instrumentation.

The study by Feuerhahn et al., (2013) serves as an appropriate example of differences in variable selection. They investigated the relationship between emotional exhaustion, a component of burnout syndrome, and cognitive functioning. Although the constructs of stress and burnout are very closely related, they are not the same, thus making it difficult to compare results from the current study. Specifically, teachers in this study rated themselves as having a low to moderate amount of stress. Therefore, there EF may not have been impaired, and in fact their low to moderate levels may have served as that perfect level of challenge rather than being perceived as overwhelming. It may be the impairment of EF due to stress is not discernible until the level of stress has reached a critical level.

Impact of Years of Service and
Educational Setting

The second research hypothesis for this study pertained to the moderating effects of contextual variables such as teachers' years of service and the educational setting in which they taught. It was hypothesized that years of service and educational setting would have a statistically significant moderating effect on the relationship between teacher stress and executive functioning. The median years of experience for the sample was 9.5 years, but most teachers in the sample had fewer than 5 years of experience. The sample was evenly split across elementary and secondary settings, with 31 teachers in each setting. Results showed no statistically significant effect for years of service, but educational setting, specifically the elementary school setting was found to be more stressful for teachers compared to the secondary setting.

Participants' years of service in the profession had no bearing on the relationship between cognitive flexibility ability and level of teacher stress. Similarly, the relationship between a teacher's ability to inhibit responses and level of occupational stress was also unaffected by years of experience. Current literature in the field of teacher stress is somewhat inconsistent regarding any salient relationship between experience and level of occupational stress (e.g., Klassen & Chiu, 2010)). However, a theoretical argument does exist for the inclusion of professional experience as a potential moderator of occupational stress in teachers. For example, Kyriacou (2007) outlined key differences between experienced and novice teachers and concluded that more experience would likely allow teachers to adapt to changing demands and apply skills more flexibly than novice teachers who would likely need to put forth additional effort when facing similar situations. It is plausible that when compared to their more seasoned peers, teachers with

less experience are exposed to more novel situations and would need to rely more heavily on executive functioning skills to solve problems and achieve goals. As these novice teachers gain experience over time, the number of situations that present as novel would lessen, thus reducing demands on their executive functioning processes. In addition, a 2010 study by Klassen and Chiu found a significant relationship between years of experience and teacher stress, such that teachers in the first few years of their career and teachers approaching retirement both experienced higher levels of stress compared to peers who were not in those stages of their careers. Furthermore, current statistics pertaining to the levels of dissatisfaction and occupational stress reported by early career teachers, as well as current rates of attrition within the teaching field show that novice teachers are more likely to quit within the first five years of their careers, thereby supporting the rationale that years of experience is an important variable in the study of teacher stress.

Results from this study failed to show a significant impact of teachers' years of experience on their level of occupational stress. Based on extant research and current survey data, it would be reasonable to expect teachers in the beginning stages of their career to enter the field with some degree of apprehension and uncertainty. On the other hand, the opposite may also hold true where new teachers may enter the field with more enthusiasm and energy, and such vigor, if present, may serve as a barrier against high levels of occupational stress in the short-term. Entering the field in such a fashion could in turn promote healthy professional habits that could boost resilience in the long-term. Teachers who participated in this study did not endorse high levels of stress, nor did they endorse negative manifestations of stress to an elevated degree.

Like years of experience, extant research has yet to provide consistent support for educational setting as a moderating factor in the study of teacher stress. And, akin to years of experience, it does not seem unreasonable to expect that different academic settings pose different types of challenges to teachers, thereby contributing differently to levels of occupational stress. In their research Geving (2007) and Wolters and Daugherty (2007) theorized that a high degree of negative behaviors of students in secondary settings may result in higher levels of stress for teachers in that setting, but ultimately failed to find significant differences across primary and secondary settings. Klassen and Chiu (2010) suggested that the naturally occurring differences such as organizational structure and quality of relationships between teachers and other staff members between elementary and secondary settings could place varying demands on teachers, thereby moderating a teacher's level of work stress. In a different study conducted in 2011, the same authors found that educational setting was a small, but significant contributor within their model of teacher stress, explaining two percent of the variance in teacher stress explained by educational setting. Specifically, they found that Kindergarten teachers who participated in their study were 7% less likely to quit as a function of high stress levels compared to teachers in higher grades. Results from this study were consistent with Klassen and Chiu's 2011 study in that educational setting contributed minimally to teacher stress. Further, participants from elementary settings reported experiencing more stress than those from secondary settings.

Overall, the results from this study yielded little insight into the relationship between teacher stress and executive functioning. Although supporting research seemed to suggest the connection between these two variables, it is possible that the assessments used to measure stress and EF were not sufficiently sensitive. Or simply that, the teachers

in this sample were not experiencing high levels of stress and therefore, their EF was not impacted.

Implications for Practice

Although findings from this study showed no significant correlation between teacher stress and executive functioning, some inferences can be generated regarding implications relevant to teaching practice. The theory of EF and stress suggests that the relationship between the two constructs exists as an inverted U-shaped curve, such that very low levels of stress and very high levels of stress are associated with poor EF, but moderate levels of stress are associated with higher levels of EF. Findings from this study show that the mean level of teacher stress for the entire sample was in the mild to moderate range and overall EF performance was also in the average range, thus indicating that the overall level of stress reported by the sample was manageable and had not yet reached the point where it would begin to show deleterious effects on EF. It is possible that the moderate levels of stress reported by the participants aided the deployment of EF processes in ways that benefited their performance.

The contrast between reports of teacher stress in literature and the minimal levels of stress in this study were puzzling. Many studies have been conducted in large urban areas and it is possible that the more suburban districts represented in this study may have represented less stressful settings. However, the rate of Free and Reduced lunch across the districts in this study ranged from approximately 26% - 80%. Also, the rate of teacher turnover in these districts was notable with most of the participating districts experiencing approximately 20% teacher turnover, which is higher than the state average of 17%. These ancillary data suggest that teachers in this study worked in conditions that were likely to present a high degree of occupational stressors, but their reported levels of

stress did not align with such external factors. It is possible that the teachers who had experienced the highest levels of stress had simply left the field. Those who remained either experience less stress or were able to find ways to manage their stress.

Based on the broader studies suggesting teacher stress, more so than what was found in this study, the teaching field must also consider the implications relevant to the physical and mental wellbeing of the teaching population. Interventions designed to reduce stress and/or increase teachers' abilities to handle occupational stress are important components of the overall issue of teacher stress, especially within the context of executive functioning. School psychologists and other health providers in the school (e.g., school counselor or social worker, school nurse, or physical education teachers) might work together to create programming around stress management and offer workshops on the negative effects of stress, mindfulness, and self-care.

Recently, two articles have been published on mindfulness and teacher stress. Roeser et al. (2013) studied the impact of a mindfulness training intervention on levels of stress and burnout among elementary and secondary teachers in the United States and Canada. All participants (N = 113) completed baseline measurements of stress and burnout and were then randomly assigned to a treatment or waitlist-control group. The treatment group received a total of 36 hours of mindfulness training spread out over 11 sessions during an 8-week period. The intervention aimed to build skills relevant to reducing stress and enhancing resilience to improve teaching outcomes. Participants in the treatment group were taught to monitor and recognize their internal reactions to stressors and cope by stepping away from such situations before responding. Results immediately following the completion of the intervention and from a three-month follow-up suggested greater mindfulness capacity and improvements in focused attention,

working memory, and occupational self-compassion among teachers who received the intervention compared to their peers in the control group. Treatment-group participants also reported lower levels of occupational stress and burnout.

Another study by Harris, Jennings, Katz, Abenavoli, and Greenberg (2016) studied the effect of the Community Approach to Learning Mindfully (CALM) – a daily, school-based intervention aimed at improving stress management skills, socioemotional competencies, and overall wellbeing among educators – on a sample (N = 64) of teachers and paraprofessionals from two middle schools in the United States. After providing baseline readings of blood pressure, cortisol levels, and self-reports of socioemotional functioning and wellbeing, the sample was randomly assigned to treatment and waitlist-control groups. The treatment group participated in the CALM program which consisted of yoga sessions and mindfulness training, offered 4 days a week over 16 weeks. Results of pre-post data analyses suggested improvements in mindfulness, positive affect, and physiological markers (blood pressure and cortisol) among treatment-group participants compared to their control group peers. Furthermore, the authors of the study reported that participants found the intervention to be feasible and beneficial for stress reduction and fostering wellbeing.

The conceptual framework of both studies specifically mention the role of executive functioning in the appraisal and coping processes associated with stress and the impact of high levels of stress on EF related processes such as self-regulation, emotional regulation, and attention. Roeser et al. (2013) mentioned the growing understanding of the relationship between EF and stress and its impact on children's health and extending that knowledge to how the same constructs affect teachers. The fact that teaching is an

attention-intensive job with a high degree of uncertainty that places great socioemotional demands on teachers. The job requires teachers to make hundreds of decisions daily – a requirement that is inherently stressful. The authors consider it essential to strengthen EF given its vulnerability to stress. This combination of teachers' essential job functions, the stress that accompanies them, and the overall role of EF in modulating performance serves as the rationale for instituting programs and strategies aimed at reducing levels of stress within the teaching population. Similarly, Harris et al. (2016) promoted the importance of contemplative interventions such as mindfulness training as they have been shown to improve regulation of attention, emotions, and other EF-related processes. The positive results from both studies suggest that interventions related to stress management hold promise for improving teachers' well-being and are feasible for implementation in the workplace.

Limitations

This study had several limitations. First, the sample used in this study displayed more homogeneity than originally expected. The average TSS score reported in this sample was close to the quantitative mean rating for the TSI, i.e. the mean stress rating provided by all 62 teachers who participated in the study fell within what would be considered average range for this instrument. Although participants were recruited from eight different schools with varying levels of SES – ranging from 26% to 80% of students receiving free and reduced lunch - the fact that all schools were in primarily suburban areas of the Rocky Mountain Region may have resulted in less variation in the reported levels of teacher stress than expected. Plus, the overall SES level of the schools did not appear to directly influence the average level of teacher stress reported by participants from those schools. In fact, in some cases the mean TSS score from schools with

relatively higher SES was greater than the mean score reported by teachers from schools with relatively lower SES. It is possible that the shared characteristic of being located in primarily suburban, middle class locales produced less variation than originally expected, thus producing a relatively homogenous profile of reported stress in this sample.

Second, issues pertaining to the instruments used to collect data and logistical concerns associated with data collection were also identified as limitations. The TSI, although a widely used instrument in the study of teacher stress, was originally developed decades ago and has not been re-normed or updated since. The two EF subtests of the NIH Toolbox were not as highly correlated as expected, thus creating the need to use two smaller measures of EF rather than one global one. Prior research studies that utilized the DCCS and Flanker subtests of the NIH Toolbox demonstrated a high degree of positive correlation between the two subtests ($r = 0.71$), but results from this study indicated a weak positive correlation ($r = 0.37$), thereby raising concerns about the degree to which the information from these subtests aligned with the constructs they were expected to measure.

Logistical concerns associated with data collection also added to the limitations of the study. To reduce time-related burdens of participation in the study, the stress and EF measures were administered in different formats. The TSI was administered in a paper-pencil format, but the EF measures were administered via iPad. Teachers may have underreported their levels of stress as the researcher was in the room as they were completing this survey. If all instruments were administered in the same format (on the iPad) it might have increased the sense of anonymity in their responding.

Implications for Future Research

The stressful nature of the teaching profession and the established links between high levels of stress and effects on EF suggest the need for continued investigation of the relationship between these constructs in the teaching population. First, recruiting participants from multiple settings such as urban, suburban, and rural school districts who serve students from varying SES backgrounds would result in a more heterogeneous sample. Second, future studies would benefit from utilizing longitudinal research designs that allow for multiple measurements of stress and EF over time. Given the dynamic nature of the K-12 school environment, teachers' levels of stress are likely to fluctuate over the course of the school year and multiple data points of stress and EF over time for each participant would help to elucidate the course of stress and EF in teachers as they navigate the natural variations in their job duties. Third, the nebulous nature of both constructs suggests the need for utilization of instruments that can measure stress and EF with greater sensitivity. Consistency in data collection procedures, i.e. all data gathered using the same mode of input (paper-pencil or electronic), data collected at similar points in the day (morning or afternoon), etc., would likely reduce threats to validity and allow researchers to interpret data with greater confidence.

Finally, given that the relationship between EF and stress is represented by an inverted U-shaped curve, data from teachers who report mild to moderate levels of stress is likely to be associated with concurrent improvement in EF abilities, thereby presenting challenges in uncovering a meaningful relationship between the two constructs in this population. Data from this group of teachers is clearly of importance and should be included in future studies, however, focusing efforts on studying the population of

teachers who endorse high to very high levels of occupational stress may prove more valuable as they are more likely to also experience lowered EF functioning and are at greater risk for experiencing negative personal and professional outcomes.

Conclusion

Teaching is widely acknowledged as being a highly stressful profession. A large percentage of new teachers leave the field within the first five years of their career, prompting concerns about the high rates of attrition and turnover that plagues the field today. High levels of teacher stress have been associated with job dissatisfaction, poor physical and mental health, and several other negative outcomes. However, not all teachers experience the same outcomes in the face of high levels of stress. EF has been shown to act as an influential factor in lessening or worsening levels of stress and has recently been included in the study of teacher stress.

This study aimed to understand the general relationship between teacher stress and EF and attempted to understand the moderating influence of teachers' years of experience and the educational setting on the relationship between teacher stress and EF. Unfortunately, the findings did not demonstrate a statistically significant correlation between EF and stress in this sample, nor was it moderated by years of experience. Educational setting was found to have some moderating influence on teacher stress in this study as elementary teachers endorsed higher levels of stress than their peers who taught in secondary settings. Although original hypotheses were not satisfied, the findings from this study hold implications for current teaching practice and can inform future research around teacher stress and EF. Theoretical links between EF and stress suggest that EF can serve as a resilience or a risk factor in terms of the amount of stress experienced by individuals. Teaching is a highly stressful profession and the teachers' daily duties

require high EF usage. As both stress and EF appear to be heavily involved in a teacher's occupational functioning and can significantly impact professional success, the role of EF in teacher stress is worthy of further inquiry.

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APPENDIX A

INFORMED CONSENT FORM

UNIVERSITY *of*
NORTHERN COLORADO

CONSENT FORM FOR HUMAN PARTICIPANTS IN RESEARCH

UNIVERSITY OF NORTHERN COLORADO

Project Title: Teachers' Executive Functioning Abilities and Levels of Occupational
Stress

Researcher:	Niraj M. Patrawala, B.A.,
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Purpose and Description

The primary purpose of this study is to investigate whether a relationship exists between
teachers' levels of occupational concerns and their executive functioning abilities.
Executive functioning is an umbrella term used to describe a set of mental abilities
required for goal-directed, problem-solving behaviors. Additionally, this study aims to
determine whether the relationship between executive functioning and occupational
concerns varies among teachers depending on years of teaching experience and the
educational setting in which they teach, i.e. elementary school vs. secondary school
settings.

You will be asked to complete one questionnaire about your perceived level of
occupational concerns, and participate in two neuropsychological tasks used to measure
different types of higher-order cognitive abilities, also referred to as executive
functioning abilities. Generally speaking, neuropsychological assessment refers to tasks
and practices utilized by psychologists to understand brain-behavior relationships across
various domains of functioning. The specific nature and scope of each
neuropsychological instrument varies, and depending on the task, the examinee may be
asked to demonstrate different abilities by answering questions either verbally or
nonverbally, or by performing different tasks of varying complexity based on a set of
instructions provided by the examiner. The questionnaire, provided in pen and paper
format, consists of 49 items pertaining to different aspects of work-related concerns
experienced by teachers. You will be asked to indicate the degree to which you agree or

disagree with each statement. The questionnaire is followed by additional questions about your age, number of years of experience as a teacher, the educational setting in which you teach, and other information relevant to the study. The neuropsychological tasks will be administered using an iPad. Each task will present specific instructions that require you to harness different mental abilities such as impulse control, mental flexibility, etc., to successfully complete the activity.

Altogether, participation in this study is expected to take approximately 15-30 minutes of your time. Data will be collected outside of school hours in a one-on-one setting that is quiet and free from distractions. Every attempt will be made to collect all data during the initial session, thereby negating the need for additional meetings.

Confidentiality

Your participation in this study is strictly voluntary. You may choose to discontinue at any time, without risk of penalty. Every precaution will be taken to protect your identity throughout the duration of the study as well as after the study is concluded. Personally identifiable information such as your name will be stored and only used to contact you in the event of missing or corrupted data. For all other purposes, your name will be replaced with a personal identification number. Access to your personal information will be restricted to the researcher, the research advisor, and the research assistants involved in the study. In addition, all questionnaires will be stored in a locked file cabinet in a secure room, and assessment data will be stored electronically on a password protected iPad that can be accessed only by the researcher or assistants involved in the project. Once the electronic documents and files are no longer needed, they will be permanently deleted from the external memory device. All hard copies of consent forms will be stored in a locked cabinet in a secure location on the UNC campus for three years following the completion of the research study. After three years, all documents will be destroyed. During the three year period, access to these documents will be restricted to the researcher, research advisor, a representative of the Institutional Review Board (IRB), the UNC IRB Administrator, and authorized federal officials.

Risks and Benefits of Participation

Participation in this study poses no greater risks than those normally encountered during participation in similar professional or personal activities. While you may experience increased heart rate, increased focus, feelings of excitement, or other forms of mental or physical arousal during participation in neuropsychological assessment, such feelings are expected to be similar to effects associated with watching horror movies, playing video games, or engaging in other stimulating, but low-risk activities. Participation in this study may not be directly beneficial to you; however, your contributions may prove beneficial for future research about the relationship between teachers' occupational concerns and executive functioning abilities. Upon completion, you will be given the option to enter a raffle drawing for one of three $50 gift cards. Participants' personal identification numbers will be randomly selected from a pool of qualifying entries and the three winners will be notified after conclusion of the data collection phase of the study. This

research study is a stand-alone project and will not be followed by further requests for participation.

Participation is voluntary. You may decide not to participate in this study and if you begin participation you may still decide to stop and withdraw at any time. Your decision will be respected and will not result in loss of benefits to which you are otherwise entitled. Having read the above and having had an opportunity to ask any questions, please sign below if you would like to participate in this research. A copy of this form will be given to you to retain for future reference. If you have any concerns about your selection or treatment as a research participant, please contact Sherry May, IRB Administrator, Office of Sponsored Programs, 25 Kepner Hall, University of Northern Colorado Greeley, CO 80639; 970-351-1910.

_____

Participant's Signature   Date

_____

Researcher's Signature   Date

APPENDIX B

INSTITUTIONAL REVIEW BOARD
APPROVAL

DATE: May 4, 2016

TO: Niraj Patrawala, B.A.

FROM: University of Northern Colorado (UNCO) IRB

PROJECT TITLE: [854168-2] Teachers' Executive Functioning Abilities and Levels of Occupational Stress

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: May 4, 2016

EXPIRATION DATE: May 4, 2017

REVIEW TYPE: Expedited Review

Thank you for your submission of Amendment/Modification materials for this project. The University of Northern Colorado (UNCO) IRB has APPROVED your submission. All research must be conducted in accordance with this approved submission. This submission has received Expedited Review based on applicable federal regulations.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. All NON-

COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of May 4, 2017.

Please note that all research records must be retained for a minimum of three years after the completion of the project. If you have any questions, please contact Sherry May at 970-351-1910 or Sherry.May@unco.edu. Please include your project title and reference number in all correspondence with this committee. Niraj -

Thank you for your patience with the IRB process. Dr. Helm, the first reviewer, provided approval based on the amendments and modifications submitted. I, subsequently, reviewed your original and revised materials and am also providing approval. Please be sure to add a space at the bottom of each page of the consent form prior to the signature page for participants to initial (e.g., Page 1 of 3_____please initial) before using these materials in your participant recruitment and data collection. Best wishes with this very interesting and worthwhile dissertation research. Sincerely,

Dr. Megan Stellino, UNC IRB Co-Chair

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Northern Colorado (UNCO) IRB's records.

APPENDIX C

TEACHER STRESS INVENTORY
(PARTICIPANT VERSION)

TEACHER CONCERNS INVENTORY

The following are a number teacher concerns. Please identify those factors which cause issues in your present position. Read each statement carefully and decide if you ever feel this way about your job. Then, indicate how strong the feeling is when you experience it by circling the appropriate rating on the 5-point scale. If you have not experienced this feeling, or if the item is inappropriate for your position, circle number 1 (no strength; not noticeable). The rating scale is shown at the top of each page.

Examples:

I feel insufficiently prepared for my job.   1   2   3   4   5

If you feel very strongly that you are insufficiently prepared for your job, you would circle number 5.

I feel that if I step back in either effort or commitment,
I may be seen as less competent.   1   2   3   4   5

If you never feel this way, and the feeling does not have noticeable strength, you would circle number 1.

HOW STRONG?	1 No strength; Not noticeable	2 Mild strength; barely noticeable	3 Medium strength; moderately noticeable	4 Great strength; very noticeable	5 Major strength; extremely noticeable
1.I easily over-commit myself.	1	2	3	4	5
2.I become impatient if others do things too slowly.	1	2	3	4	5
3.I have to try doing more than one thing at a time.	1	2	3	4	5
4.I have little time to relax/enjoy the time of day.	1	2	3	4	5
5.I think about unrelated matters during conversations.	1	2	3	4	5
6.I feel uncomfortable wasting time.	1	2	3	4	5
7.There isn't enough time to get things done.	1	2	3	4	5
8.I rush in my speech.	1	2	3	4	5
9.There is little time to prepare for my lessons/ responsibilities.	1	2	3	4	5
10. There is too much work to do.	1	2	3	4	5
11. The pace of the school day is too fast.	1	2	3	4	5
12. My caseload/class is too big.	1	2	3	4	5
13. My personal priorities are being shortchanged due to time demands.	1	2	3	4	5

HOW STRONG?	1 No strength; not noticeable	2 Mild strength; barely noticeable	3 Medium strength; moderately noticeable	4 Great strength; very noticeable	5 Major strength; extremely noticeable

14. There is too much administrative paperwork in
 my job.   1   2   3   4   5

15. I lack promotion and/or advancement opportunities.   1   2   3   4   5
16. I am not progressing my job as rapidly as I would like.   1   2   3   4   5
17. I need more status and respect on my job.   1   2   3   4   5
18. I receive an inadequate salary for the work I do.   1   2   3   4   5
19. I lack recognition for the extra work
 and/or good teaching I do.   1   2   3   4   5

I feel frustrated...

20. ...because of discipline problems in my classroom.   1   2   3   4   5
21. ...having to monitor pupil behavior.   1   2   3   4   5
22. ...because some students would better if they tried.   1   2   3   4   5
23. ...attempting to teach students who are poorly motivated.   1   2   3   4   5
24. ...because of inadequate/poorly defined discipline
 problems.   1   2   3   4   5
25. ...when my authority is rejected by pupils/
 administration.   1   2   3   4   5
26. My personal opinions are not sufficiently aired.   1   2   3   4   5
27. I lack control over decisions made about
 classroom/school matters.   1   2   3   4   5
28. I am not emotionally/intellectually stimulated on
 the job.   1   2   3   4   5
29. I lack opportunities for professional improvement.   1   2   3   4   5

I respond to stress...

30. ...by feeling insecure.   1   2   3   4   5
31. ...by feeling vulnerable.   1   2   3   4   5
32. ...by feeling unable to cope.   1   2   3   4   5
33. ...by feeling depressed.   1   2   3   4   5
34. ...by feeling anxious.   1   2   3   4   5

35. ...by sleeping more than usual.   1   2   3   4   5
36. ...by procrastinating.   1   2   3   4   5
37. ...by becoming fatigued in a very short time.   1   2   3   4   5

HOW STRONG?	1 No strength; not noticeable	2 Mild strength; barely noticeable	3 Medium strength; moderately noticeable	4 Great strength; very noticeable	5 Major strength; extremely noticeable

38. ...with physical exhaustion.   1   2   3   4   5
39. ...with physical weakness.   1   2   3   4   5

I respond to stress…
40. ...with feelings of increased blood pressure.   1   2   3   4   5
41. ...with feeling of heart pounding or racing.   1   2   3   4   5
42. ...with rapid and/or shallow breath.   1   2   3   4   5
43. ...with stomach pain of extended duration.   1   2   3   4   5
44. ...with stomach cramps.   1   2   3   4   5
45. ...with stomach acid.   1   2   3   4   5

46. ...by using over-the-counter drugs.   1   2   3   4   5
47. ...by using prescription drugs.   1   2   3   4   5
48. ...by using alcohol.   1   2   3   4   5
49. ...by calling in sick.   1   2   3   4   5

Please answer the following questions.

a) Gender: Male   Female

b) Age: _____ years

c) Years of professional teaching experience (do not include current year): _____ years

d) Number of students in your classroom: _____ students

e) What grade level best describes your current teaching responsibilities?
     Elementary   Secondary

f) Please rate your current level of external (non-work related) concerns or difficulties (e.g. serious difficulties related to health, finances, relationships, etc).

_____

1
(Minor, i.e. daily hassles)

5
((Severe, i.e. death of a loa loved one, divorce, etc.)