ABSTRACT

Title of Dissertation:	COPING AS A MEDIATOR OF THE RELATIONSHIP BETWEEN STRESS REACTIVITY AND TEACHING OUTCOMES
	Margaret Jordan Kim, Doctor of Philosophy, 2019
Dissertation directed by:	Professor Hedwig Teglasi, Department of Counseling, Higher Education, and Special Education

To understand the origins of burnout in early-career teachers, the current study proposed that individual differences in stress reactivity and coping effectiveness would contribute to end-of-year teaching outcomes for student teachers in their final teaching placements as interns. Stress reactivity is a biologically-based individual difference that influences the intensity and duration of an individual stress response, while coping is the process through which external and internal stressors are addressed. Patterns of coping behavior and stress reactivity are often linked in research, as reactivity is thought to influence the intensity of stress, and thus also the emotional experiences with which individuals must cope. A preponderance of research investigates specific coping strategies and this study instead focuses on coping effectiveness in the face of negative emotions and challenging conditions.

Two distinct mediation models were proposed. The first model hypothesized that stress reactivity would influence teaching self-efficacy indirectly through self-rated coping efficacy, and results revealed a significant negative indirect effect. This suggests that stress reactivity negatively influences one's perceptions of their ability to cope with their emotions, which in turn has a negative influence on perceptions of teaching self-efficacy. The second model predicted that stress reactivity would influence evaluations of student teacher performance, through performance measures of coping effectiveness. Mediation analysis did not reveal a significant indirect effect, but did reveal a significant positive pathway from performance coping to supervisor evaluations of student teachers.

A significant positive correlation between stress reactivity and performance coping was also identified and stands in contrast to the *negative* correlation between stress reactivity and self-rated coping efficacy. The unique direction of association across methods of measurement underlines the idea that performance and self-rated measures capture distinct facets of a construct, and that multiple approaches to measurement are crucial for a full understanding of functioning under stress. Results from the performance model open the door for continued investigation of alternate methods for understanding and assessing individual differences in coping. Implications of the findings for literature on stress reactivity, coping, and teacher stress and burnout are discussed.

COPING EFFECTIVENESS AS A MEDIATOR OF THE RELATIONSHIP BETWEEN STRESS REACTIVITY AND TEACHING OUTCOMES

by

Margaret Jordan Kim

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Advisory Committee:
Professor Hedwig Teglasi, Ph.D., Chair
Professor Jeffery Harring, Ph.D.
Professor MaryAnn Hoffman, Ph.D.
Professor Emeritus William Strein, Ph.D.
Professor Margaret Polizos Peterson, Ph.D.

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My time in graduate school can be measured in hand written to-do lists. I have consistently and repeatedly managed my largest projects and busiest times by putting pen to paper and breaking my academic life down into discrete steps and specific tasks. After crossing out the last item on my list during finals of my *first* semester as a graduate student, I put the list on the fridge, satisfied that I had survived.

As I finish my final semester, the realization that I am on my last round of lists is a strange one. One of the final items on my list is to write this page of Acknowledgements for my dissertation. Compared to many of the other things I have done since entering graduate school, it is small task to cross off my list. However, it feels large to me. Although my career as a graduate student can be broken down into a list of tasks that I have completed, the list of people who have helped me get to this point is more impressive, and I am grateful for the space to thank a few of them.

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Chapter 1: Introduction

Teacher burnout and attrition are major problems for schools in the United States. Not only are school systems challenged by the practical and financial burdens of frequently replacing teachers who quit due to stress (Ingersoll & Strong, 2011), research suggests that high levels of teacher stress are associated with lower quality instruction and more punitive behavior management practices (Reinke, Herman, Stormont, Newcomer, & David, 2013). Although a significant body of literature examines this subject through the lens of teacher burnout – stress and demoralization that occur over time – the current study attempts to understand the origins of teacher stress by examining the experience of *student* teachers. Because student teachers are entering the profession, burnout is not an appropriate construct for understanding the novel challenges they face as they lead a classroom for the first time. Instead, the current study focuses on the individual differences in student teachers' stress reactivity and coping in the face of the novel challenges in the classroom. Coping is considered a relevant construct in relation to burnout, as multiple studies have examined burnout and coping together to predict and evaluate teacher functioning (Chang, 2013; Herman, Hickmon-Rosa, & Reinke, 2018).

Understanding how people cope is crucial for explaining individual differences in functioning under challenging conditions, like those faced by student teachers in the classroom. A significant and broad body of literature is dedicated to examining individual differences in coping, focused on the behaviors and strategies individuals use to cope and the associated outcomes. Although the body of research

conducted in this way is robust, the current study proposes a shift in focus, centered around an integrated understanding of coping *effectiveness* and the *fit* between strategies and problems, rather than specific coping behaviors. As a key aspect of this conceptualization, the current study argues that coping cannot be examined as a construct in isolation and suggests that it must be studied jointly with individual differences in stress reactivity, a biologically based individual difference that impacts the subjective experience of stress.

Stress reactivity is connected to coping in two ways. First, stress reactivity is thought to result in negative internal experiences (e.g. cognitions, emotions) that become a target of coping efforts. Second, stress reactivity influences and shapes the coping process through unique patterns of experiencing and identifying contexts as stressful (the process of appraisal), and by requiring that certain kinds of coping behaviors be used to manage the emotional responses individuals experience. The idea that coping and stress reactivity are closely related is not new. Compas and colleagues (2001a) noted that individual differences in coping and stress reactivity are connected and should be considered together to form a more complete understanding of individual differences in functioning under stress.

The current study proposed a novel model to explain the relationship among stress reactivity, the effectiveness of coping efforts, and outcomes for student teachers. The model accounts for the impact of stress reactivity on the coping process, and the impact of stress reactivity on individual functioning through coping efforts. It was hypothesized that one's coping effectiveness would act as a mediator between stress reactivity and effectiveness as a teacher. The current section outlines the

constructs and relationships within the proposed model before transitioning to a comprehensive review of relevant literature.

Coping Defined.

In research, coping is most frequently defined as "constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984). This definition is widely cited and agreed upon within coping literature. Importantly, Lazarus and Folkman (1984) defined coping as a transactional process between a person and a situation they perceive to be stressful – that is – within their conceptualization, coping is not merely behaviors in isolation. Instead, the definition itself includes the situation, appraisal or interpretation of that situation, resulting behaviors, and then repetition of the process as individual actions change and shape the unfolding stressful encounter.

Lazarus and Folkman's definition suggests that coping is closely related to context, and the specific situations to which individuals respond. The majority of coping research focuses on what strategies individuals use to manage and respond to these external situations – coping with a specific context or problem (e.g. a test, chronic illness, an argument) and associates coping behaviors with outcomes. Although understanding what strategies are effective in the face of specific problems can be useful, the current study investigates how student teachers cope with the many daily demands of teaching, a context that presents a broad range of problems and challenges that do not have a universal or consistent coping strategy as a solution. For

this reason, the effectiveness of coping and individual perceptions of coping efficacy are the focus of the current study.

Furthermore**,** the definition of coping highlights that alongside external problems, individuals must also cope with *internal demands* (Lazarus and Folkman, 1984), which suggests that an exclusive focus on the external problems excludes the internal experiences with which an individual must cope. Internal demands include one's emotional and cognitive reactions to stressful contexts, the subjective internal experience of stress in response to challenging situations (Lazarus & Folkman, 1984). For some, internal demands might be addressed when the individual copes with the external or situational facets of a problem. That is, they are able address negative emotions by addressing the external elicitor of the emotions. However, for others, internal demands may represent a more significant problem that requires distinct and focused coping efforts *before* the external problem can be addressed. For example, if an individual is experiencing a significant emotional response to a challenge in the classroom, it may be necessary for the individual to manage their emotions before they can appropriately mange the specific problem with which they are faced in the classroom.

The importance of a teacher's ability to cope with the internal experience is discussed by Jennings and Greenburg (2013), who noted that managing emotions may be simultaneously challenging and critical for teachers, as they are the regulators of the classroom environment and they are charged with the continuous supervision of children. This role means that they cannot "walk it off" or "take a break" if feeling overwhelmed as individuals in other professions might be able to do. For student

teachers on internship, who find themselves alone in a classroom for the first time, their ability to cope with their own reactions may be that much more important. They must be able to cope with their internal reactions to the inevitable and repeated trial-*and-error* involved in developing their skills as a teacher.

The fact that individuals must cope with both external problems and internal emotional states is evident within research that examines and categorizes coping behavior. The literature posits two styles of coping: emotion focused coping and problem focused coping. Emotion focused coping strategies are those that target negative emotions or cognitions, while problem focused strategies are those that address the external situation directly (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). Based on the associations between each style of coping and outcomes, problem focused coping is often considered adaptive, while emotion focused coping is identified as problematic. However, more recent research suggests that regardless of the strategies used, effective coping not only includes how one addresses the external situation, but also how well they are able to address their own negative internal states (Lazarus, 2006).

The current study focuses on the effectiveness with which individuals cope, with an emphasis on how effectively they manage the *internal demands* associated with challenge. The effectiveness of coping is assessed through both self-ratings and performance measures, and the current study examines the contribution of both measures to outcomes in teaching. However, given the current study's focus on the effectiveness with which individuals cope with internal demands (emotions) as they teach, it follows that the current study must also examine individual differences in the

internal demands themselves. The following section proposes that stress reactivity represents an internal demand with which individuals must cope, and an important piece of the current study's model predicting outcomes for student teachers.

Connecting Coping and Stress Reactivity

As described above, the current study is centered around the widely accepted definition of coping that characterizes it as a process, and that highlights that individuals must cope with both internal and external sources of stress. It is through the internal demands outlined in Lazarus and Folkman's definition that coping is tied to individual differences in stress reactivity. Stress reactivity is defined as biologically based individual differences in the intensity, duration, and recovery of a stress response. The underlying process of reactivity is biological and exists outside individual awareness, but results in differences in the subjective, lived experience of stress, and these differences can be thought of as an internal factor with which an individual must cope during stressful times. That is, individuals who are more temperamentally reactive tend to experience a greater intensity and duration of their stress responses, which become an internal demand with which individuals must cope.

Given that stress reactivity represents an internal demand with which individuals must cope, those who are highly reactive must not only cope with external contextual problems as they arise, but with high levels of their own emotionality. Researchers have suggested that the most effective coping includes both emotion-focused and problem focused strategies, that is, one must utilize both forms of coping to effectively and completely cope (Lazarus, 2006). In his work on temperament,

Strelau (2008) highlights that those who are most reactive must engage in "auxiliary" behaviors when working toward a goal – specifically, extra actions that serve a regulatory function *alongside* those that are goal directed. For example, if a teacher is planning and teaching a lesson, she must engage in a variety of behaviors to achieve that goal. She must plan the lesson on paper, assemble and create necessary worksheets and materials, execute the lesson with students, and manage the behavior of students who might not follow directions.

However, Strelau's theory argues that a more reactive teacher would have to engage in other behaviors, on top of those listed above, to regulate her emotions. A reactive teacher might have to plan to take breaks because the act of lesson planning was overwhelming and created feelings of apprehension about an upcoming lesson. Furthermore, a reactive teacher might have to take extra time before the lesson to manage anxiety or fear before presenting the lesson to her students or experience an intense emotional response if the lesson does not go as planned that could impact her functioning for the rest of the day. And, as noted previously, it might be especially difficult for a teacher to find time to do these things when expected to continuously manage the behavior of a classroom full of small children.

Although Strelau was not referring to coping directly when discussing auxiliary and goal directed behaviors, the theory is relevant for current study. Individuals who are more highly reactive must cope with the external problem, *and* with a greater degree of emotionality, and Strelau's characterization of goal-directed and auxiliary behaviors seems parallel to the characterization of emotion-focused and problem-focused within coping literature. This suggest that stress reactivity not only

represents a factor with which people must cope, it also influences the patterns of coping behavior individuals must use to resolve situations effectively.

The close relationship between stress reactivity and one's actions in response to stress raises questions about whether stress reactivity also influences the effectiveness of the coping efforts of those with higher levels of reactivity, since they must engage in a unique combination of coping strategies to cope effectively. That is, if individuals who are more reactive must engage in *more* actions (both auxiliary and goal-directed) to cope or reach a goal, does this impact how effectively they are able to solve the problems with which they are faced? There is a small body of recent research that has examined this topic. Sladek and colleagues (2016) found that high levels of stress reactivity were associated with lower levels of self-reported coping efficacy. Wadsworth and Berger (2006) posit that a high level of stress reactivity limits availability of effortful processing resources that individuals might use for effective coping, which could also limit a person's sense of efficacy in coping overall. The proposed model is based on a review of the research on the relationship between coping effectiveness and stress reactivity, and the relations of both on outcomes.

Stress Reactivity, Coping, and Outcomes

Research on coping and stress reactivity frequently utilizes measures of physical or mental health as outcomes, as indicators of how both coping and stress reactivity contribute to individual functioning. Studies that connect stress reactivity, coping, and symptoms of physical and mental health have consistent and reliable outcomes. Research demonstrates that elevated and blunted levels of stress reactivity are associated with a higher level of negative mental and physical health symptoms

throughout development (Aron & Aron, 1997; Sobolewski, Strelau, & Zawardski, 2001). Problem-focused coping has reliable associations with fewer mental health symptoms, while emotion-focused coping is frequently associated with a greater number of mental health symptoms, and poor physical health outcomes (Folkman, Lazarus, Gruen, & DeLongis, 1986).

Although the findings that connect stress reactivity and coping with physical and mental health are reliable, there are limitations to the exclusive use of these measures to understand the impact of coping and stress reactivity. First, physical and mental health outcomes are distal outcomes, associated with broad adaptive patterns of functioning (see Skinner & Zimmer-Gembeck, 2007) that are *not* specific to the challenging contexts and problems with which people are faced. Second, although they provide important insights into individual functioning, self-report measures are overrepresented in coping research methodology. Based on a comprehensive review of coping literature Compas and colleagues (2017) posited that the biggest limitation in current coping research is that both coping and associated outcomes are assessed through self-report, that research almost exclusively examines associations between self-report measures of varying constructs. Compas and colleagues (2017) recognized that coping research must utilize novel approaches for both coping and outcomes to fully understand the implications of coping using one kind of strategy versus another. Although not discussed by Compas, the same limitation exists within stress reactivity research, which relies heavily on self-rated measures of mental health symptoms as study outcomes.

The Current Study

The current study shifts focus from the distal mental and physical health outcomes to ones that are specific to the study's participants' experience: teaching self-efficacy and supervisor evaluations of performance in the classroom during participants' intern year. A model proposed by Jennings and Greenburg (2013) suggests that appropriate emotion understanding and emotion management (i.e. coping with and managing one's emotions) are crucial for supporting positive outcomes for both teachers and students, so there is precedent for examining coping and stress reactivity as contributors to performance in the classroom.

Given the literature that has been reviewed, it was predicted that stress reactivity would contribute to the functioning of student teachers in the classroom. However, it was not expected that stress reactivity *alone* would account for individual differences in teaching self-efficacy or supervisor evaluations of performance in the classroom. Rather, based on previous research, it was expected that stress reactivity would contribute to individual differences in *coping* effectiveness, by shaping individual differences in 1) the need to cope, and 2) unique behaviors individuals must use to cope, which in turn, would contribute to how effectively individuals manage the demands of the classroom and their overall teaching efficacy.

Although one's coping effectiveness was expected to contribute to both teaching self-efficacy and externally evaluated performance in the classroom, research has demonstrated that performance outcomes (like an external evaluation of teaching effectiveness) and self-rated outcomes are uniquely associated with different kinds of measures (Spangler, 1992). Specifically, research has shown that performance outcomes are associated with performance tasks, while self-rated

outcomes are associated with self-report measures. In contrast to self-rated measures which gather information through individual perceptions of their own functioning, performance measures obtain estimates of the constructs of interest through evaluation by individuals other than the participants, that is – individual levels of coping and teaching effectiveness are evaluated by external raters, rather than through self-ratings. The two meditation models tested in the current study were informed by this research and used both performance and self-report measures of coping effectiveness. The measures were incorporated into broader models that examined the pathways of influence between stress reactivity, coping, and the functioning of student teachers.

The first model (See Figure 1) proposed that self-rated coping competence/effectiveness would mediate the relationship between stress reactivity and self-rated teaching self-efficacy. The structure of the second model (See Figure 2) is similar, but utilized performance measures of coping and supervisor ratings of teaching effectiveness rather than self-rated ones. Within the proposed model, it was expected that performance measures of participants' coping effectiveness would mediate the relationship between reactivity and external evaluations of student teacher performance during their intern year.

Through the two models presented, the current study seeks to provide insights into the contributions of stress reactivity and coping to individual functioning in the context of teaching. First, the proposed models sought to expand the small body of research that connects coping efficacy with stress reactivity. Second, the current study sought to ads to extant research on stress reactivity and coping through the inclusion

of performance measures of coping and teaching outcomes in one of the mediation models. The use of performance measures represents a step away from the exclusive use of self-report measures within coping literature. The addition of performance measures was thought to provide a novel dimension to the field's understanding of coping effectiveness, and its relation to stress reactivity and outcomes.

Finally, instead of following pattern of previous research focused on the contribution of stress reactivity and coping effectiveness on mental or physical health, the current study characterizes the ways stress reactivity and coping contribute to successful functioning within a specific and challenging profession. The context-specific outcome measures used in the current study were selected to provide important insights into the impact of coping and stress reactivity on day-to-day functioning and job performance.

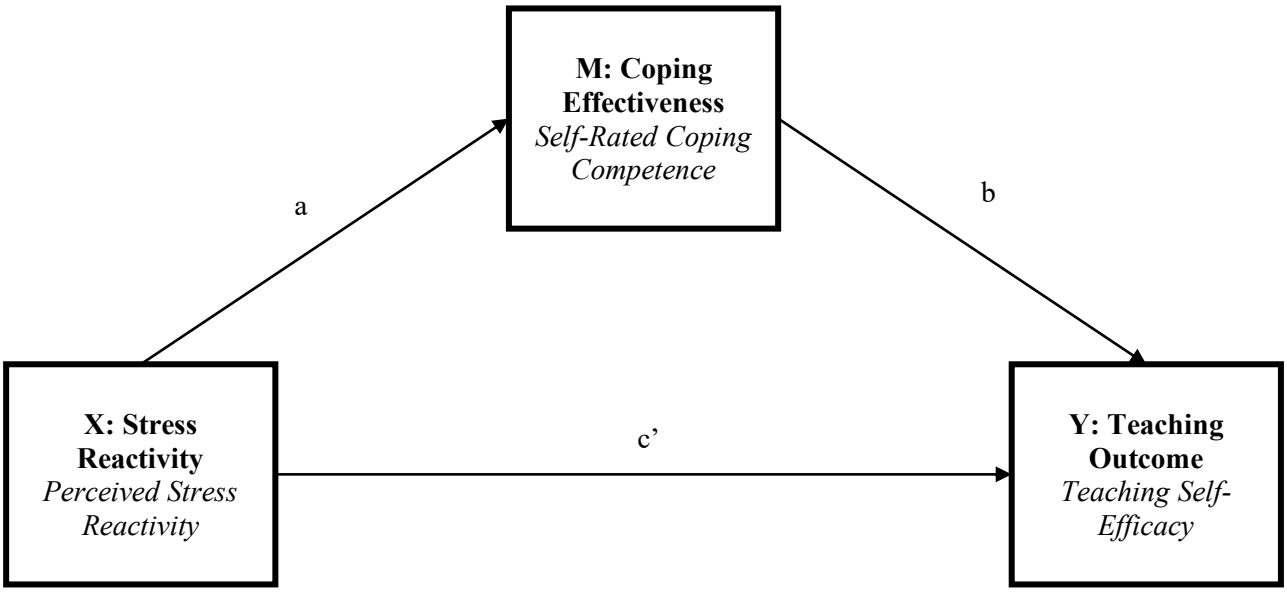

Figure 1. Self-rated mediation model

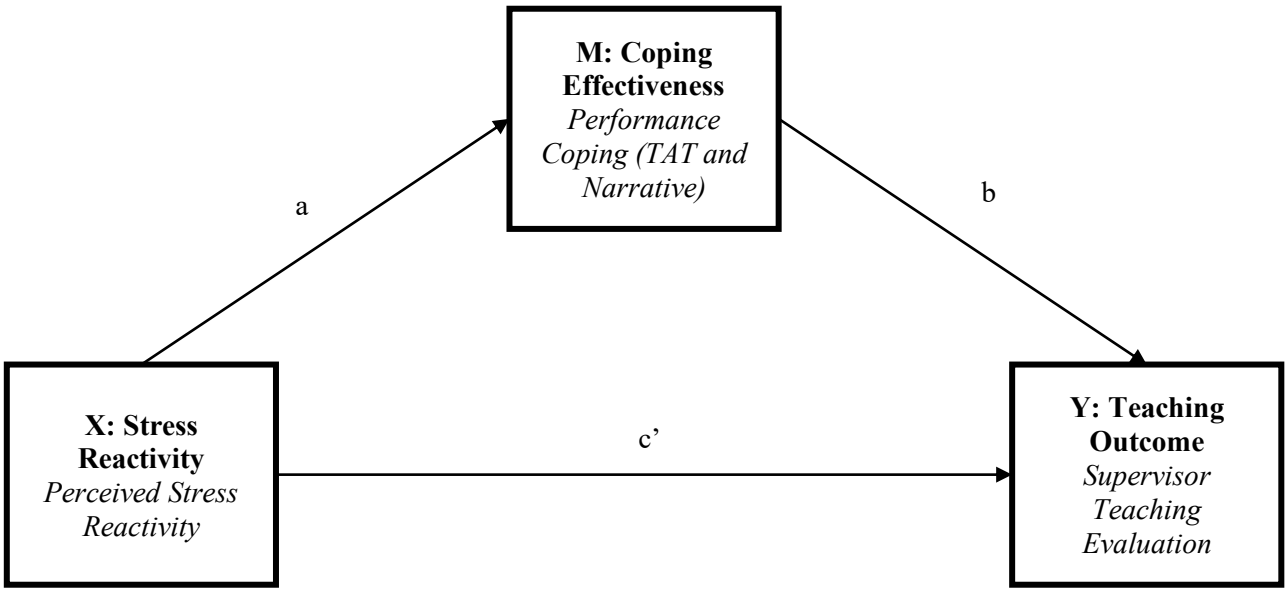

Figure 2. Performance mediation model.

Chapter 2: Review of Relevant Literature

Coping Defined and Deconstructed

In conversation, the word *coping* is often used to describe general functioning under stress. However, the body of psychological research on coping utilizes a more precise and widely agreed upon definition of the construct. This definition characterizes coping as "constantly changing cognitive and behavioral efforts to manage specific external or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984). Although the definition dates back over thirty years, it is widely cited and agreed upon within the coping literature. Compas and colleagues (2017) identified Lazarus and Folkman's definition as one of the most commonly cited definitions of coping in the literature, alongside a definition from Compas et al (2001), which characterizes coping as "conscious and volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances" (89).

Both definitions are complex and reflect the intricacy and nuance that are inherent in how individuals manage the challenges with which they are faced, although it is important to note that Compas (2001) draws a sharper line between the internal experience and the external stressor, deemphasizing appraisal as the link between challenging situations and the need to cope (Compas, 2017). The current study recognizes core elements of both definitions in its characterization of coping, and emphasizes elements from Lazarus and Folkman's (1984) definition of coping

focused on the importance of individual appraisal in how individuals experience and respond to stress.

Lazarus and Folkman's (1984) definition of coping highlights the dynamic and multifaceted nature of coping behavior, the kinds of demands with which individuals cope, and the process of appraisal through which individuals decide they must cope. Perhaps most importantly, this definition highlights that coping is a *process*, that is – coping behavior is one piece of a transaction between an individual and a challenging situation, rather than a behavior that can be examined or understood in isolation.

The definition provided by Compas (2001) defines coping as a regulatory process and explicitly and specifically defines the different elements of experience with which individuals might regulate as they attempt to cope with a stressful situation, including cognitions, emotions, physiology, and the environment. Compas' (2001) mention of physiology is especially relevant for the current study because of its focus on stress reactivity. Stress reactivity, as an individual difference, is rooted in physiological differences, and Compas (2001) highlights that such physiological processes need to be regulated and managed as part of the coping process.

The current section highlights key components of the coping process, honoring elements of both definitions, and emphasizes the importance of fit between strategies and demands for effective coping.

Internal and external demands. Coping is elicited in response to challenge. The widely accepted definition of coping highlights that challenge takes the form of both *external* and *internal* demands (Lazarus & Folkman, 1984). External demands

include the context outside of a person that is appraised as challenging, while internal demands include negative affective and cognitive experiences that must be resolved (Lazarus & Folkman, 1984). Although the definition of coping highlights that individuals must respond to both internal and external challenges, a significant portion of coping research is centered around coping with a specific problem or situation. For example, some research examines the ways individuals manage the challenges of chronic illness (Compas, Jaser, Dunn, & Rodriguez, 2012; Endler, Parker, & Summerfeldt, 1998). Other research has examined the ways individuals cope with the stressors of an interpersonal argument (Folkman & Lazarus, 1988; Folkman, Lazarus, Dunkel-Schetter, et al., 1986), an exam (Abella & Heslin, 1989), or a challenging profession (Chen & Cunradi, 2008; Mortensen, 2014). Although these are all generally agreed upon challenging circumstances, the research is one sided, because it focuses on the context as the sole challenge that must be coped with. The affective responses (the internal demands) are assumed to occur in response to the external challenge or context, and not measured or accounted for specifically as a distinct aspect of the context that must be addressed and that might vary from person to person.

Despite minimal incorporation into research, internal demands represent a major factor with which individuals must cope. Internal demands include individual differences in affective or cognitive responses under stress that are overwhelming or difficult to manage. In his definition of coping, Compas (2001) identified examples of internal factors that must be regulated, including cognitions, emotions, physiology, and behavior. The current study emphasizes the idea that an examination of coping

without an understanding of individual differences in underlying stress responses provides an incomplete picture of the ways in which individuals manage and respond to challenge. For this reason, the current study integrates stress reactivity into its models of coping and teaching outcomes. Stress reactivity is characterized as biologically-based individual differences in the intensity, duration, and recovery of a stress response, and is thought to impact the subjective experience of stress (Fortunato, Gatzke-Kopp, & Ram, 2013). The current study posits that individual differences in stress reactivity represent individual differences in internal demands with which individuals must cope, and so must be considered alongside individual differences in the coping process. Upcoming sections of this review outline relevant research on stress reactivity and its established relations with coping.

Appraisal. Within the coping process, appraisal provides the link between the person and the context. Through appraisal, individuals determine what it at stake, and whether coping must occur (Folkman, Lazarus, Gruen, et al., 1986). That is, the appraisal is the process through which individuals make judgements about whether a situation is overwhelming or stressful. It is through appraisal, that individuals also judge the extent to which they can cope with or manage the situation. Research on emotion regulation highlights that situations in and of themselves are not inherently stressful, but it is through individual appraisal and affective responses that contexts are deemed to be overwhelming or challenging (Gross, 2013). Thus, the specific situations listed in the previous section may be stressful in different ways or to varying degrees for different individuals, depending on unique appraisals and resultant internal experiences.

Appraisal is also closely connected to individual differences in stress reactivity. Those who are highly reactive tend to identify stressful events as *more* stressful and perceive a greater level of threat than those who are less reactive (Tomaka, Blascovich, Kelsey, & Leitten, 1993), which suggests that those who are more reactive are more likely to identify threats (and identify larger threats when they do). Thus, stress reactivity is not only a demand that must be coped with (an idea introduced in the previous section); it influences the ways in which contexts are appraised. Because appraisal is a critical piece of the coping process, it is expected that stress reactivity contributes to the coping process through appraisal as well. Thus, appraisal, as part of the coping process, is linked to stress reactivity, and highlights the close relationship between affective experiences resulting from reactivity and the cognitive interpretations of personal experience.

Coping strategies: emotion and problem focused coping. Although affective responses are not always explicitly characterized as problems in current research, the field has not overlooked the fact that people must cope with their emotional responses. Coping literature incorporates this idea by characterizing coping strategies as *emotion focused* or *problem focused* and describes each as including distinct types of behaviors in response to stress. Problem focused coping includes efforts directed at aspects of the problem outside the individual – elements of the context that must be addressed. In contrast, emotion focused coping includes efforts to address one's internal, emotional responses to challenge.

Research often characterizes the two categories of strategies as opposing, categorically separate from each other. Because problem focused coping attempts to

resolve the "real life" situation, coping theory often identifies it as the more adaptive response to a problem. Research supports this conclusion, as problem focused coping is correlated with positive outcomes like psychological well-being or higher levels of positive affect (Dunkley, Ma, Lee, Preacher, & Zuroff, 2014). Conversely, because emotion focused coping is directed inward and often associated with negative outcomes like burnout and symptoms of mental illness, it is considered less adaptive (Glidden & Natcher, 2009; Shin et al., 2014).

Other, similar patterns of characterizing coping strategies have also emerged, including approach and avoidance coping (Finset, Steine, Haugli, Steen, & LÆrum, 2002) and engagement and disengagement coping (Bettis et al., 2016; Jaser, Champion, Dharamsi, Riesing, & Compas, 2011). Although not directly analogous to emotion and problem focused coping, the different lines of research represent a pattern of labeling coping strategies and using associations with outcomes to label them as adaptive or maladaptive.

Approach vs. avoidance coping. Approach strategies include those that directly address a problem, while avoidance strategies include behaviors associated with distancing one's self (emotionally, cognitively, or physically) from a problem in hopes that it will resolve independently (Finset et al., 2002). There are similarities and parallels that can be drawn between approach/avoidance and emotion/problem focused coping strategies. Approach strategies, in many ways, are consistent with the idea of problem-focused coping – a tendency to deal with problems directly. Avoidance strategies are similarly aligned with emotion-focused coping, as avoidant strategies are seen as a way to reduce one's emotional response to stress. For

example, avoidance might be used to escape the emotional impact of a stressful situation, whereas approach implies that one is actively dealing with a problem. Outcomes associated with approach and avoidant styles of coping also appear to be parallel to emotion focused and problem focused coping. Approach coping has been positively correlated with well-being, while avoidant coping has been correlated with higher levels of psychological distress in pre-service teachers (Gustems-Carnicer & Calderón, 2012). Overall, although distinct from evaluations of problem vs. emotion focused coping, it does not appear that categorizing strategies into patterns of approach or avoidance takes coping theory beyond what has been demonstrated in the emotion/problem focused literature and faces the same limitations as labeling strategies as emotion focused or problem focused.

Engagement vs. disengagement coping. Another body of research categorizes coping strategies into patterns of engagement and disengagement coping styles. The literature that distinguishes between engagement and disengagement coping is more recent and more nuanced than the previously reviewed perspectives for understanding coping behavior. Engagement coping includes two subtypes – primary control and secondary control, both of which include active attempts to resolve the stressful transaction between a person and their environment. Primary control coping includes efforts to change a situation directly, while secondary control coping includes cognitive and behavioral efforts to change oneself to better fit the context (Connor-Smith et al, 2000).

Primary control coping appears to be most consistent with problem-focused perspectives, although forms of engagement coping are thought to be direct pathways

for the resolution of stress and are both therefor similar to problem-focused and approach patterns of coping. Disengagement coping is consistent with avoidant patterns of coping, and includes strategies focused on disconnecting from stressful situations. Both forms of engagement coping are considered adaptive due to correlations with lower levels of depression and anxiety symptoms (Bettis et al., 2016; Jaser et al., 2011), while disengagement is not. Results associated with disengagement coping are inconsistent, as some studies have connected it to negative outcomes, while others have found no correlation with outcomes.

The body of research on engagement and disengagement coping adds more nuance to the body of literature focused on labeling and categorizing coping strategies. Differentiating between primary control engagement coping and secondary control engagement coping recognizes that at times, individuals must actively address their internal states in order to cope with a problem. Furthermore, accentuating the difference between avoidance, and actively addressing one's emotions in a productive way, represents progress in the assessment and conceptualization of coping because it recognizes that there are both productive and unproductive ways to manage and address one's emotions under stress. However, even with such advances, limitations in the measurement and study of coping remain.

Limitations in labeling. Despite consistent results connecting patterns of coping to outcomes, there are limitations to the approaches described above. First, recent research has recognized that both forms of coping are necessary to cope effectively (Lazarus, 2006). Second, the complexity of the early stages of the coping process is lost, and the idea of *fit* between a strategy and a problem is overlooked.

Wadsworth and colleagues (2018) demonstrated that the "regulatory fit" between a person's pattern of coping and the problem or context determined the effectiveness of coping strategies. The study suggested that the fit of coping strategies with a problem is critical for individual adaptation under stress. Given importance of the fit and appropriateness of coping behaviors, the current study shifts focus away from coping strategies to the overall *effectiveness* of coping efforts. That is, the focus is on how effectively individuals are able to address the problems with which they are faced, rather than on what they do to face them, because it is recognized that the same strategies may have different implications for different people and circumstances.

Section conclusion. The current section described the many interrelated elements of the coping process, to highlight the complexity of individual responses to stress and the challenges associated with trying to characterize the ways individuals cope. The current section broke down and highlighted key elements of the widely cited definition of coping provided by Lazarus and Folkman (1984). The idea that individuals must cope with both external and internal problems, and that there must be a match between coping strategies and problems for coping to be effective was emphasized. The current section also highlighted that the majority of current coping research examines coping behavior in response to specific external problems, but that the internal and emotional challenges in these studies remain implicit and undefined. The current study highlighted these details to propose a shift in focus away from the categorization of specific coping behaviors, and to emphasize the importance of coping effectiveness and efficacy, which will be discussed in the upcoming section.

Coping Effectiveness and Efficacy

In the previous section, many elements of the coping definition were outlined, and current research focused on coping strategies was critiqued. The idea of shift in focus to coping effectiveness was introduced, as coping effectiveness captures whether coping efforts are appropriate and successful for an individual. The current section reviews current research on coping effectiveness and efficacy and highlights the importance and relevance of each for the current study.

Coping self-efficacy. Coping self-efficacy reflects a person's belief about how effectively they can cope with challenges and stressful situations. Understanding individual differences in coping efficacy is important, because it provides a window into whether individuals feel they can cope with problems effectively. Although people can possess a global sense of how well they are able to handle stress, a significant portion of the coping self-efficacy research is situation-specific, focused on individual beliefs on how well they can handle a specific kind of challenge or stress, like recovering after a hurricane, firefighting, or nursing (Benight & Bandura, 2004; Benight, Ironson, & Durham, 1999). In these contexts, coping self-efficacy has been positively associated with well-being and positive psychological functioning, and negatively associated with negative thought patterns, avoidance of problems, and self-rated psychological distress. While this approach is important and gives insights into the challenges specific to certain contexts, it overlooks the effectiveness with which individuals feel they can address the internal, emotional challenges that must also be addressed, and how they cope on a day to day basis.

Alongside research focused on context specific coping efficacy, other research examines individual differences in global perceptions of coping self-efficacy and

assesses how well individuals manage the emotional experiences associated with challenge. Chesney and colleagues (2006) presented a broad coping self-efficacy scale that evaluates overall coping efficacy by asking individuals to rate how effectively they can engage in specific kinds of "adaptive: coping behavior to manage problems. Self-ratings of efficacy for *both* problem focused and emotion focused coping, were associated with reduced psychological distress and increased well-being. Although emotion-focused coping is often considered less adaptive, results from the study by Chesney and colleagues (2006) suggested that self-efficacy for managing emotions is associated with positive outcomes. The finding lends support to the idea that that certain coping behaviors in and of themselves aren't adaptive, but it is how (and how effectively) an individual applies them, that contributes to individual differences in functioning.

Another measure, the Coping Competence Questionnaire, shifts focus away from coping behavior altogether, and assesses the extent to which individuals feel they are able to deal with their own emotional and cognitive reactions to stressful events (Schroder & Ollis, 2013). The measure was designed as a measure of resilience to the feelings of helplessness and hopelessness associated with depression. Research suggests that those with a high perceived ability to cope with their negative emotions experience fewer depressive symptoms and a greater sense of overall self-efficacy (Schroder & Ollis, 2013). Furthermore, one of the studies using the CCQ showed that a high perceived ability to cope was negatively correlated with the use of emotion-focused strategies, but unrelated to problem focused ones, which suggests perceptions about one's ability to cope are not necessarily associated with specific

patterns of coping behavior that have been identified as adaptive, like problem focused coping. The current study utilized an adapted version of the Coping Competence Questionnaire, as the effectiveness with which individuals manage and respond to the internal demands associated with stress, and specifically stress experienced by new teachers, is of particular interest.

Performance measures of coping effectiveness. Coping effectiveness does not have to be evaluated through the exclusive use of self-ratings. The fit of coping strategies with the context, and overall coping effectiveness can be assessed through performance measures, which provide a window into the processes through which individuals appraise and respond to challenge. Performance measures are methods of measurement through which constructs of interest are evaluated by individuals other than the participant. Examples of such performance measures include the Thematic Apperception Test (TAT; Morgan & Murray, 1935) and personal narratives through which individuals are expected to describe and resolve conflict. Performance measures provide a "readout" of the way individuals understand, experience, and cope with conflict or challenge. Structured coding systems allow for such insights to be quantified, compared to, and used alongside other more traditional methods for understanding coping.

Teglasi (2010) introduces a three-level coding system for the TAT that quantifies how well individuals cope, regardless of strategy selection, and accounts for both internal and external demands. The focus of the coding system is on whether strategies "match" and address the problems to which they are applied. The approach accounts for unique situations in which approaches usually considered maladaptive

are appropriate and adaptive, as well as the ability to address *both* internal and external sources of stress. Narratives can be coded using the same principles and provide unique insight into how individuals define problems in their own experiences and allow for an examination of the fit between context and coping strategies within participants individual experiences.

Outcomes associated with coping efficacy and effectiveness. Coping self-efficacy has demonstrated positive relations with self-rated psychological wellbeing and adjustment (Chesney et al., 2006) and fewer self-rated negative psychological symptoms (Benight et al., 1999; Schroder, 2004). This research suggests that those who feel as though they are able to cope effectively and appropriately have more positive mental health outcomes than those who do not rate a high ability to cope. The connection is logical, as those who rate themselves as effective copers are able to resolve external problems and manage negative emotions appropriately, which could contribute to positive feelings and reduced negative emotions or cognitions associated with anxiety.

Fewer studies examine the relation between coping efficacy and performance outcomes. One study by Herman and colleagues (2018) found that low levels of coping efficacy in combination with a high level of burnout in teachers was associated with poorer student outcomes than those who reported a higher level of coping efficacy and less burnout. Although the authors were not able to make conclusions regarding causality in the study, the results suggest that individual perceptions of their ability to cope have been connected to real world outcomes for students. However, it is unclear whether low efficacy contributes to poor student

outcomes or whether poor student outcomes contributes to lower levels of efficacy. Furthermore, although teachers were asked "how stressful" they found their job, it was not possible to assess whether the teachers were coping with equally difficult classrooms or contexts, and how their stress reactivity might have impacted their coping. Regardless, the body of literature connecting coping efficacy to broader real-world outcomes (both in teaching and otherwise) is limited and requires further exploration.

Section conclusion. Research on coping strategies evaluates adaptiveness and effectiveness through associations with outcomes. In contrast, the current section highlights that measures of coping efficacy and effectiveness provide an estimate of individuals' perceptions about their ability to cope with the challenges they face or to utilize certain coping strategies. Thus, the effectiveness is coping is not evaluated based on its association with distal outcomes, but instead is evaluated based on a person's experience. This perspective is significant, because ultimately, the goal of the coping process is for the individual to address both internal and external problems. Evaluations of coping efficacy and effectiveness examine coping in a way that is connected to the coping itself, rather than distal mental health outcomes.

Stress Reactivity

The body of literature on coping provides important insights into the ways in which individuals manage and respond to stress. However, without an understanding of the variation in how individuals *experience* stress, research on coping provides an incomplete picture of individual functioning under challenging conditions. To examine and account for individual differences in the experience of stress, the current

study focuses on stress reactivity. Stress reactivity is a biologically based individual difference that influences the subjective experience of stress (Strelau, 2011). The current section provides a brief review of literature focused on stress reactivity and highlights its relevance for the current study before transitioning to a comprehensive review of its relationship with individual differences in coping.

Definitions of stress reactivity. Psychological literature offers multiple definitions of stress reactivity. Literature with a psycho-biological emphasis focuses on the physiological responses associated with stress reactivity and defines the construct as "the deviation of a physiological response parameter from a comparison or control value that results from an individual's stress response to a discrete environmental stimulus" (Boyce et al., 2001). The definition emphasizes the changes in underlying physiological processes as contributors to the experience of stress.

Definitions of stress reactivity found in temperament literature are consistent with those focused on underlying physiological reactions in many ways. Rothbart (2004) defined stress reactivity as "characteristics of the individual's responsivity to changes in stimulation on *multiple levels*, (e.g. behavioral, autonomic, neuroendocrine), and through parameters of latency, rise time, peak intensity, and recovery time of reaction" (2004, p. 82, emphasis added). Rothbart's definition highlights that stress reactivity as a phenomenon is observable across multiple domains of functioning, from the cellular to the behavioral level, which suggests that individuals vary systemically in their responsivity to stress. The definition also highlights the different ways in which stress responses can be quantified: latency, rise time, peak intensity, and the duration and recovery from a reaction.

The Regulative Theory of Temperament (Strelau, 2008) provides a conceptualization of stress reactivity similar to that of Rothbart (2004), as both definitions connect underlying biological processes with individual reactions. Strelau posited that individual differences in reactivity are due to inherent neurobiological mechanisms, and that the mechanisms "determine the intensity of behaviors and reactions to situations" (123). In other words, temperamental differences, including those in stress reactivity, affect the stimulating value of situations themselves. The definition suggests that those who are more reactive experience subjectively greater levels of stress and change in mood than those who are less reactive when faced with the same demands (Goryn & Marszał-wis, 2012).

Schlotz and colleagues (2011) defined the construct of *perceived* stress reactivity as "a disposition that underlies individual differences in physiological and psychological stress responses. It is assumed that perceived stress reactivity is relatively stable over time, across situations and response systems" (81). Like Rothbart's definition, the definition provided by Schlotz (2011) connects multiple levels of functioning in its characterization of stress reactivity, including both the physiological and psychological experiences of stress. Notably, Schlotz and colleagues (2011) described reactivity as a disposition, a general pattern of temperamental responses to stress, and emphasized the importance of the subjective, psychological experience of stress, and its relevance for individual functioning.

Underlying processes. Across the definitions of stress reactivity, there is consistent agreement that these individual differences are rooted in underlying biological or physiological processes. A significant body of literature assesses

changes in physiological responses to gauge an individual's reactivity to stress. This methodology attempts to build understanding of the underlying biological mechanisms and their influence on individual functioning. There is significant breadth to this research, as a broad range of parameters are used to estimate individual differences in stress response. These parameters include changes in the activation of the Hypothalamic Pituitary Adrenal (HPA) Axis (Allwood, Handwerger, Kivlighan, Granger, & Stroud, 2011; Evans et al., 2013), magnitude and duration of cortisol response (Evans et al., 2013; Kuhlman, Olson, & Lopez-Duran, 2014), changes in Respiratory Sinus Arrhythmia (Hinnant & El-Sheikh, 2013; Obradović, Bush, Stamperdahl, Adler, & Boyce, 2010), vascular and cardiac reactivity to stress (Tomaka et al., 1993), heart rate, and activation of the autonomic nervous system (Allwood et al., 2011). All of these physiological responses are used to gauge an individual's level of reactivity to a presented stressor at a physiological level.

It is important to note that the different physiological measures do not represent analogous measures of reactivity, and that each may capture unique components of an overall response to stress. For example, each measure might have different patterns of rise and return to baseline after a stressful event (Allwood et al., 2011). This highlights that it is important to consider what different physiological measures of stress reactivity describe *about* responses to stress, and how each might provide a distinct or unique contribution to an individual's subjective experience of stress in context.

Although the physiological measures of stress reactivity provide important objective insight into the body's reaction to stress, it is important to recognize what

such measures do *not* tell us. Measures of change in heart rate or activation of the HPA axis indicate that a stress response has occurred, but they do not provide insight into the *subjective* feeling of stress experienced by an individual – their interpretation or appraisal of the physical symptoms they feel in their bodies. Thus, although biological models are important as they quantify objective individual differences in biological responses, these measures alone are not enough to characterize the cognitive, social, and emotional experience of an individual who is faced with situations that are stressful. Furthermore, Schlotz and colleagues (2011) noted the limitations of using a single biological or physiological measure of reactivity. Specifically, many biological measures provide a single data point that reflects an individual's reaction to a specific stressor on a given day, rather than a person's overall experience of stress in the aggregate. This highlights the importance of other approaches to measurement that examine reactivity through self-reported, internal experiences.

Stress reactivity and behavior. Strelau (2008) discussed the ways in which stress reactivity contributes to different kinds of behaviors individuals engage in to reach goals. Strelau (2008) argued that those who are highly reactive must engage in auxiliary behaviors to manage their own reactivity, alongside behaviors that are explicitly goal-directed. This theory suggests that individual differences in stress reactivity not only characterizes the individual experience of stress, but also the ways in which individuals behave. In many ways, the characterization of two different kinds of behavior appears parallel to emotion-focused and problem-focused coping strategies, where auxiliary behaviors are comparable to emotion focused strategies, as

those utilized to manage emotions (either in working toward a goal, or in response to a stressor). However, what is unique in Strelau's conceptualization, is the fact that unlike emotion-focused coping strategies, which are often considered maladaptive, auxiliary behaviors are considered to be complementary and crucial behaviors for those who are highly reactive. Overall, however, Strelau's theory highlights that those who are more reactive engage in distinctive patterns of behavior to manage their reactivity – that is, elevated reactivity results in a unique pattern of internal experience and external behavior.

Outcomes associated with stress reactivity. In stress reactivity research, self-rated mental and physical health symptoms are the most commonly used outcome measures and are used to highlight the connection between stress reactivity and *broad* overall functioning. Research has highlighted that significantly elevated or significantly blunted levels of stress reactivity contribute to negative health outcomes, including cardiovascular disease and slower recovery after surgery (Lovallo, 2011; Rosenberger, Ickovics, Epel, D'Entremont, & Jokl, 2004). Self-reported physical health symptoms are also used to gauge the relationship between stress reactivity and physical symptoms. Scales, such as the Pennebaker Inventory of Limbic Languidness (PILL; Pennebaker, 1982) or the Cohen–Hoberman Inventory of Physical Symptoms (CHIPS; Cohen & Hoberman, 1983), ask individuals to rate the frequency of different physical symptoms. Individuals with higher levels of stress reactivity endorse more, and more frequent physical symptoms than those who are less reactive (Benham, 2006; J. Connor-Smith & Compas, 2004).

In adults and adolescents, elevated levels of stress reactivity have been associated with self-rated symptoms of post-traumatic stress disorder (Strelau & Zawadzki, 2005), anxiety (Dragan, Dragan, & Kononowicz, 2012; Strelau & Zawadzki, 2011), and depression (Hankin, Badanes, Abela, & Watamura, 2010). In children, elevated and blunted levels of reactivity have been associated with poor emotion regulation and externalizing behaviors (Banny, Tseng, Murray-Close, Pitula, & Crick, 2014; Gatzke-Kopp, Greenberg, & Bierman, 2013). Although it is recognized that the impact of stress reactivity in functioning shifts throughout development, with greater associations with internalizing disorders beginning in adolescence (Romeo, 2010), these results suggest that over or under-reactivity to stress contributes to mental and behavioral health outcomes for both adults and children.

The associations between stress reactivity and these mental health outcomes is not unexpected, as anxiety, depression, PTSD, and other mental health conditions are thought to share biological underpinnings and common processes with stress reactivity. For example, the stress hormone cortisol is a common factor in conceptualizations of stress reactivity, anxiety, and depression (Evans et al., 2013; Kuhlman et al., 2014). There also appear to be common patterns within cognitive processes. For example, those with depressive traits tend to overestimate the stressfulness of events (Skočić, Rudan, Brajković, & Marcinko, 2010), which shows a similar pattern of appraising and responding to stress that is consistent with a high level of reactivity patterns outlined here suggest that the associations between stress

reactivity and mental health outcomes may be expected and logical, given common underlying processes and biological connections between the disorders.

Although there are consistent findings connecting stress reactivity and symptoms of physical and mental health, research on the connection between stress reactivity and functioning in specific contexts and life situations is less robust. The paucity of findings may exist, in part, because individual behavior is variable within and across contexts, and difficult to reliably connect to personality traits or temperament. In response to this challenge, Zayas and colleagues (2008) proposed that an understanding of what is *psychologically active* for an individual can be used to connect temperamental traits like stress reactivity and specific outcomes. That is, without understanding what is relevant or important to an individual, or their own perceptions of a situation, it is difficult to connect individual differences in stress reactivity to specific behaviors or patterns of functioning. The results shared here suggest that without consideration of other factors and individual differences, the connection between stress reactivity and individual functioning in *specific* contexts is not consistent or reliable.

Thus, overall, the accumulated effects of stress reactivity appear have robust connections to broad measures of functioning and mental health, which is likely due to common underlying processes. However, the contribution of stress reactivity and functioning and behavior in specific contexts is less robust, and warrants further examination, especially alongside individual efforts to cope. This connection will be discussed in greater detail in upcoming sections of this review.

Conceptualization and relevance for the current study. Recognizing the biological and physiological mechanisms that underlie individual differences in stress reactivity, the current study focuses on individual differences in the subjective cognitive and emotional experience of stress associated with these processes. Thus, the current study measures and examines individual differences in perceived stress reactivity, as characterized by Schlotz and colleagues (2011). Schlotz and colleagues (2011) describe perceived stress reactivity as closely related to constructs like self-efficacy, neuroticism, and physical health, and suggest that it exerts its greatest influence on outcomes when are under stress. The Perceived Stress Reactivity Scale was designed to assess individual differences in this area and focuses on elements of stress reactivity that are assumed to be observable in oneself. That is, the questions on the scale focus on the emotional and cognitive responses associated with reactivity to stress, rather than focusing on the physiological responses from which they arise.

The subjective cognitive and emotional aspects of stress reactivity assessed through the PSRS are identified as most relevant for the current study and the proposed models. Although stress reactivity is reliably quantifiable at a biological and physiological level, it is the negative cognitive and emotional experiences associated with stress reactivity that must coped with under stressful circumstances. Perceived stress reactivity then, represents a significant contributor to internal demands individuals must address in order to cope effectively.

Section conclusion. The current section highlighted that stress reactivity is studied from a variety of perspectives, all of which provide similar definitions that characterize the construct as individual differences in the intensity and duration of

stress responses. The many avenues through which stress reactivity is studied highlights that individual differences in responsivity to stress are observable in multiple ways and on multiple levels, from underlying biological processes to affective and emotional experiences in response to challenge. The current study focuses primarily on the subjective emotional and cognitive reactions that are associated with reactivity to stress, while recognizing that the underlying biological processes produce the observable and subjective stress responses within individuals. It is also recognized that differences in levels stress reactivity influence or contribute to unique patterns of individual behavior, like the auxiliary behaviors described by Strelau (2008). Individual differences in reactions to and perceptions of stress are considered especially relevant for the current study because they represent the internal experiences with which individuals must cope and contribute to unique patterns of behavior and functioning. The relationship between stress reactivity and coping is widely recognized, and previous research on the connection between the two constructs is discussed in following section.

Stress Reactivity and Coping

Thus far, theory and literature about the coping process and about stress reactivity as individual constructs have been reviewed, and an initial justification for connecting the two constructs has been introduced. Specifically, the review has proposed that an examination of coping without an understanding of the internal experiences to which individuals must respond provides an incomplete picture of the ways in which individuals respond to stress. The current section builds on this idea, by reviewing the research that connects coping and stress reactivity, and suggesting

that similarly, to understand the impact of stress reactivity on outcomes, one must also have an understanding of the ways in which individuals cope with context or person specific internal demands. The ways in which stress reactivity influences coping, and the ways in which coping impacts the experience and outcomes of stress reactivity are both discussed. Finally, the idea of "fit" between strategies and demands is revisited, and relationships within the proposed mediation models are emphasized.

Stress reactivity and appraisal. Theory suggests that stress reactivity influences coping, in part, through the process of appraisal. Specifically, stress reactivity influences perceptions of how stressful situations or challenges are (Strelau, 2011). These types of perceptions are an important piece of appraisal processes as they influence an person's decisions about whether coping is necessary and what kinds of strategies will be most effective (Folkman, Lazarus, Gruen, et al., 1986). One study found that those who demonstrated greater vascular system reactivity were more likely to appraise situations as threatening, while those who were less reactive in their vascular system were more likely to appraise situations as a positive challenge, an opportunity for growth (Tomaka et al, 1993). Such differences in appraisal patterns would likely in turn, affect how individuals approach and cope with the situation and highlights that those who are more reactive might need to cope with their emotional response to the idea of a threat, alongside the external situation. Thus, stress reactivity likely influences the coping process through the ways in which individuals appraise the contexts they are in.

Stress reactivity and coping strategies. There are theoretical connections between coping and stress reactivity. Strelau (2008)'s framing of goal-directed and auxiliary behaviors for those who are highly reactive seems to parallel the characterization of coping strategies as problem-focused and emotion-focused. As with goal-directed behaviors, problem focused coping is directed at the external situation, a problem as it exists independent of one's ongoing emotional state. And, similar to auxiliary behaviors, emotion focused coping strategies are focused on managing internal experiences and emotions. If Strelau's (2011) theory is expanded to consider coping behavior, it suggests that those who are more reactive must use more strategies and behaviors that are focused on the internal, but *alongside* those that are problem focused, not necessarily in place of them.

Although stress reactivity is thought to influence coping through appraisal, and theoretically connected to unique patterns of coping behavior through Strelau's theory on auxiliary behaviors, other research suggests the relationship between the two constructs is not unidirectional. Specifically, some research highlights that patterns of coping can influence the *experience of,* and *outcomes associated with* stress reactivity. Many studies that examine the relationship among stress reactivity, coping, and outcomes focus on the role of specific coping behaviors as moderators of the relationship between stress reactivity and mental health outcomes. Such models are based on the emerging idea that specific strategies may not be equally effective for those with varying levels of stress reactivity and propose that specific kinds of strategies will impact the relation between stress reactivity and outcomes.

A number of studies that identify coping behavior as a moderator of the relationship between stress reactivity and outcomes utilize the Responses to Stress Questionnaire (RSQ; Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001b) to assess both stress reactivity and coping. The RSQ obtains estimates of automatic, reactive responses to stress alongside intentional coping behaviors. Using the RSQ, Monti and colleagues (2018) found that primary control coping and stress reactivity interacted to predict self-rated symptoms of anxiety and depression in young adults. Specifically, the *higher* the level of participants' stress reactivity, the stronger the relationship between primary control coping and lower symptoms of anxiety and depression. Using similar methodology, Wadsworth and Berger (2006) demonstrated that primary control coping buffered the effects of stress reactivity but only for those with low levels of stress reactivity. However, Wadsworth and Berger examined the effects in adolescents, which may suggest that the relation between coping and reactivity varies over the course of development.

Other studies utilize the RSQ to examine both coping behavior and stress reactivity, but also utilize physiological measures to capture individual differences in stress reactivity. Connor-Smith and Compas (2004) reported that engagement coping moderated the relationship between stress reactivity (assessed through heart rate and the RSQ) and self-reported health outcomes. The study also demonstrated that primary control coping moderated the relationship between self-reported arousal and health outcomes, while secondary control coping buffered the relationship between self-reported arousal and both health *and* internalizing outcomes. These results suggest that coping behaviors can reduce the negative impact of reactivity on both

self-reported physical health and internalizing symptoms. Furthermore, the distinct roles of primary and secondary engagement coping in reducing the negative impacts of reactivity on health and mental health outcomes highlights the importance of *fit* between the strategy and the situation. Fit is also highlighted in recent research by Wadsworth and colleagues (2018). After assessing patterns of self-rated coping, physiological reactivity, and self-rated outcomes for children in manipulated contexts, the authors concluded that regulatory fit between coping style and context is critical for adaptation to stress.

Finally, other studies that posit a moderating role of coping behavior examine stress reactivity exclusively through physiological measures. Paysnick and Burt (2015) demonstrated that problem-focused coping buffered against self-rated internalizing and externalizing symptoms for individuals who demonstrated higher levels of physiological reactivity, measured through skin conductance level and respiratory sinus arrhythmia.

The moderation studies described above illustrate that specific coping behaviors have a unique impact on mental health outcomes for those who are more or less reactivate to stress and demonstrate that these results are consistent across distinct measures of stress reactivity. Given these results, it cannot be expected that the same coping strategy will have universal effects across people of varying levels of reactivity. For example, an emotion-focused strategy might be effective, even crucial, for a highly reactive individual to manage a stressful situation, whereas the same strategy might be irrelevant or unnecessary for someone with a lower level of stress

reactivity. Thus, the current study shifts focus away from strategies, and instead focuses on the effectiveness of individual coping efforts.

Stress reactivity and coping efficacy. Because coping efficacy is distinct from the specific strategies individuals use to cope, it cannot be expected that coping efficacy will relate to stress reactivity and outcomes in the same ways as coping strategies. The current section reviews the limited body of literature on stress reactivity and coping effectiveness and builds a justification for the use of a mediation model, over moderation, to explain the relations among these variables.

Research on the relationship between stress reactivity and coping efficacy and effectiveness is limited. Many studies discuss the relationship between stress reactivity and "adaptive coping." However, upon closer examination, in such studies, the adaptiveness or effectiveness of coping strategies is *assumed* based on previous research that connects strategies and outcomes, rather than on an evaluation of fit between strategies and context, or individual perceptions about the effectiveness of their coping efforts. By using previous associations with outcomes, rather than in-vivo evaluations of coping efforts, such studies are not truly examining effective coping. Instead, they rely on findings from the predominant approach to research that examines coping behavior alongside stress reactivity and distal mental health outcomes.

Sladek and colleagues (2016) examined the relationship between cortisol reactivity, self-rated coping efficacy, and mental health outcomes for college students. Results suggested that those who demonstrated a higher level of cortisol reactivity utilized fewer engagement coping strategies and had lower estimates of

their own ability to cope, that is, lower coping efficacy. In the development of the Perceived Stress Reactivity Scale, Schlotz and colleagues (2011) demonstrated that perceived stress reactivity was negatively correlated with a general sense of efficacy but did not examine the relationship between stress reactivity and coping efficacy specifically. Drake and colleagues (2016) found that coping efficacy served as a protective factor against higher levels of cortisol stress reactivity. Taken together, results suggest that stress reactivity may influence individual perceptions of how well they are able to cope, and potentially how well they actually cope. However, the limited number of studies that examine the relationship between stress reactivity and the perceived effectiveness of coping efforts highlights an area for further exploration and growth in coping literature.

Finally, although not explored explicitly in research, in the same way that stress reactivity influences the ways in which individuals appraise problems, it may similarly influence the ways in which individuals appraise and rate their own coping efforts. That is, for those who are more reactive, it seems possible that the internal responses may extend beyond and become bigger problems than external challenges. That is, it seems possible that a reactive person may cope with an external problem effectively, but may not feel as though they did, due to the intensity of their own internal or emotional response. Through this process, it seems likely that one's level of reactivity may influence individual ratings of their coping efficacy.

New directions for outcomes in research on stress reactivity and coping. The research on coping and stress reviewed in the current section demonstrates that both are significant contributors to self-rated mental health outcomes. The studies

reflect a trend in coping and stress reactivity research, where the outcomes of individual differences in coping and stress reactivity are evaluated through their impact on mental health symptoms.

The current study does not diminish the importance of understanding individual differences in psychological functioning and symptomology. In fact, it recognizes that understanding the contribution of stress and coping is likely crucial for understanding the etiology of mental health disorders, as many are thought to share biological underpinnings with stress reactivity. However, the current study also argues that the presence or absence of mental health symptoms is not the be-all and end-all for individual functioning and attempts to fill a void in current research by examining the contribution of coping effectiveness and stress reactivity on individual functioning. Within the current study, the focus is on job performance and efficacy under stressful conditions – that is, the way stress reactivity and coping effectiveness contribute to the functioning of student teachers during their internship year.

There is some precedent for examining the impact of coping on performance. Some studies have the impact of coping on external evaluations or performance measures. For example, class grades (Hsieh, Sullivan, Sass, & Guerra, 2012), GPA (Nounopoulos, Ashby, & Gilman, 2006), or work performance (Rabenu, Yaniv, & Elizur, 2016) have been utilized as outcomes or correlates connected to coping strategies or effectiveness, and have demonstrated mixed results in terms of significant relationships. In these studies, coping is often used as a single factor in a broader model, rather than a direct predictor of academic or external outcomes. Kim

(2017) identified that performance measures of coping were associated with externally evaluated job performance of student teachers.

The body of research that examines coping in association with performance measures is significantly smaller than research focused on other, self-rated outcomes. This may be because it is more difficult to obtain external evaluations of performance, or because research attempts to expand upon and clarify already established connection between coping and internal functioning. Compas and colleagues (2017) noted that this lack of variability in methodology is one of the greatest limitations in coping research – that psychological knowledge about coping is limited to information gathered through self-rated coping strategies and their associations with self-rated outcomes. The current study attempts to address this limitation, by proposing a model that includes performance measures of both coping and individual functioning.

There are few studies that examine the relation between stress reactivity and functioning in specific contexts, and no studies that examine the relationships among stress reactivity, coping, and functioning in specific contexts. This may relate to the idea discussed by Zayas (2008), who suggested to reliably connect temperament and behavior, one must have an understanding of what is *psychologically active* and *personally relevant* for an individual, that understanding temperament alone is not enough to predict or explain variations in behavior. The limited research, alongside Zayas' recognition that other personal factors must be considered alongside reactivity, suggests that there is little precedent for understanding temperament as an independent or single predictor of functioning in a given context. Rather, it is the

accumulated effects of stress reactivity that potentially contribute diminished coping efforts and subsequent mental health outcomes.

Furthermore, given that individuals cope with internal demands alongside external problems, a direct path cannot be drawn from individual differences in stress reactivity to behavior and functioning in a specific context. To clarify, stress reactivity contributes to the internal experiences with which individuals cope. Because individuals consistently cope in the moment as a way to address or resolve these negative internal experiences, it follows that there would be few contexts in which an individual's stress reactive response would not be followed by some attempt to address it. Thus, it would be expected that stress reactivity would contribute to the classroom functioning of student teachers *through* their coping efforts, and more specifically, through the impact of stress reactivity on individual difference in coping efficacy and effectiveness.

Although previous models of the relationship among stress reactivity, coping behavior, and outcomes have consistently been moderation models, in which specific patterns of coping behavior moderate the relationship between stress reactivity and mental health outcomes, the current study posits that moderation is not an appropriate model for the variables of interest, given established patterns of relationships among and between variables. Instead, given its focus on the *performance* of student teachers in the classroom, rather than their mental health symptoms, the current study proposes that mediation models best explain the relations among stress reactivity, coping effectiveness and the functioning of student teachers in the classroom. That is, rather than exerting influence on the functioning of student teachers directly, stress

reactivity contributes indirectly to functioning through individual differences in coping efficacy and effectiveness.

The Current Study

Although there are well documented connections between specific coping strategies and stress reactivity, there is only minimal research that connects stress reactivity and the effectiveness of one's coping efforts. Furthermore, although both constructs (both jointly and individually) have established connections to self-rated adjustment and mental health outcomes, there is a paucity of research connecting either coping effectiveness or stress reactivity to individual functioning and performance under specific challenging conditions, like novel professional experiences. The current study thus adds to the field's research base by studying the relationship between stress reactivity, coping effectiveness, and the performance of student teachers during their field-based practicum. The current study further contributes to coping literature by extending methodology beyond self-report, and utilizing performance measures, alongside self- report, to assess both coping and teaching outcomes.

Methods of measurement. The use of both self-report and performance measures of coping and teaching effectiveness is a critical part of the current study and the proposed models. Self-report methodology includes rating scales through which individuals self-identify their patterns of social, emotional, or behavioral functioning based on questions with set responses. In contrast, performance measures include methods of evaluation where constructs of interest are not self-reported and instead assessed by others through observation or evaluation of the participant's

behavior or writing. Within the current study, performance measures included supervisor ratings of participants' effectiveness as teachers, and researcher ratings of participants' coping effectiveness, based on teaching experience narratives and stories told about ambiguous pictures. Beyond *who* is rating the participant, there is an additional distinction between the performance and self-rated measures of coping used in the current study. Specifically, the self-rated measure of coping is highly structured and focused on individual self-perceptions of their ability to cope. In contrast, the performance measures of coping use structured inference by researchers and examine the narratives of participants for schemas and structure that go *beyond* what is shared directly by participants to draw conclusions about their ability to cope.

For the current study, two mediation models, one for each method of measurement, were tested. One model utilized the performance measures of coping effectiveness and teaching effectiveness, while the other utilized self-report measures of the same constructs.

Preliminary examination of relations among variables. Before testing the proposed models, the current study examines the correlations among the variables of interest: perceived stress reactivity, self-rated and performance measures of coping, teaching self-efficacy, and supervisor evaluations of student teacher performance. Given previously reported results (e.g. Sladek et al, 2016) and the connection between stress reactivity and appraisal, it is expected that self-rated stress reactivity will be significantly and negatively correlated with measures of self-rated coping efficacy and supervisor rated effectiveness. Significant positive correlations are expected between measures of coping (self-rated and performance) and measures of

teaching effectiveness (self-ratings and supervisor ratings). Finally, correlations are not expected between stress reactivity and teaching effectiveness.

Hypotheses 1 and 2: Mediation models. The current study examines the relationship between coping effectiveness, stress reactivity, and teaching performance in two mediation models using different measures of coping and teaching performance. Given previous literature that connects stress reactivity and coping effectiveness (Sladek et al, 2016) and coping effectiveness with general self-efficacy (Schlotz, 2011), academic self-efficacy (Devonport & Lane, 2006), and job performance (Kim, 2017), it is expected that coping effectiveness will mediate the relationship between stress reactivity and teaching performance. That is, stress reactivity is expected to exert an indirect effect on teaching outcomes through coping effectiveness. Mediation is conceptualized as a process through which one variable influences an outcome by influencing another, intermediary variable. With this structure, it is expected that stress reactivity will influence coping effectiveness, which in turn will influence student teacher performance in the classroom. See Figure 3 below.

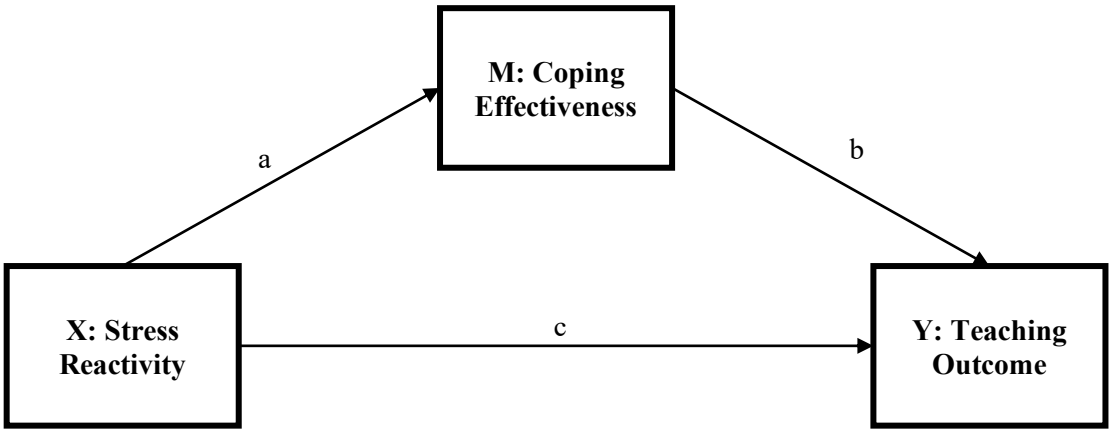

Figure 3. General mediation model for the proposed study.

Separate mediation models are proposed, one with self-rated measures of coping and teaching outcomes and one with performance measures of coping and teaching outcomes. Research shows that performance and self-rated outcomes are associated with and predicted by distinct kinds of measures(Spangler, 1992). Specifically, performance outcomes, related to actual functioning, are predicted by implicit or performance measures, like the TAT or narratives, while self-rated outcomes, are consistently predicted by self-rated measures of the construct (McClelland, Koestner, & Weinberger, 1989). It is expected that models proposed within the current study will follow a similar structure.

Self-rated mediation model. Given the established relationships among stress reactivity, coping efficacy, and outcomes, alongside research that identifies the relation between self-rated variables and self-rated outcomes, it is hypothesized that self-ratings of coping effectiveness, via the Coping Competence Scale, will mediate the relationship between perceived stress reactivity and teaching self-efficacy. That is, stress reactivity will predict teaching self-efficacy through self-rated coping competence. See Figure 4 below.

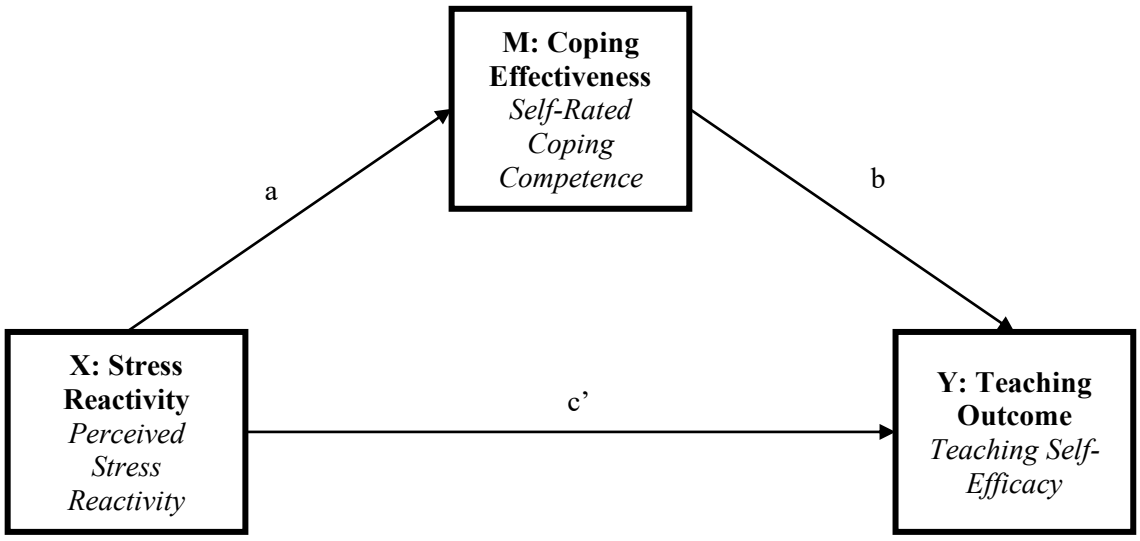

Figure 4. Self-rated mediation model.

Performance mediation model. For the performance model, given the established relationships among stress reactivity, coping efficacy, and outcomes, alongside research that identifies the relation between performance variables and performance outcomes, it is expected that stress reactivity will influence supervisor evaluations of performance via its influence on performance measures of coping. See Five below.

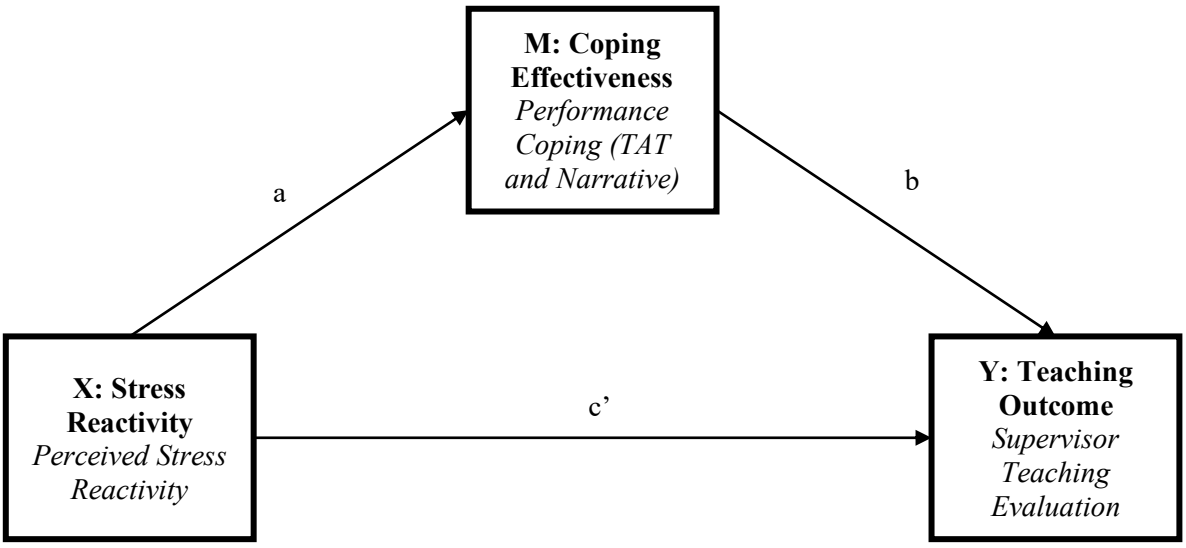

Figure 5. Performance mediation model.

Chapter 3: Methods

Summary of Purpose

The current study utilizes measures and procedures that are part of a larger ongoing research project. The broad project was developed through a relationship between the School Psychology department and the Teacher Training Program at the University of Maryland. The overarching goal of the project is to understand and ultimately reduce the stress of students as they transition into their careers as teachers, and to understand developmental trajectories of student teachers throughout their professional training

As one piece of the broader project, the current study focuses on individual differences in stress and coping in student teachers. The purpose of the current study specifically is to identify the impact of individual differences in stress reactivity and coping effectiveness on the performance of student teachers during their intern year. Through the use of performance measures of coping and outcomes, the current study seeks to expand upon a body of literature based primarily on self-report measures of coping and outcomes. Two mediation models are proposed to predict teaching self-efficacy and supervisor evaluations of effectiveness. The first model predicts that self-rated coping competence will mediate the relationship between stress reactivity and teaching self-efficacy. The second model predicts that implicit measures of coping will mediate the relationship between external evaluations of teacher performance.

Design

The current study is longitudinal and prospective and gathers information from student teachers throughout their senior year practicum placements (See Table 1 for a detailed timeline of phases and measure administration). The study presents two mediation models through which different measures of coping effectiveness are expected mediate the relationship between stress reactivity and end-of-year teaching outcomes.

Table 1
Study Timeline

Study Phase	Meeting/Activity	Time	Measures and Interviews
Recruitment	Classroom Visit	Early Fall	*n/a*
Phase 1	Meeting 1	Early/Mid Fall Semester	• Demographic Information • *Thematic Apperception Test* (Morgan & Murray, 1935) • *Adapted Coping Competence Questionnaire* – (Schroder & Ollis, 2011) • *Perceived Stress Reactivity Scale* (Schlotz et al, 2011)
	Meeting 2	End of Fall Semester	• Teaching Experience Narrative
Phase 2	Home Writing	Three times over 6 weeks; February - March	• Meaningful Teaching Experience Writing Prompts
	Final Meeting	End of Spring Semester	• Teacher Self-Efficacy • School-Based Supervisor and Professor Supervisor ratings

Procedures

Participants. The 69 participants in the proposed study were enrolled as undergraduate education majors at the University of Maryland, College Park. The participants were recruited from four graduating cohorts over the course of four years.

The exact number of participants recruited from each cohort can be found in Table 2 below.

Table 2:
Participants by Cohort

Cohort	N	Percent
Cohort 1	15	21.7%
Cohort 2	14	20.3%
Cohort 3	15	21.7%
Cohort 4	25	36.2%

The sample included participants that range in age from 19 to 26 years old, although the majority of participants were 21 years old (n = 53, 76.8%). The majority of participants self-identified as female (n = 66, 95.7%). Although this reflects an apparent lack of variability in age and gender, this ratio reflects actual demographics in early career elementary school teachers – a profession dominated by young women (National Center for Education Statistics, 2018). Although primarily white (n = 43, 62.3%), the sample also included African American (n = 5, 7.2%), Asian American (n = 7, 10.1%), Middle Eastern (n = 1, 1.4%) and Hispanic/Latina (n = 7, 10.1%) student teachers. Six teachers (8.7%) self-identified identified as biracial or multiracial, selecting multiple races to describe their background. All demographic information is listed in Table 3 below.

Table 3:
Demographic Information

Category	N	Percent
Age		
19	1	1.4%
20	3	3%
21	53	76.8%
22	7	10.1%
23	2	2.9%
24	2	2.9%
25	0	0%
26	1	1.4%
Race		
White	43	62.3%
African American	5	7.2%
Asian American	7	10.1%
Hispanic/Latino	7	10.1%
Middle Eastern	1	1.4%
More than one race indicated**	6	8.7%
Gender		
Male	3	4.3%
Female	66	95.7%

**Includes demographics from the 69 participants who participated in the first meeting*
*** Demographics indicated within the multi-racial population include: Latinx, African American/Black, Middle Eastern/Arab, Asian American, and White/Caucasian.*

Participant Recruitment. Participants were recruited from three sections of senior education majors on track to enter a second semester elementary education practicum. Participants were recruited from four different cohorts of students over four years. Each year, members of the research team visited seminar classes during the first weeks of the fall semester and provided information about the study, including participation requirements, payment for participation, and the purpose of the study. Interested students provided contact information to the research team, who later contacted them directly to set up initial meetings.

Research Buddy Procedures. Once students expressed interest in the study, they were paired with a member of the research team, a "research buddy," based on common availability. The research buddy became a student's primary point of contact throughout the course of the study. The research buddy initiated contact with assigned potential participants via email and organized an initial meeting during which participants were briefed again on the purpose and methods of the study, and then gave informed consent for their ongoing participation. Research buddies continued to meet with assigned participants for each phase of the study, sent email prompts and reminders, and were the consistent contact points. Research buddies work to build a personal connection with their participants, which is thought to facilitate continued engagement and communication throughout the extended time period of the study.

Study Phases. The study included two phases. The first phase occurred during their fall semester, when participants participated in a twice-weekly school placement. The second phase occurred during the second semester, when participants participated in a full-time student-teaching placement, during which they eventually took full control of their classrooms for six weeks.

The first phase of the study included two meetings between participants and their research buddies, one at the beginning of the semester, and the other at the end. The purpose of these meetings was to gather background information through semi-structured interviews and scales, and complete story telling and writing tasks with their research buddy.

The second phase of the study included three writing prompts emailed to the participants over the course of six weeks. If participants did not complete all three

writing prompts, they were given two extra chances to complete the writing tasks. The online method allowed for teachers to participate remotely while facing many teaching demands. The second phase also included a final in person meeting between the research buddy and the participant at the end of the semester. The purpose of the final meeting was to ask participants to reflect on the overall experience of the year, complete final rating scales, and pay participants for their time.

Participation and Attrition. Identification numbers were assigned to seventy-eight participants who signed up for the study. Of the seventy-eight participants, sixty-nine participants participated in the first meeting, sixty-five participated in the second meeting, and sixty-two finished the entire process by participating in the final meeting. Sixty-eight participants received evaluations from the PDS Coordinators (professors on campus), and fifty-eight received ratings from their University Supervisors (supervisors hired by the University who supervise fewer students and engage in more direct observation). The roles of each supervisor will be discussed in greater depth in an upcoming section. Completion rates for each phase of the study are described Table 4 below.

Table 4
Phase Completion

Phase	*n*
Assigned ID Number	78
Phase 1	
Meeting 1 (TAT)	69
Meeting 2 (Significant Teaching Experience)	65
Phase 2	
Weekly Writing 1	64
Weekly Writing 2	58
Weekly Writing 3	53
Completed All 3	53
Final Meeting	62
Supervisor Ratings	
Professor Supervisor	68
School Based Supervisor	58

Maintenance of confidentiality. Before being paired with a research buddy, participants were assigned ID numbers to keep responses confidential. ID numbers, and not names, were attached to all participant contributions to the study. This procedure allowed responses from the same participant to be compiled over time without attaching identifying information. Although a participant's research buddy was aware of both their participants' ID numbers and names, the rest of the team only had access to de-identified data. Only the "data manager" and the PI had access to both names and ID numbers.

When gathering ratings from supervisors and professors, to protect confidentiality of students both in and out of the study, the raters were sent a spreadsheet that included the names of all the students in their classes and corresponding numbers, uniquely assigned for this portion of the study only. Supervisors completed the ratings and then removed student names *before* sending the list back to the researchers. The researchers in the current study only had name-

number connections for participants, and so were able to evaluate the effectiveness of the teachers in the study without revealing their names to their instructors or violating the confidentiality of non-participants.

Measures

The current section describes the measures used in the current study to evaluate the constructs of interest. In addition to describing the measures, internal consistency for all measures will be reported. Internal consistency is a statistic that reflects whether items from a scale are answered in consistent and reliable ways. It is calculated to identify the closeness of the relationship between items in a single scale, which is often used to draw conclusions regarding the reliability of the items in a scale for capturing the construct of interest. Internal consistency is most commonly measured using Cronbach's alpha. The statistic reflects the degree of closeness between the items in a scale, or the consistency in response across the items in a scale and is not a reflection of the dimensionality of a scale (Tavakol & Dennick, 2011). For the current study, Cronbach's alpha was calculated to establish internal consistency for all measures. Alpha values of .70 or above are widely considered acceptable values for unidimensional constructs and internal consistency in research. Alpha values are reported throughout this section and can be viewed in Table 7 at the end of this section. All study measures described in the upcoming section can be found in Appendix A.

Measure of stress reactivity. The Perceived Stress Reactivity Scale (PSRS; Schlotz et al, 2011) is a 23-item, 5-factor scale that assesses individual differences in the experience of reactivity to stress broadly and in specific domains. The version

used in the current study was translated from German and adapted from an original version of the scale that included 29 items. To complete the scale, participants are asked to "indicate the answer that most closely describes [their] reaction in general" (93) by selecting one of three response options that are unique to each item, which makes the PSRS unique when compared to other Likert scales, which often have Likert anchors that are consistent across all items. The current study obtained an overall score for the scale using the directions provided by Schlotz and colleagues (2011). A full version of the scale and directions for scoring the scale are available from Schlotz and colleagues (2011) and in Appendix A.

The five factors of the PSRS describe different subtypes of reactivity, while the broad scale assesses stress reactivity in the aggregate. Schlotz and colleagues (2011) examined internal consistency and test-retest reliability for all items and scales in American, British, and German samples, and found consistent results across populations. Values from the American sample (n = 336) are reported as they are most relevant to the current population. The PSRS Total scale is a composite of all scales and was found by Schlotz et al (2011) to have adequate internal consistency and test-retest reliability (α= .87; r =.85), with a population mean of 18.16, and the standard deviation was 6.84. Subscales include measurements of Prolonged Reactivity (α= .62, r = .67), Reactivity to Failure (α=.65, r =.62), Reactivity to Social Conflicts (α=.71, r =72), Reactivity to Work Overload (α= .77, r =.77), Reactivity to Social Evaluation (α= .63, r =.81). Notably, based on the analysis by Schlotz (2011) test-retest reliability values fell below .7 for both the prolonged reactivity and reactivity to failure scales, which suggests that the two individual subscales may be

less consistent than others over time. However, Schlotz et al (2011) noted that theoretically, it might be expected to observe some variability in levels of reactivity across time points.

However, it is important to note as this variability may have an unknown effect on the data collected within the current study. Schlotz and colleagues (2011) also noted that the PSRS may be sensitive to the effects of individual differences in social desirability, that those who demonstrate higher levels of concern for social desirability may not rate themselves accurately as being more reactive. Finally, it is not clear how the scale aligns with other physiological or biological measures of reactivity. Although these factors are not prohibitive in the use of this scale, it is important to note that unlike physiological measures of stress reactivity, this self-report measure may be influenced by other personality factors.

For the current study, only the overall scale was used to assess individual differences in stress reactivity, as individuals' broad, trait-like patterns of reactivity were of interest over reactivity to specific kinds of challenge. Examination of the scale within the current sample revealed an acceptable level of internal consistency (α = .85) consistent with the value calculated for the original U.S. sample (α= .87).

Performance and self-rated measures. For the mediator and outcome variables in the current project two distinct methods of measurement were used: self-rated and performance measures. Self-rated measures examine constructs of interest through participants self-report on structured scales. In contrast, performance measures examine constructs of interest through ratings or evaluations provided by individuals *other than* the participants themselves (researchers, supervisors).

Research demonstrates a consistent pattern of correlation within, but not across, these methods of measurement.

Measures of coping efficacy and effectiveness. The proposed study assesses participants' ability to cope in two different ways. The first is through self-ratings on an adapted version of the Coping Competence Questionnaire. The second is through structured coding of teaching narratives and the Thematic Apperception Test (TAT), which are considered performance measures of coping.

Self-rated coping efficacy. The current study used an adapted version of the Coping Competence Questionnaire (CCQ; Schroder & Ollis, 2013) to examine individual differences in coping self-efficacy. The original CCQ is a 12-item, one factor scale that captures the ability to cope with and be resilient to hopelessness and helplessness, traits associated with depression. It was selected for the current study because it captures one's ability to cope with their own emotions. The original CCQ has excellent internal consistency (>.90; Schroder, 2004) and adequate test-retest reliability after one month (Schroder & Ollis, 2013). High scores on the original CCQ are representative of a high self-rated ability to cope with stressors and emotions and have demonstrate negative associations with depression and emotion focused coping strategies (Schroder & Ollis, 2013). The original CCQ used the sum of all items to calculate a total score, and the mean score for the sample was 49.17, and the standard deviation was 11.63.

Adaptation of the CCQ. For the current study, three major changes were made to the scale to create the modified version, which will be referred to as the Adapted Coping Competence Questionnaire, or the ACCQ. These changes were made due to

concerns that the original version, designed to capture negative thoughts and feelings associated with depression, might be overly negative for the non-clinical population in the current study. The goal of the current study is to understand the ways in which individuals cope with and respond to the negative thoughts and frustrations that occur on a daily basis.

Although it is unusual to make changes to an established measure, it is important to note that a *PsycInfo* database search revealed that the article that published original CCQ has been cited only twice in articles found within the database, which suggests that the overall scale has not been verified or examined by anyone other than the original authors. Furthermore, the authors themselves recognized that the scale required further validation related to its reliability and validity for understanding the ways in which individuals cope (Schroder & Ollis, 2013). Description of the changes made are described below, and the actual changes can be viewed in Appendix A.

First, changes were made to the valence of half the items on the scale. On the original CCQ, all items were phrased to describe negative responses to stress. For the adapted version, items 1, 2, 3, 6, 11, and 12 were changed to describe positive responses to stress. For example, item 12 was changed from a completely negative response ("When I do not instantly succeed, I am at a loss") to a positive one ("If I am not doing well, I usually think I can turn things around"). This modified wording created more variety in the structure and phrasing of items, and such varied language is thought to prevent habitual responding across items (Weijters, 2013).

The second change made to items from the CCQ was to reduce the intensity of the phrasing within some of the items. This change is also apparent in item twelve, where the language was shifted from "instantly succeed" to "doing well." These changes were made with the intention to "soften" the language, to make items relevant for daily coping and for the experiences of the non-clinical population of the current study, since the original scale was intended to assess the coping skills of individuals with depression.

Finally, the directions were altered for the current study. The original directions were general. The adapted version of the scale used in the current study provided more guidance than the original measure and required individuals to respond with day-to-day experiences in mind, to ensure that participants provided answers that reflected their perceived ability to cope with daily stressors, like those that might occur in their classrooms, although there was no explicit directive for them to consider their teaching experiences.

Properties of the Adapted CCQ. Although the validation of the Adapted CCQ was beyond the scope of the original research questions, the significant changes to the measure warranted close examination of the updated measure's factor structure and convergent and discriminant validity. For this reason, a Principal Components Analysis and Parallel Analysis were conducted, alongside correlational analysis to evaluate convergent and discriminant validity of the adapted measure. *Please note that an in-depth description of these analyses can be viewed in Appendix B, and a brief summary can be viewed below.*

Alongside an overall, single component solution, the principal components analysis and Horn's parallel analysis revealed that a two-component solution was appropriate for the adapted scale. Review of individual items across the two identified components suggested that the first component reflected one's efficacy for coping with their emotions under challenging conditions and was labeled ACCQ-Emotion. The second component appeared to capture optimism about or confidence in one's ability to handle specific tasks or external problems in the future. This scale was labeled ACCQ-Confidence. Interestingly, this separation seems as though it might align with the popular ideas of emotion-focused and problem focused coping, but rather than characterizing the scales represent one's efficacy for each kind of coping. Patterns of correlation with effortful control and negative affect were comparable to the original measure, which provides some initial validity for the adapted version of the measure used in the current study.

Mean scores were calculated for the overall ACCQ (unlike the original scale, which utilized a sum), as well as the individual identified subscales for use in analysis. The overall score is thought to represent one's overall level of coping competence, while the two components capture unique facets that contribute to coping efficacy – one's ability to cope with emotions and one's confidence or optimism for coping with external challenges. Internal consistency was calculated for the overall scale and subscales. Internal consistency was also evaluated for the broad scale and individual subscales. The overall scale ($\alpha = .84$) and individual scales (ACCQ-Emotion, $\alpha = .76$; ACCQ-Confidence, $\alpha = .79$) all demonstrated adequate internal consistency. Although these values were below the calculated internal

consistency for the original measure, the values fell above the widely accepted benchmark of .7, which suggests that the item responses group together in a consistent way.

Performance coping measures. The current model includes two story-based performance measures of coping effectiveness, the Thematic Apperception Test and teaching experience narratives. Stories obtained through both performance measures were coded using a similar coding structure.

Thematic Apperception Test. For the Thematic Apperception Test (TAT), participants were asked to tell complete stories about a standard set of black and white images that depict tension or unfinished business. Participants were prompted to tell a complete story with a beginning, middle, and end, and that included the thoughts and feelings of different characters. The current study used TAT cards 1, 2, 3, 4, 5, and 7. For the current study, members of the research team coded stories for Coping using the coding system from Teglasi (2010), and internal consistency across the six cards was excellent ($\alpha = .91$) within the current sample, which suggests that across the cards, a consistent construct was captured. The three-level coding system focuses on how fully and effectively characters in participants' stories cope with the presented stressor and is described below.

Teaching Experience Narratives. Up to four times throughout the study, participants wrote Teaching Experience (TE) Narratives about their classroom experiences in response to prompts generated by the research team. Participants wrote once at the end of Phase 1, and three times over six weeks during Phase 2. The prompt was based on Pennebaker's paradigm for using narratives in research (e.g.

Pennebaker & Chung, 2007; Gortner, Rude, & Pennebaker, 2006). The prompts in the current study required participants to write for twenty minutes about a meaningful student teaching experience. The TE narratives were coded using a modified version of TAT codes from Teglasi (2010), discussed below, and the four narratives demonstrated excellent internal consistency ($\alpha = .91$).

Coding procedures for performance measures. Description of coding procedures are described by Kim (2017), and available in Appendix C of the current paper. Both TAT stories and TE narratives were coded using the three-level coding system for Coping from Teglasi (2010). When TAT stories are coded using this method, the stories are examined for coping processes through which the participant deals with the tensions depicted in the scene or outlined in their narratives. The coding system includes a consideration of how well individuals deal with both external, situational problems and internal, emotional ones. Codes focus on the appropriateness, effectiveness, and the completeness, of the coping strategies described in the stories, rather than the behaviors themselves. Because personal teaching narratives do not include a consistent stimulus, individual stories were coded for how completely and effectively the participant coped with the situation as defined within the narrative, which could include situational problems, emotional problems, or both. Criteria for coding the TE narratives were modified from the original to be more appropriate to individual experiences. Please refer to the appendix for specific details of the coding manual and examples of coded stories.

The TAT stories and TE narratives were coded at one of three possible levels: Non-Coping, Incomplete or Partial Coping, or Long-Term Coping. The lowest level

is *Non-Coping*. Stories coded at this level include characters who are stuck or unable to deal with the tensions they experience. Stories coded at this level may also include unrealistic or inappropriate coping strategies, given the definition of the problem. The second level is *Incomplete or Partial Coping*. At this level, tensions within stories are addressed, but in an incomplete way. For example, the problem might only be addressed with a short-term solution, or the coping strategies used may only partially address the problem. The final level is *Long Term Coping*. Stories coded at this level have characters who effectively cope with problems in a way that is complete and accounts for long term outcomes.

Because the prompt for the TE narrative is open ended, and does not *require* participants to describe challenging situations, not all stories depicted situations with which the participants had to cope. Although the majority of stories provided by participants did depict some kind of challenge or struggle within the classroom, select stories were purely positive and did not include reflection on any problems or challenges. A total of 14 stories across 9 participants were assigned a distinct "No-Code" designation and left blank within the data set.

All TAT stories and TE narratives were assigned codes by two independent raters. In the initial round of coding, story sets for 18 participants across the four cohorts were used to establish and refine the current coding system and were not used in reliability analyses. Coding decisions for these story sets were discussed and agreed upon collaboratively, to establish a consistent understanding of the coding guidelines and criteria

Interrater Reliability. Agreement and reliability between the two raters were established through a number of procedures. First, Spearman's rho was calculated to determine the correlation between the ordinal ratings from the two independent raters. Spearman's rho was selected because it is considered preferable for ordinal data as at it rank-orders the values. This is preferable because with ordinal coding systems it is unknown whether the intervals between each of the ordinal values are equal.

Spearman's rank order correlations guidelines from Ferguson (2009) are used. Using Ferguson's standards, .2 is considered the minimum r value for a practical effect, .5 is considered the benchmark for a moderate effect, and .8 is considered the benchmark for a strong effect. Review of the correlation coefficients calculated between the two raters ranged from the "moderate" to "strong" range across different stories rated. The overall correlation value of $r_s = .71$ between the two raters across TAT stories and TE narratives approaches "strong" and can be viewed in the table below.

However, a significant correlation in and of itself is not enough to demonstrate consistency between raters, as it only assesses the ways in which the variables vary compared to each other – closeness of the two raters is not captured. For example, using correlation, one rater could rate all participants very low, and another could rate them very high, but as long as the individual participants were rated in similar ways in comparison to each other by each rater, a significant correlation could be identified. For this reason, further evaluation of interrater reliability was conducted using the Intraclass Correlation coefficient, because the ICC

also captures the *closeness* of the variables as well as whether or not they vary in comparable ways.

Inter-rater reliability for 51 story sets was evaluated using an Intraclass Correlation Coefficient (ICC, 3, 1) model– a two-way mixed-effects model of consistency between two raters. A consistency model was selected for analysis over absolute agreement as the directionality and closeness of individual ratings reflects some degree of agreement between raters since TAT stories and TE narratives are coded on a continuum. Guidelines from Cicchetti (1994) for the interpretation of ICC values state that values less than .4 are considered "Poor," values between 0.40 and 0.59 are considered "Fair," values between .6 and .74 are considered "Good," and those between .75 and 1.00 are considered "Excellent." All ICC values that estimated the relation between raters on the TAT and Narratives fell in the Good or Excellent range (.75-.91) and are displayed in Table 5.

Table 5

Inter-rater Reliability for TAT Story and TE Narrative Coding: Two Way – Mixed IntraClass Correlation Coefficient and Spearman's Rho

Measure	Intraclass Correlation Coefficient (ICC 3,1)	Spearman's rho
TAT		
Card 1 *(51 stories)*	.91	.83**
Card 2 *(51 stories)*	.90	.77**
Card 3 *(51 stories)*	.76	.54**
Card 4 *(51 stories)*	.76	.63**
Card 5 *(51 stories)*	.85	.72**
Card 7 *(51stories)*	.75	.56**
TAT Total *(306 stories)*	.83	.67**
Teaching Experience Narratives		
Significant Teaching Experience *(43 stories)*	.94	.82**
Weekly Writing 1 *(42 stories)*	.78	.69**
Weekly Writing 2 *(38 stories)*	.91	.72**
Weekly Writing 3 *(40 stories)*	.90	.73**
Narrative Total *(163 stories)*	.89	.75**
Total (306 TAT stories, 163 Narratives)	**.84**	**.71****

Note: *Reliability was calculated for 51 sets of stories. The other story sets were used to establish and refine the coding system and maintain consistency year-to-year.*

Composite Scores. For the current study, mean scores were calculated for both TAT stories and TE narratives. Mean scores were identified as an appropriate method for creating overall scores because of the variable number of TE narratives completed across participants – averaging the available coping codes allowed for the creation of a composite variable that was comparable across participants with different numbers of completed TE narratives.

An additional Performance Coping Mean (PCM) score was calculated and included in analysis. The two measures were used and combined for their unique potential contribution to the study's evaluation of coping effectiveness. The TAT was

selected because it provides an estimate of participants coping effectiveness using the same stimuli for all participants, hence it is relatively free of the context variation due to different experiences in the classroom. The story a participant tells about a TAT card provides an index of how well they resolve ambiguous situations in the moment and provides a general measure of coping effectiveness. In contrast, TE narratives provide insight into patterns of coping and stress management specific to the teaching context, which is not necessarily held constant across participants. By utilizing both measures as part of an overall score (i.e. the Performance Coping Mean, PCM), the estimate of coping competence is more comprehensive, and includes measures of coping that are both general, and specific to the context of interest (teaching).

The Performance Coping Mean (PCM) is the average of *all* performance coping codes assigned to TAT stories and TE narratives. The PCM provides an overall score that incorporates both performance measures. Previous research by Kim (2017) revealed a significant positive correlation between the coping codes assigned to TAT stories those assigned to TE narratives *(*$r = .93$, $p < .01$). The correlation for the current sample was similarly high *(*$r_s = .83$, $p < .01$), which suggests the stories capture similar coping processes. Furthermore, internal consistency for all TAT stories and TE narratives together was well above the cutoff for the acceptable range *(*$\alpha = .95$). The level of consistency between the two measures suggests creating a composite score is appropriate for the current analyses, that they are capturing consistent patterns of coping. Composite scores were created for participants who completed the Phase One writing prompt, and at least one weekly writing prompt.

Participants who completed fewer than one TE narratives during the second semester writing prompts did not have their TE narrative scores utilized in analysis.

It is important to note both the advantages and drawbacks of calculating the mean scores for the performance model. A strength of the approach is that it captures the variability in coping across the student teachers sampled. Specifically, calculating the mean can highlight the subtle differences between individuals who receive consistent high coping codes across stories and those who receive some high and some low coping codes across their stories. This variability is helpful as it provides a means to distinguish between participants who are labeled on a three-point coding system. However, there are important statistical challenges to note with such an approach – in particular, the ordinal nature of the data is lost, and the lines are blurred between one "level" of coping and another, and because the "true" distance between one level and another is not known, it may influence the analysis in unknown ways.

For the purposes of the current study, despite the identified statistical challenges with calculating a mean, it was determined that a mean score would be most appropriate as it captured one's coping *over time*, in the aggregate, a composite of their coping effectiveness across many experiences. This provides more nuance than other measures of central tendency (e.g. median) that are often used with ordinal data, as it is sensitive to and captures differences in codes from individual stories in a way that a median is not.

Measures of teaching outcomes. The current study utilizes two separate outcome measures to evaluate student teacher effectiveness at the end of their intern year, both of which are described below.

Performance outcome: Supervisor ratings. Student teachers who participated in the study had multiple supervisors who oversaw and provided feedback on their work while on internship. To obtain estimates of student teacher effectiveness for the current study, two different kinds of supervisors were asked to rate the effectiveness of the student teachers for the study[1]. The first kind of supervisor asked to provide evaluations of interns are called "PDS Coordinators." PDS coordinators oversee twenty to thirty interns across approximately five schools. They are full time employees of the university's education program and observe the interns in the classroom periodically. The second kind of supervisor asked to provide evaluations of are called "University Supervisors.". University Supervisors are employed part time by the University but are more field based than PDS coordinators. Their primary role in the program is to observe, support, and evaluate the interns over the course of the year. They typically supervise five to nine interns within a single school, and observe them frequently, both formally and informally, over the course of the internship experience. To distinguish between the two kinds of supervisors and for clarity for readers new to teacher development practices, PDS coordinators will be referred to as "Professor Supervisors" and University Supervisors will be referred to as "School Based Supervisors" for the purposes of this paper.

[1] Although participants are rated by their supervisors on a single-item scale that evaluates their overall effectiveness as a teacher, it is recognized that teaching effectiveness is complex and multifaceted. Although beyond the scope of the current study, for more comprehensive information on this topic, the reader is directed to the body of work Charlotte Danielson, which outlines four broad domains of effectiveness on which teachers can be evaluated: Planning and Preparation, Classroom Environment, Instruction and Professional Responsibilities (Danielson, 2013).

Because both kinds of supervisor observed, evaluated, and provided feedback to student teachers over the course of their internship on many aspects of teaching, it was expected that they would be able to draw from these experiences to provide a broad estimate of intern effectiveness. To evaluate student teacher effectiveness, the supervisors were asked to evaluate all interns using a single item. The prompt read: *How would you judge the student's effectiveness as a teacher on the ten-point Likert scale below? Points 1-3 on the Likert scale represent "degrees of concern" about the student teacher. Points 4-7 reflect the range from low to high average, and points 8-10 represent "degrees of excellence" that the student teacher might rate.* This prompt was used to gain a broad assessment of teaching effectiveness that was *not* based in participants' self-perceptions of their abilities as teachers. In addition to individual ratings, a mean score of the two ratings was also calculate and used in analysis and will be referred to as the Supervisor Rating Mean (SRM) for the purposes of the current study.

Interrater reliability. Inter-rater reliability for the ratings from the two supervisors was evaluated using two methods: correlation, and Intra Class Correlation coefficients.

A Spearman correlation was calculated to examine the relationship between the Professor Supervisors and School Based Supervisors for the current study. Spearman's rho was found to be .72, which is considered a "strong" relation between the two raters and can be viewed in Table 6 alongside other measures of interrater reliability.

Due to the limitations of correlation alone for estimating interrater reliability discussed in a previous section, an Intraclass Correlation Coefficient (ICC, 3, 1) model– a two-way mixed-effects model of consistency between two raters was calculated alongside the Spearman correlation. A consistency model was selected for analysis over absolute agreement as absolute or exact agreement might not be expected given the range of values on the item. The same guidelines used to evaluate the coding of TE narratives and TAT stories (Cicchetti, 1994) was used to evaluate the level of agreement between the supervisors. The ICC value calculated to represent the level of agreement between the two raters fell in the Excellent range (.78) and can be viewed in Table 6 below. For the current study, the mean of the two supervisor ratings is calculated and used as an overall estimate of participants' effectiveness.

Table 6
Inter-rater Reliability for Supervisor Ratings:
Two Way – Mixed IntraClass Correlation Coefficient and Spearman's Rho

Measure	Intraclass Correlation Coefficient (ICC 3,1)	Spearman's Rho
Supervisor Effectiveness Rating	.78	.72**

Self-rated Outcome: student teacher self-efficacy. Participants' teaching self-efficacy was assessed using the twelve item Efficacy subscale from the Teacher Responsibility Scale (Lauermann & Karabenick, 2013). On a 10-point Likert scale, participants rate how confident they are (*I am confident that…)* in their ability to be effective in different aspects of teaching (*e.g. I can get any of my students to make excellent progress throughout the school year*). The efficacy scale is broken up into

four factors, that includes self-efficacy for fostering student motivation, student achievement, forming-student teacher relationships, and teaching skills. As the current study was most interested in student teachers' overall level of efficacy, an overall score was calculated by calculating the mean across the twelve items of the study.

Lauerman and Karabenick (2013) did not include in-depth discussion of the efficacy scale, because their research was primarily focused on efficacy for its relationship with and connection to teacher responsibility. For the current study, the overall scale had a demonstrated internal consistency of $\alpha = .92$, which suggests that the items on the scale are capturing similar aspects of the same construct. Participants completed the efficacy items from Teacher Responsibility Scale multiple times throughout the course of the study, at the beginning and end of the school year, and as part of the one-year follow up. However, only year-end ratings were used for current analysis, as a measure of student teacher self-efficacy late in the spring semester, when they were nearly done with their internship experience.

Table 7

Internal Consistency for Study Measures

Measure	Cronbach's Alpha
Coping Measures	
Coping Competence (A-CCQ; 12)	.84
ACCQ - Emotion (ACCQ-E, 5))	.76
ACCQ - Confidence (ACCQ-C; 4)	.79
TAT Cards 1, 2, 3, 4, 5, 7	.91
TEN stories (4)	.92
Performance Coping Mean (All TAT, All TE Narratives)	.95
Stress Reactivity Measures	
Perceived Stress Reactivity Scale (PSRS; 23)	.85
Outcome Measures	
Teacher Self Efficacy Scale (TSE; 12)	.92

Analytic Considerations.

Approach for missing data. For each proposed model, only complete data sets were used (listwise deletion), which is common statistical practice. (Preacher & Hayes, 2004). That is, for the self-rated mediation model, data from participants were included if the PSRS, CCQ, and TSE scales are all complete. Given these criteria, there were 62 participants with data sets available for use in the self-rated model (meaning seven cases were excluded from analysis), Similarly, for the performance mediation model, data from participants were included in analysis if the PSRS, the TAT, at least two coded TE narratives, and at least one supervisor rating is available. For participants who wrote one or zero weekly writing prompts, or who had one or zero codable responses, only the TAT was used as a performance measure of coping, so that an individual TE narrative does not exert undue influence on the performance measure of coping. Data sets from four participants met this criterion and utilized only the TAT as the performance measure of coping Given this criteria, 68 participants with data sets available for use in the performance model (meaning one case was excluded from analysis).

Although listwise deletion can reduce the power of studies, power analyses suggested that there was adequate power to detect an effect even with cases deleted. Furthermore, review of the information provided above reveals that very few cases were removed using listwise deletion, which suggests that information from a very small proportion of the data collected was excluded, and that the sample was not changed due to the exclusion of the participants. Furthermore, listwise deletion was identified as preferable to try and establish a certain level of consistency within the

data that were collected. Because response rates in the performance coping measures were already variable, it was considered preferable to only use participants with complete data sets to minimize the variability beyond what already existed within the complete data sets.

Consideration of nested and grouped data. Data for the current study are grouped in a number of ways: by cohort, by supervisor, by county, and by school. Differences between these groups or the impact of such groupings is beyond the scope of the current study's research questions and is not of interest at this time. Although, significant differences across the groups for outcomes or within individual measures is not expected, the potential impact of such groupings on data must be considered. There is no reason to expect individual traits – coping efficacy and stress-reactivity to be influenced by such factors since they are relatively stable sources of individuality. However, students' supervisors may vary systematically in their ratings and comparability of raters was examined in multiple ways.

Intraclass correlation coefficients across Professor and School Based supervisors suggests that their ratings are consistent with each other. Furthermore, a paired sample t-test examined the scores of the 58 participants who received ratings from both supervisors, and revealed no significant differences between site (M = 7.05, SD = 2.01) and campus (M=7.36, SD = 2.07) supervisor ratings of student teacher effectiveness $t(57) = -1.73$, $p = .09$. These statistics suggested no significant differences between site and Professor supervisor rating patterns. To examine patterns of evaluation across the four Professor supervisors, who rated different students from one another, a one-way ANOVA was conducted, which revealed no significant

differences across the Professor supervisors in their evaluations of their students $F(3, 67) = .32$, $p = .810$.

Another factor that warranted consideration was the potential differences in variables across the cohorts. It was important to establish that there were not differences in the target variables across the four years that data were collected. One-way ANOVA tests were conducted to examine whether significant differences in variables (including stress reactivity, self-rated coping competence, performance coping, teaching self-efficacy, and supervisor evaluations of effectiveness) existed. No significant differences were identified across cohorts for any of the variables examined. ANOVA tables examining the differences across cohorts can be viewed in Appendix D.

Given the statistics presented above, it does not appear that participants' supervisors systematically affected the evaluations of student teacher effectiveness, or that having a particular supervisor created a significant difference in outcome rating. Given the consistency across raters, and the lack of significant differences across them, it was decided that the impact of nested data was minimal and did not need to be addressed statistically.

Power Analysis. Monte Carlo power analysis simulations were used to calculate the power of the current models to detect a significant effect (Muethen and Muethen, 2002). Monte Carlo power analysis simulations are considered preferable for bootstrapped mediation analysis as they account for non-normality and missing data, challenges that other analytical approaches to power analysis do not address (Schoemann, Boulton, & Short, 2017). The approach is used to evaluate the power to

detect the presence or absence of any effect, rather than effect of a specific magnitude.

Using the Monte Carlo *Power Analysis for Indirect Effects Application* developed by Shoemann, Boulton, and Short (2017; https://schoemanna.shinyapps.io/mc_power_med/), a range of power values for a range of sample sizes (N= 45 through N = 75) was calculated for all the proposed models, with desired power set at .8. In research, there is consensus that a power of .8 or above signals adequate power to detect a significant effect. For the calculations, the analysis was specified to use 1000 replications and 20,000 Monte Carlo draws per repetition and began at random-seed 1234, as recommended by Shoemann and colleagues (2017). The range of values, as well as the calculated power for the actual sample size can be viewed in Table 8 below.

Table 8
Monte Carlo Simulation Power Analysis for Indirect Effect

	Range of Power Values		
Model	**N = 45**	**N = Actual**	**N=75**
Self-Rated Model			
PSRS, CCQ, TSE	.81	.93 (62)	.94
Performance Model			
PSRS, TAT/Narrative Mean, Supervisor Ratings	.54	.81 (68)	.87

Chapter 4: Results

Preliminary Analyses and Descriptive Statistics

Descriptive Statistics. Descriptive statistics for measures of coping, stress reactivity, teacher efficacy, and teacher effectiveness, including means, standard deviations, ranges, and skew are summarized in Table 9, below.

Table 9
Descriptive Statistics

Measure	*n*	*M*	*SD*	Min	Max	Skew
Coping Measures						
Coping Competence (A-CCQ)	69	4.15	.69	2.58	6.00	.115
Coping Competence – Emotion	69	3.61	.87	1.80	6.00	.20
Coping Competence - Confidence	69	4.71	.79	2.00	6.00	-.83
TAT Cards 1, 2, 3, 4, 5, 7	69	1.70	.65	1.00	3.00	.56
Card 1	69	1.77	.75	1.00	3.00	.41
Card 2	69	1.74	.80	1.00	3.00	.51
Card 3	69	1.72	.80	1.00	3.00	.54
Card 4	69	1.48	.68	1.00	3.00	1.10
Card 5	69	1.71	.82	1.00	3.00	.59
Card 7	69	1.78	.80	1.00	3.00	.42
TE Narrative: STE, WW1, WW2, WW3	67	1.86	.77	1.00	3.00	.36
Significant Teaching Experience	60	1.88	.90	1.00	3.00	.24
Weekly Writing 1	60	1.92	.85	1.00	3.00	.16
Weekly Writing 2	53	1.94	.79	1.00	3.00	.10
Weekly Writing 3	54	1.88	.79	1.00	3.00	.20
Performance Coping Mean	69	1.76	.69	1	2.92	.48
Stress Reactivity Measures						
Perceived Stress Reactivity Scale	69	21.50	6.9	7	36	-.05
Outcome Measures						
Supervisor Rating Mean	68	7.14	1.8	1	10	-.932
School Based Supervisor	58	7.36	2.00	1	10	-1.03
Professor Supervisor	68	7.01	1.9	1	10	-.785
Teacher Self-Efficacy	62	5.49	.72	2.75	6.92	.684

The Perceived Stress Reactivity Scale (PSRS) in the current sample had a calculated mean of 21.5 and a standard deviation of 6.9. Schlotz and colleagues

(2011) reported that in the original US sample, the mean score was 18.16, and the standard deviation was 6.84. This suggests that the mean of current sample was well within a standard deviation of the sample mean of the original scale.

The Adapted Coping Competence Questionnaire had a sample mean of 4.15 and a standard deviation of .69, while the original CCQ had a sample mean of 4.14 (converted from the reported mean sum score of 48.17 (Schlotz et al, 2011) by dividing by the number of items). However, it is important to note that because the items are different across the adapted and original scales, identical values across the original and updated scales might not have identical meaning.

Sample means were not reported or not available for the Teacher Self-Efficacy scale, Supervisor Ratings, the TAT, and the TSE narratives.

Correlational Analysis. Pearson's correlations were calculated to determine the strength of associations among the variables and measures of interest in the self-report model including: Perceived Stress Reactivity Scale, Coping Competence Questionnaire and its identified components, and Teacher Self-Efficacy. Pearson correlations were identified as appropriate as the variables were continuous and expected to have a linear relationship.

Spearman correlations were used to identify the strength of relationship among performance model variables. Spearman correlation was selected over Pearson correlation for these variables because the distributions of the data for the Performance Coping Mean, TAT stories, and TE Narratives were not normally distributed, and Spearman correlations are nonparametric – and do not carry assumptions regarding normality of the data.

Additionally, Spearman correlations utilize a rank-order procedure to determine the strength of association by ordering the data rather than raw data values. That is, although the scores for the Performance Coping Mean (PCM), the TAT, and the TE narratives were continuous values – calculated from the mean of codes assigned to stories, the original ratings of the TE narratives and TAT stories were considered ordinal, evaluated on a three-point scale. Because the original coding systems were ordinal, the exact interval between each coded value was unknown, which could make it more difficult to interpret the raw values of the composite scores. Using a Spearman rank correlation removes some of the error that might be introduced by utilizing the raw data, and provides a correlation based on the rank of the values rather than the raw data.

Correlations among variables in the self-rated model. Pearson Correlations were calculated to determine the strength of association between the variables in the self-rated model including Perceived Stress Reactivity, Coping Competence, and Teaching Self Efficacy. The analysis revealed a significant negative correlation between Perceived Stress Reactivity and the Coping Competence Questionnaire (r = -.73**, p < .01*).* Analysis also revealed a significant positive correlation between self-rated coping competence and self-rated teaching self-efficacy (r = .36**, p < .01*).* There was no significant correlation between Perceived Stress Reactivity and Teaching Self-Efficacy. All correlations can be viewed in Table 10 below.

Although the original hypothesis for the current study was focused on overall coping competence as a variable, principal components analysis revealed two distinct components (Emotion, Confidence) within the adapted measure of coping

competence. For this reason, the correlations between these two components and the other variables in the self-rated model were also examined. Similar to the total score, both components from the two-component model were significantly and negatively correlated with the PSRS, the study's measure of stress reactivity. However, of the two identified scales, only one demonstrated a significant correlation with teaching self-efficacy. Similar to the total score, the CCQ-Emotion scale was significantly correlated with end of year teaching self-efficacy (r = .29*, p <.05). However, the second factor, CCQ-Confidence was not significantly correlated with overall teaching self-efficacy. All correlations can be viewed in Table 10 below.

Table 10:
Pearson Correlations Among Variables in Self-Rated Model

Scale	1	2	3	4	5
Perceived Stress Reactivity (1)	1	-.73**	-.63**	-.60**	-.13
Coping Competence (2)		1	-	-	.36**
CCQ – Emotion (3)			1	-	.29*
CCQ – Confidence (4)				1	.19
Teaching Self Efficacy Spring (5)					1

Correlations among variables in the performance model. Spearman correlations were calculated to capture the strength of association among the variables in the performance model and can be viewed in Table 11 below. Analysis revealed a significant positive correlation between Stress Reactivity and the Performance Coping Mean (r_s = .24*, p <.05) and the TAT (r_s = .29*, p < .05). The correlation of stress reactivity with coping coded from TE narrative did not reach significance (r_s = .18). Stress reactivity did not demonstrate a significant correlation with the other performance variable, the School Based Supervisor ratings. Other significant correlations were identified between the Performance Coping Mean and the

Supervisor Rating Mean (r_s = .67**, p < .01) as well as between the associations among measures contributing to each mean (i.e. TAT, Teaching Experience Narrative, Professor Supervisor, and School Based Supervisor).

Across these correlations, the PCM, the TAT, and TE narratives demonstrated significant positive correlations with the SRM, the Professor Supervisor Ratings, and the School Based Supervisor ratings. Stress reactivity was significantly correlated with coping measured by the TAT and the PCM. However, the correlation between stress reactivity and the TE narratives did not reach significance. Notably, the correlations between stress reactivity and performance measures of coping were consistently positive, which is distinct from the relation between stress reactivity and self-rated measures of coping. Correlations can be viewed in Table 11 below.

Table 11
Spearman Correlations Between Variables in Performance Model

Scale	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Perceived Stress Reactivity (1)	1	.239*	.288*	.187	.141	.167	.164
Performance Coping Mean (2)		1	-	-	.670**	.607**	.676**
TAT (3)			1	.862**	.618**	.541**	.626**
TE Narratives (4)				1	.651**	.586**	.668**
Supervisor Evaluation (5)					1	-	-
Professor Supervisor (6)						1	.715**
School Based Supervisor (7)							1

Correlations among performance and self-rated variables. Finally, correlations between variables from the Self-Rated and Performance variables were calculated using Pearson and Spearman correlations. Analysis revealed that Teaching Self Efficacy was significantly correlated with the Performance Coping Mean (r_s = .28, p < .05), and the TAT (r_s = .29, p < .05). Teaching Self-Efficacy also had a significant positive Pearson correlation with School Based Supervisor ratings (School

Based; $r = .34$, $p < .01$), and with the Supervisor Ratings Mean ($r = .32$, $p < .01$). This means that student teacher evaluations of their own teaching effectiveness completed toward the end of the first semester are moderately correlated with evaluations from their School Based supervisors. All correlations discussed in this paragraph can be viewed in Table 12 below.

Table 12
Spearman and Pearson Correlations Between Variables in Self-Rated and Performance Models

	Performance Measures					
Scale	Performance Coping Mean	Thematic Appercepti on Test	Teaching Experience Narrative	Supervisor Rating Mean	Professor Supervisor	School Based Supervisor
PSRS	.25*	.29*	.19	.19	.22	.17
CCQ	-.08	-.03	-.03	-.02	-.06	.02
CCQ E	-.14	-.15	-.13	-.04	-.05	-.04
CCQ C	.03	.01	.01	-.02	.02	-.05
TSE, Spring	.28*	.29*	.24	.32*	.24	.34**

***Note**: Correlations shaded in gray are Spearman Correlations. Unshaded correlations are Pearson's correlations

Hypothesis Testing: Mediation Analysis

Bootstrapped mediation analyses were conducted to examine the hypotheses regarding the relation between stress reactivity, coping effectiveness, and the effectiveness of student teachers at the end of their practicum placement. The first test of mediation examined Hypothesis 1, which posited that self-rated coping competence mediates the relationship between stress reactivity and teaching self-efficacy. The second test of mediation examined Hypothesis 2, which posited that the PCM would mediate the relationship between stress reactivity and the SRM.

Mediation and MPlus. To address both hypotheses, simple mediation models were tested using Preacher and Hayes' (2008) bootstrapping procedures for indirect effects. Preacher and Hayes (2008) bootstrapping procedures for testing indirect

effects were selected to test the hypotheses for the current study for multiple reasons. First, unlike stepwise approaches for examining mediation (e.g. Baron & Kenny, 1986), bootstrapped approaches are non-parametric, and do not assume normality of the indirect effect (Hayes & Scharkow, 2013). It has been demonstrated that indirect effects in mediation analysis generally do not have normal distributions (Mackinnon, Lockwood, & Williams, 2004), which means that traditional stepwise approaches to testing mediation hypotheses may be inappropriate due to their assumptions of normality.

Second, unlike other methods used to test mediation models, bootstrapped mediation analysis does not require or assume a significant direct/total effect to exist between X and Y, which reflects the growing consensus that such a relation is not required for mediation to exist. Specifically, bootstrapped mediation is sensitive to situations in the different paths within an indirect effect (i.e. *a* and *b),* might "cancel" each other out, where one is negative and the other is positive, which together might result in an apparent lack of total effect. However, in these situations, despite the lack of a statistical relationship, a theoretical connection between X and Y must exist for mediation to be an appropriate analysis according to Baron and Kenny's original formulation of a mediation effect. The models proposed within the current study follow such a structure – there are no established statistical relationships between X (Stress Reactivity) and Y (Teaching Performance) in either of the proposed models, but initial correlations suggest the possibility of a significant effect along the *ab* pathway (Hayes, 2017), and a justification for the theoretical connection between X and Y has been established within the literature reviewed in this paper. This pattern

suggests that a mediation effect (rather than a simple indirect effect, *without* mediation) was an appropriate model for the research questions that are the focus of the study.

Bias corrected bootstrapped mediation analyses were used to test Hypothesis 1 and Hypothesis 2. Alongside the tests of the two primary models, additional mediation analyses were conducted using the individual components of composite variables that demonstrated patterns of correlation that warranted examination of an individual model.

The bootstrapping procedure was completed using the MPlus statistical program and code (Muthén & Muthén, 2012). Through MPlus, the original sample was re-sampled with replacement 5,000 times to create 5,000 bootstrapped samples. Next, MPlus calculated values for the indirect effect of X (Stress Reactivity) on Y (Teaching Outcomes) through M (Coping Effectiveness), or the path *ab,* for each of the 5,000 bootstrapped samples. Next, as part of the bootstrapping procedure, MPlus ordered the indirect effect values from smallest to largest, creating a distribution of the indirect effect values (*ab*) across the 5,000 bootstrapped samples. Then, MPlus identifies the upper and lower bound for the 95% confidence interval of distribution, which was then reviewed to determine whether the hypothesized indirect effect exists. One can conclude a significant indirect effect exists if the confidence interval does not contain zero, as a non-zero effect exists across the entire distribution of bootstrapped indirect effect values (Hayes, 2017).

For the current analysis, confidence intervals and regression coefficients were standardized using the "STDYX" command in MPlus. This procedure standardizes

the output so that coefficients represent change in the outcome in relation to a standard deviation in the predictor, rather than an individual unit of analysis. This command was used because the variables were continuous, and because it made the two models tested more comparable to each other, and accounts for differences in the scale between predictor and outcome variables. Please refer Appendix E for the code that that was used to run analysis in MPlus.

Hypothesis 1: self-rated mediation model. The bootstrapped mediation procedures described above were used to test the hypothesis the self-rated coping efficacy mediates the relation between stress reactivity and teaching self-efficacy. Mediation analyses based on 5,000 samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) showed that stress reactivity had a significant indirect effect on teaching self-efficacy via self-rated coping competence, as the standardized 95% confidence interval for the values of *ab* did not include zero [LL= -.74, UL= -0.13]. Examination of the estimate of the indirect effect suggests that stress reactivity has a significant negative indirect effect on teaching self-efficacy through self-rated coping competence (Self Rated Model: *ab* = -.42). This coefficient for the indirect effect signifies that for each standard deviation increase in self-rated stress reactivity, teaching self-efficacy decreases by .42 standard deviations as a result of stress reactivity's effect on coping competence, which in turn affected teaching self-efficacy. Results related to the indirect effect can be viewed in Table 13.

Results revealed significant standardized regression coefficients on the *a* and *b* pathways of the mediation model. Specifically, analysis revealed that stress reactivity had a small but significant negative effect on self-rated coping competence

(B_a = *-.73**, p < .01),* which suggests that higher levels of stress reactivity negatively influence one's sense of overall coping efficacy. Self-rated coping competence demonstrated a significant positive effect on teaching self-efficacy (B_b = *.57**, p < .01),* which suggests that a higher level of coping efficacy contributes to a higher level of teaching efficacy. This regression coefficient represents the change in Y (teaching self-efficacy) for each standard deviation change in M (coping competence) when X (stress reactivity) is held constant. Finally, analysis revealed a non-significant direct effect of stress reactivity on teaching self-efficacy, ($B_{c'}$ *= .28, p = .07).* This value reflects the effect of stress reactivity on teaching self-efficacy when coping competence is held constant. All regression coefficients can be viewed in Figure 6 at the end of this section.

Overall, the results suggest that self-rated stress reactivity has a small but significant negative effect on one's perceptions about their ability to cope, which in turn has a significant impact on end of year teaching self-efficacy. Thus, stress reactivity negatively influences teaching self-efficacy *through* one's self-rated coping effectiveness.

Self-rated model: ACCQ-Emotion: Based on the correlations between the ACCQ-Emotion factor and other variables in the model (previously shared and discussed in Table 12, above), it was determined that a second mediation analysis would be conducted to determine if the CCQ-Emotion factor mediated the relation between self-rated stress reactivity and teaching self-efficacy in a similar way to overall coping competence. Because the ACCQ-Confidence factor did not demonstrate significant correlations with teaching self-efficacy, it was not considered

as a potential mediator of the relationship between self-rated stress reactivity and teaching self-efficacy.

The same bootstrapped mediation procedures described above were used to determine whether self-rated efficacy for coping with emotions (ACCQ-Emotion) mediated the relation between stress reactivity and teaching self-efficacy. Mediation analyses based on 5,000 samples using bias-corrected 95% confidence intervals showed that stress reactivity had a significant indirect effect on teaching self-efficacy via self-rated coping competence for emotion, as the standardized 95% confidence interval for the values of *ab* did not include zero [LL= -.46 -., UL= -.02]. Examination of the estimate of the indirect effect suggests that stress reactivity has a small, but significant, negative indirect effect on teaching self-efficacy through self-rated coping competence for emotion (Self Rated Model, ACCQ-E: *ab* = -.21). This coefficient for the indirect effect signifies that for each standard deviation increase in self-rated stress reactivity, teaching self-efficacy decreases by .21 standard deviations as a result of stress reactivity's effect on coping competence (emotion), which in turn affected teaching self-efficacy. Information related to the indirect effect can be viewed in Table 14, and the significant regression coefficients can be viewed in Figure 7.

Self-rated model conclusions. Overall, the results from the self-rated models suggest that individual differences in stress reactivity negatively influence student teachers' teaching self-efficacy through their perceptions of their ability to cope, and most specifically through their perceptions of their ability to cope with their emotions. Notably, stress reactivity did not affect teaching self-efficacy through

individual perceptions of confidence for dealing with problems. This suggests that one's sense of efficacy for coping with emotions, rather than with specific problems or situations, contributes to a sense of efficacy in teaching.

Hypothesis 2: performance mediation model. Bootstrapped mediation analyses were also used to test the hypothesis that coping effectiveness (measured using the PCM, the mean of codes assigned to the TAT stories and TE narratives) mediates the relation between stress reactivity and external evaluations of student teacher effectiveness (measured using the SRM, the mean of ratings from the School Based Supervisors and the Professor Supervisors). Mediation analyses based on 5000 samples using bias-corrected bootstrapped 95% confidence intervals (Preacher & Hayes, 2004) showed that stress reactivity did not have a significant indirect effect on teaching effectiveness via performance coping as the 95% confidence interval for the estimates of the indirect effect included zero [LL= -.02, UL= .28]. Information regarding the bootstrapped confidence interval for the indirect effect can also be viewed in Table 13.

Although the indirect effect was *not* significant, examination of the specific regression coefficients within the proposed model suggests that some of the predicted relationships within the overall model were significant. Specifically, the PCM significantly predicted the SRM (B_b = *.60**, p < .01).* This suggests a direct connection between one's coping effectiveness and one's effectiveness as a teacher. It also suggests that coping influences the functioning and performance of teachers. The regression coefficients from the other pathways within the model were not significant, however, the significant positive correlation between stress reactivity and the PCM

has important implications for understanding the relation between self-reported stress reactivity and coping effectiveness using multiple methods of measurement. All regression coefficients can be viewed in Figure 8.

Performance model: TAT and Supervisor Rating Mean. Because the TAT (and not TE Narratives) was significantly correlated with stress reactivity it was decided to run an additional mediation analysis with only the TAT as a mediator, rather than the PCM. Specifically, the model investigated whether coping measured by the TAT mediated the relationship between stress reactivity and the SRM. Mediation analyses based on 5000 samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) showed that stress reactivity did not have a significant indirect effect on teaching effectiveness via the TAT as the 95% confidence interval for the estimates of the indirect effect included zero [LL = -.002, UL= .26]. It is important note to highlight that the lower limit of the confidence interval is very close to zero, which highlights the potential for an indirect effect, given a larger sample size. Regression coefficients for the proposed model can be viewed in Table 17 and Figure 9 below and revealed that the TAT significantly predicted the SRM (B_b = *.56**, p < .01).* When considering the overall model, it is important to keep in mind that the direction of effect from stress reactivity to coping differs across the self-report and performance models.

Exploratory Analyses

Analysis revealed that stress reactivity was positively correlated with performance coping and negatively correlated with self-rated coping competence, suggesting unique mechanisms and patterns of influence across the different models.

To further clarify the directions of influence, and to further explore the distinct role played by each specific measure of coping within the proposed models, additional analyses were run. Specifically, exploratory analyses sought to answer the question: does self-rated coping efficacy mediate the relation between stress reactivity and supervisor ratings (measured by the SRM)? And does performance coping (measured by the PCM) mediate the relation between stress reactivity and end of year teaching self-efficacy? Running analyses to answer these questions was determined to be important for drawing conclusions from the originally proposed models.

Through an examination of correlations, it was determined that it was not appropriate to utilize self-rated coping efficacy as a mediator of the relation between stress reactivity and supervisor evaluations of teacher effectiveness. Self-rated coping competence using the ACCQ was uncorrelated with the SRM, or with supervisor ratings from either the Professor Supervisor or the School Based Supervisor This suggests that performance coping and self-rated coping efficacy are not interchangeable for predicting one's effectiveness as a teacher from the perspective of the supervisor.

However, review of correlations suggested that it would be feasible to explore whether performance coping mediated the relation between stress reactivity and end of year teaching self-efficacy, as there was a significant correlation between stress reactivity and performance coping (as previously discussed), and performance coping and end of year teaching self-efficacy ($r_s = .28$, $p < .05$). Given the unique pattern of correlation it would be expected that the indirect effect would be positive.

Bootstrapped mediation analyses were used to test the exploratory model, which hypothesized that coping effectiveness (measured using the PCM, the mean of codes from the TAT stories and TE narratives) mediates the relation between stress reactivity and end of year teaching self-efficacy. Mediation analyses based on 5000 samples using bias-corrected 95% confidence intervals (Preacher & Hayes, 2004) showed that stress reactivity did not have a significant indirect effect on end of year teaching self-efficacy via performance coping as the 95% confidence interval for the estimates of the indirect effect included zero [LL= -.01, UL= .16]. However, examination of specific pathways within the model revealed that there was a significant positive effect of performance coping on teaching self-efficacy, that is, performance coping positively predicted end of year teaching self-efficacy (B_b = *.27*, $p < .05$).* This is a unique finding, as it highlights that performance measure of coping can predict both self-reported and supervisor reported measures of teaching effectiveness and is contrary to previous studies that propose significant relationships within, but not across, methods of measurement. Information regarding the bootstrapped confidence intervals for the indirect effect can be viewed in Table 13, and regression coefficients can be viewed in Figure 10.

Table 13
Standardized Bootstrapped 95% Confidence Intervals of the Indirect Effect

Mediation Models	Point Estimate	Bias-Corrected 95% Confidence Interval	
		Lower	Upper
Self-Rated Models			
Self-Rated, CCQ-Total	-.42	-.74	-.13
Self-Rated, CCQ – Emotion	-.21	-.46	-.02
Performance Models			
Performance Total (PCM, SRM)l	.13	-.02	.28
TAT and SRM.	.13	-.002	.26
Exploratory Model			
PCM and TSE	.05	-.01	.16

Note: The indirect is considered to be significant if the confidence interval does not include zero.

Table 14
Standardized Regression Coefficients for the Self- Rated Model with CCQ-Total

		Consequent						
		M (A-CCQ)				Y (TSE-Spring)		
Antecedent		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*
X (PSRS)	*a*	-.73	.06	.00	*c'*	.28	.16	.07
M (ACCQ)		--	--	--	*b*	.57	.19	.003

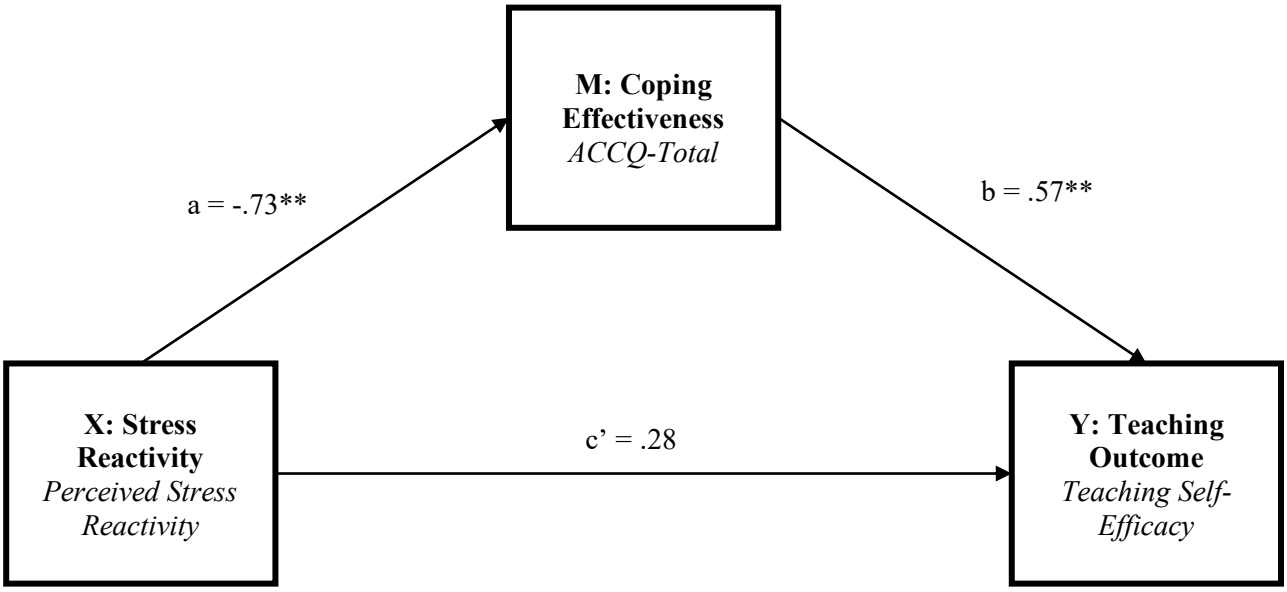

Figure 6. Standardized regression coefficients for the relationship between stress reactivity and self-rated teaching outcomes as mediated by self-rated coping effectiveness. * = $p < .05$, ** = $p < .01$

Table 15
Standardized Regression Coefficients for the Self- Rated Model with CCQ-Emotion

		Consequent						
		M (A-CCQ-Emotion)				Y (TSE-Spring)		
Antecedent		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*
X (PSRS)	*a*	-.62	.09	.00	*c'*	.08	.13	.56
M (ACCQE)					*b*	.34	.13	.00

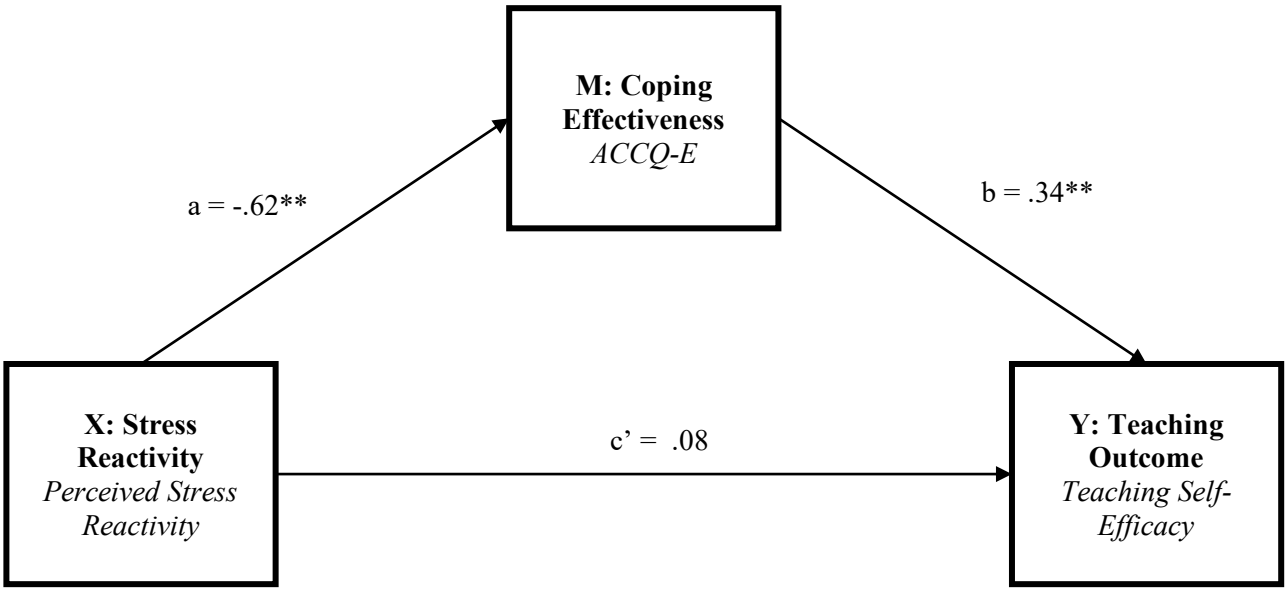

Figure 7. Standardized regression coefficients for the relationship between stress reactivity and self-rated teaching outcomes as mediated by self-rated coping effectiveness. * = $p < .05$, ** = $p < .01$

Table 16
Standardized Regression Coefficients for the Performance Model (Performance Coping Mean)

		Consequent						
		M (PCM)				Y (SRM)		
Antecedent		Coeff.	*SE*	*p*		Coeff.	*SE*	*p*
X (PSRS)	*a*	.22	.13	.08	*c'*	.07	.09	.45
M (PCM)					*b*	.60	.07	.00

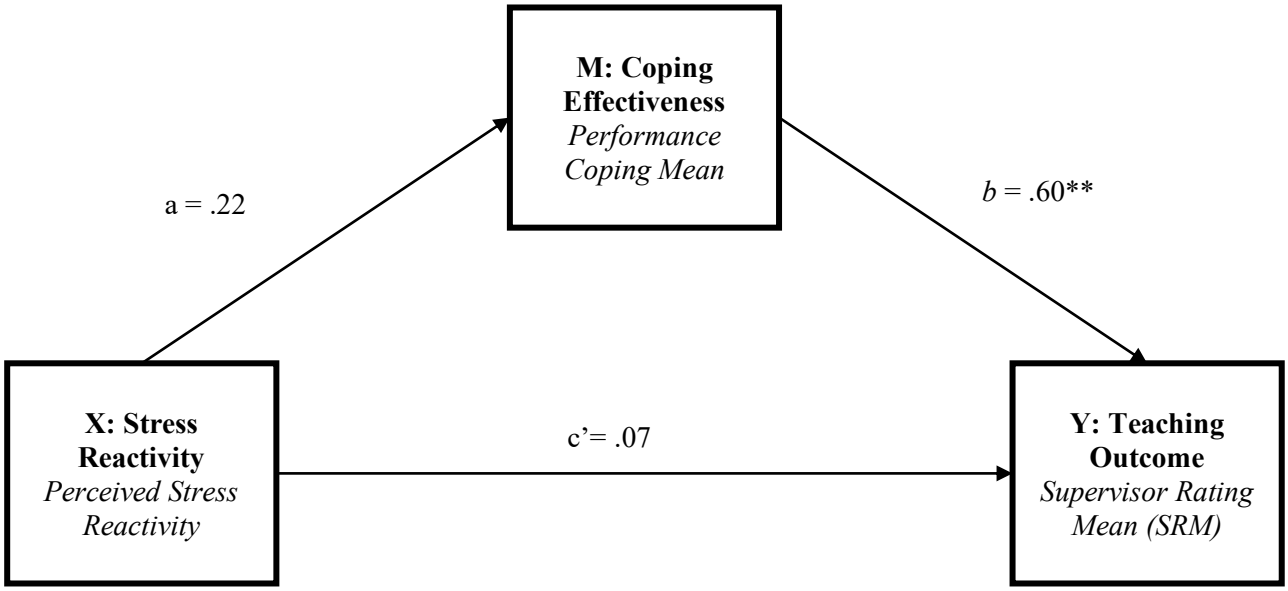

Figure 8. Standardized regression coefficients for the relationship between stress reactivity and supervisor rated teaching outcomes as mediated by coping effectiveness measured by the PCM. * = $p < .05$, ** = $p < .01$

Table 17
Standardized Regression Coefficients Model Coefficients for the Performance Model Using the TAT and SRM

	Consequent					
	M (TAT Cope)			Y (SRM)		
Antecedent	Coeff.	*SE*	*p*	Coeff.	*SE*	*p*
X (PSRS)	.23	.12	.06	.07	.09	.44
M (TAT)				.56	.07	.00

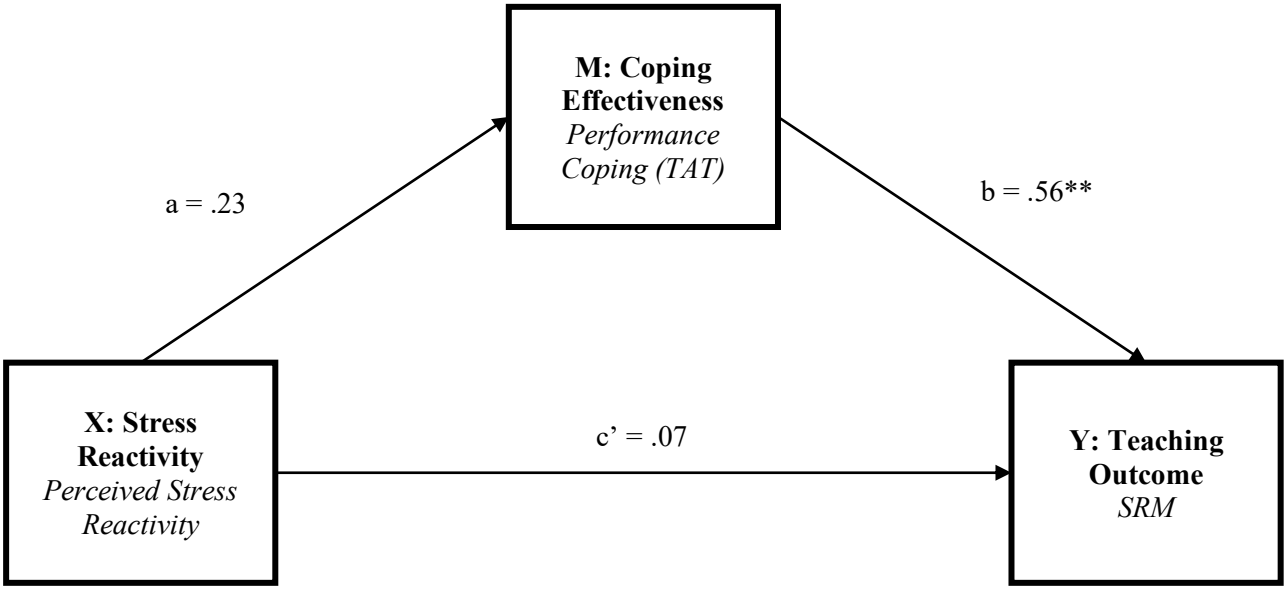

Figure 9. Standardized regression coefficients for the relationship between stress reactivity and the SRM as mediated by coping effectiveness measured by the TAT. (* = $p < .05$, ** = $p < .01$)

Table 18
Standardized Regression Coefficients Model Coefficients for the Mixed Measure Model Using the Performance Coping and Teaching Self Efficacy

	Consequent					
	M (PCM)			Y (TSE-Spring)		
Antecedent	Coeff.	*SE*	*p*	Coeff.	*SE*	*p*
X (PSRS)	.20	.13	.16	-.19	.12	.10
M (PCM)				.27	.12	.02

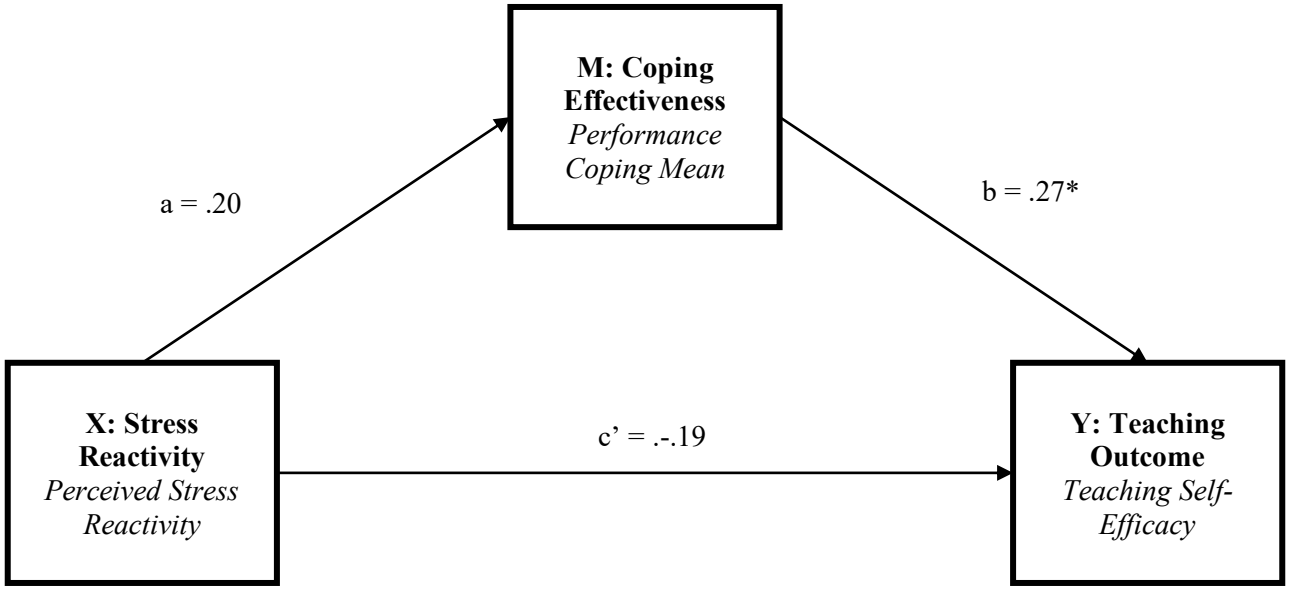

*Figure 10***.** Standardized regression coefficients for the relationship between stress reactivity and self-rated teaching outcomes as mediated by coping effectiveness measured through the Performance Coping Mean. * = $p < .05$, ** = $p < .01$

Evaluation of Model Fit for Self-Rated and Performance Models. When conducting structural equation modeling, indices of model fit provide an estimate of the model's ability to explain the relationships in the data (Kenney, 2015). However, when testing basic mediation models, fit statistics are typically not meaningful because the models are just-identified, which means that the number of free parameters is equal to the number of known values – thus, there are 0 degrees of freedom within the model. Hayes (2017) emphasizes this within his text on mediation. Specifically, he notes that within structural equation modeling and mediation models, the focus should be on "estimating the effects and interpreting them…Determining whether your model is the best fitting model you can justify is not the point. In fact, some models … are 'saturated,' meaning fit would be perfect when assessed quantitatively with various measures of fit used in structural equation modeling" (510). The quote by Hayes' applies to the models tested by the current study, as the quantitative methods used to estimate fit were all "perfect." This does not suggest that the models are perfect, but is instead a reflection of the fact that the model is saturated – that there are equal number of paths and variables. Within the current paper, Hayes' guidance will be followed, and the focus will remain on the estimation and interpretation of effects between the variables of interest.

Chapter 5: Discussion

As part of a larger project that followed student teachers during their year-long practical training and internship, the current study examined individual differences in stress reactivity and coping as contributors to the effectiveness of teachers in the classroom. Stress reactivity is characterized as an individual difference that influences the intensity, duration, and recovery of stress reactions, observable in both biological and behavioral processes. In contrast, coping is characterized as individual differences in the ways individuals respond to and manage external or contextual problems and internal reactions. The current study focused specifically on the *effectiveness* of coping efforts, how completely individuals are able to manage these demands.

As discussed in earlier sections of this paper, stress reactivity and coping efficacy are connected through research and theory. Broadly, stress reactivity affects how intensely individuals experience and perceive stress, which in turn is thought to affect whether, how, and how effectively individuals cope. Furthermore, research has generally demonstrated that those with higher levels of reactivity have lower levels of coping efficacy (Sladek et al, 2015; Schlotz et al, 2011), although other research has suggested that coping efficacy can serve as a protective factor for those who are more reactive (Drake et al, 2016) when looking at mental health outcomes.

Despite the theoretical connections that link stress reactivity and coping effectiveness, the current project is one of only a few that looks closely at the relationship between the constructs, and that identifies a pathway from stress reactivity to coping to individual functioning in a specific context. Specifically, it was predicted that coping effectiveness would mediate the relationship between stress

reactivity and teaching outcomes for student teachers. This general hypothesis is distinct from previous research on coping and reactivity, which primarily focuses on the *moderating* role of specific coping strategies (rather than coping effectiveness) on the relationship between stress reactivity and individual outcomes (e.g. Compas, Connor-Smith, & Jaser, 2004).

Given this broad prediction, the current study had two primary aims. First, the study sought to expand upon of a small body of research on the relationship between stress reactivity and coping effectiveness or efficacy by highlighting the role of coping as a potential mediator, stepping away from a prior focus of the moderating role of coping strategies. In doing so, the study hopes the results will help deemphasize the idea that certain coping behaviors are adaptive and others are maladaptive, and to focus on coping effectiveness will emphasize the importance of fit between strategies, an individual and the external problem. Second, the study sought to extend current research on coping by utilizing performance measures alongside self-report measures. The majority of coping research is reliant upon self-report, and by using performance measures of coping and teaching outcomes, the current study introduces a novel perspective and methodology for understanding the ways in which individuals handle stress and function in challenging contexts.

Setting the Stage: Preliminary Correlations

The broad hypothesis of the current study was that coping effectiveness mediates the relationship between stress reactivity and teaching outcomes, in other words, that stress reactivity indirectly affects teaching performance through its adverse effect on one's coping effectiveness. The current study tested this hypothesis

using two models, one using self-report measures and another using performance measures.

Preliminary correlational analyses suggest that the relationship between stress reactivity and coping effectiveness varies based on the source of data. Consistent with previous research based largely on self-report data (e.g. Sladek et al, 2016), stress reactivity was moderately and negatively correlated with self-rated coping efficacy. However, contrary to expectations, stress reactivity was *positively* correlated with the study's story-based performance measures of coping. These divergent patterns of associations between stress reactivity and coping in the current study demonstrate the importance of the source of information in measuring the constructs. It is also important to note that both self-rated and performance measures of coping, correlated with teaching effectiveness. Self-rated coping effectiveness was significantly and moderately correlated with teaching self-efficacy The PCM demonstrated a substantial association with supervisor ratings, the strongest effect size in the study, and a moderate correlation with teaching self-efficacy.

Self-perceptions of coping appear to be theoretically distinct from the perceptions of those outside the self, which is further underlined by the lack of correlation between the two kinds of measures of coping effectiveness. Preliminary correlational analyses highlight that although the two models presented by the current study are similar in structure relating the constructs, the direction of influence across the models is not consistent.

The distinction between self-ratings and ratings from others was also apparent in the study's measures of teaching effectiveness. Analysis revealed a significant but

moderate positive correlation between self-rated teaching efficacy and supervisor evaluations of the participants' effectiveness as teachers. This highlights that there is a connection between one's sense of efficacy and a subjective evaluation of their performance. However, it is important to note that a student teacher's sense of efficacy might be influenced by the feedback they receive from their supervisors throughout the year, since the current study uses teaching self-efficacy measures administered at the end of the year. However, because the two evaluations of effectiveness as teacher are only modestly correlated, it also appears that external evaluations of performance and self-ratings capture different facets of student teacher experience, and their performance in the classroom.

Overall, the preliminary correlations highlight that data gathered through self-report and external evaluations reflect distinct elements of complex constructs of coping and teaching effectiveness. This result is consistent with previous research that suggests that self-rated and measures such as narrative capture distinct elements of experience and are uncorrelated and predict unique outcomes (McClelland et al, 1989). These results have significant implications for the two models proposed by the current study. Although on the surface the self-rated and performance models are similar in structure, the distinct pattern of correlations between stress reactivity and the different measures of coping (self-rated and performance) suggests that the pathways within each individual model may lead to unique conclusions regarding stress reactivity, coping, and their contributions to individual functioning. Furthermore, when considered together, the two models may broaden the field's understanding of functioning under challenging circumstances, by capturing narrative

indicators of coping and functioning in a specific context as well as self-reported experiences of stress and coping. The following sections review results from hypothesis testing in the context of the broad body of literature on coping and stress reactivity.

Hypothesis Testing: Mediation Models

Hypothesis 1: Self-Rated Mediation Model. Hypothesis 1 predicted that self-rated coping effectiveness would mediate the relationship between stress reactivity and teaching self-efficacy. Specifically, it was expected that stress reactivity would negatively impact one's self-rated coping efficacy, which in turn would negatively impact end-of-year ratings of teaching self-efficacy. Results from bootstrapped mediation analyses using the overall coping self-efficacy score, and the coping self-efficacy for emotions score supported this hypothesis, and all paths within the model included the expected patterns of influence.

The findings from the self-rated model expand upon previous research on coping and stress reactivity in a number of ways. First, the bulk of prior research on coping and stress reactivity presents moderation models, where specific coping strategies are thought to moderate the relationship between stress reactivity and mental health outcomes. For example, a study by Connor-Smith and Compas (2004) highlighted that engagement coping moderated the relationship between stress reactivity and health outcomes, and another study by Paysnick and Burt (2015) revealed that problem focused coping moderated the relationship between stress reactivity and both internalizing and externalizing symptoms. However, by shifting focus to coping self-efficacy, a moderation model was no longer appropriate, and the

current study demonstrated a unique pattern of influence of stress reactivity on outcomes through coping efficacy not yet identified in the literature.

When viewed in the context of previous research, the demonstrated indirect effect illustrates that the relationship between coping efficacy and stress reactivity (and their impact on outcomes) may be *distinct* from the relationship between stress reactivity and specific coping strategies. Previous research showed that coping strategies are moderators of the relation between stress reactivity and mental health outcomes (e.g. internalizing symptoms). The mediation identified in the current study is a structurally distinct model that connects stress reactivity to context-specific functioning. The identification of a novel model opens the door to the real possibility that there is not a single model or single *type of model* that captures the relation between stress reactivity, coping, and individual functioning.

Second, because previous research on coping efficacy and stress reactivity is limited in scope, the current study expands on previous research (e.g. Sladek et al, 2016) that demonstrated negative *correlations* between stress reactivity through the identification of a significant negative pathway between stress reactivity and coping efficacy.

The direct impact of stress reactivity on coping self-efficacy fits within the broader context of theory on stress reactivity and functioning under conditions of stress. Strelau (2008, 2011) introduced the idea that individual differences in stress reactivity influence individual perceptions of how stressful or how challenging situations or contexts are, and in turn influence the behaviors individuals engage in under challenging conditions, specifically, that individuals who are more reactive

would have to engage in additional regulatory behaviors to manage their emotional reactions to stress. Wadsworth and Berger (2006) suggested that high levels of stress reactivity might reduce the personal resources available for effective coping.

When considered together, these theories point to the idea that those who are more reactive must utilize more strategies to manage both their internal experience and the external problem, and given finite personal resources, they may experience less effective coping overall. Results of the self-rated model are consistent with this theory. Results revealed that elevated levels of stress reactivity contributed to lower levels of overall coping self-efficacy, and self-efficacy for coping with emotions. However, findings from the performance model suggest that the relations are measure specific and warrant closer examination of what measures reveal about the constructs and how particular aspects of a broader construct might be related. A key finding is that perceived stress reactivity was positively correlated with coping coded from the TAT, a finding that will be discussed in a subsequent section.

Third, the distinction between the confidence and emotion factors of the coping self-efficacy measure, and the fact the that one contributed to one's efficacy as a teacher and the other does not, has implications for how self-efficacy as a construct is understood. That is, one's confidence about their ability to solve problems in the future did not appear to affect one's sense of self efficacy as a teacher, while their sense of how well they cope with their emotions did. In some ways, this re-frames the distinction between emotion focused and problem focused coping so popular in the literature. What is new, and different, when compared to previous literature is that it does not identify specific behaviors, and instead evaluates efficacy for managing both

emotions, and problems as they arise in the future. The results suggest that for coping with one's emotions is *especially* important for functioning as a teacher or in a specific work context. This stands in stark contrast to extant strategy-focused coping research, which often frames emotion focused approaches as a "less adaptive" strategy option in times of stress (Glidden & Natcher, 2009).

Finally, previous research on coping and stress reactivity (as both independent and connected constructs) has most commonly utilized self-rated mental health outcomes, including symptoms of depression (Hankin et al., 2010), anxiety (Dragan et al., 2012; Strelau & Zawadzki, 2011), PTSD (Strelau & Zawadzki, 2005), physical health symptoms (DeLongis, Folkman, & Lazarus, 1988) and general internalizing or externalizing symptoms (Connor-Smith & Compas, 2004). Although self-efficacy for teaching is a self-rated construct, unlike the mental health outcomes identified above, it is context specific – a person's perception of their ability to perform expected tasks relevant to their role as a teacher. By demonstrating the effect of stress reactivity and coping efficacy on end of year teaching self-efficacy, a pathway between reactivity, coping, and teacher functioning in a specific context is suggested, which connects stress reactivity to functioning in a specific context in a way that is rarely demonstrated in research. Furthermore, because teaching self-efficacy was the only self-rated variable that was significantly correlated with supervisor evaluations of teacher performance, there is potential *practical* significance of the self-rated model beyond individual subjective self-perception, with real implications for teacher effectiveness in the classroom.

Hypothesis 2: Performance Mediation Model. Hypothesis 2 posited an indirect effect of stress reactivity on supervisor evaluations of student teachers through performance measures of coping effectiveness (TAT stories and TE narratives). During preliminary analyses, the positive correlation between stress reactivity and coping effectiveness was contrary to expectations and led to a rethinking about the relation between these two variables in the performance model. Unlike the self-rated model, which described and identified a significant *and negative* indirect effect of stress reactivity, in the performance model, the indirect impact of stress reactivity was now expected to be in the positive direction. Thus, overall, it was expected that stress reactivity would positively impact performance measures of coping, which in turn would have a positive impact on supervisor evaluations of teacher effectiveness.

Although the overall model, and a follow up exploratory model, were not significant, analyses did yield results that warrant discussion. First, the positive pathway from performance coping to supervisor ratings of effectiveness was as expected and is generally consistent with the literature showing positive relations between coping and outcomes. In the upcoming section, the significant pathway from performance coping to supervisor evaluations is examined, and the significance of the use of performance measures is reviewed. Second, it is especially important to explain the positive (rather than negative) pathway from stress reactivity to performance coping, given that it is contrary to results from the self-rated model. Potential explanations for this unique pattern of correlation, including the role of the coding system, are discussed below.

The significant pathway from performance coping to supervisor evaluations of teacher effectiveness expands upon current coping literature in a number of ways. First, the use of the two performance measures of coping within the model represents a novel and promising approach for understanding the ways in which individuals operate under stress. The inclusion of the performance measures answers the calls from Compas (2017) who noted the exclusive use of self-report measures of coping, and from Litt, Tennen, and Affleck (2011) who noted the limitation of Likert scales for understanding coping, particularly their inability to capture the full coping process.

Through stories, the performance measures of coping (TAT, Teaching Narratives) provide an evaluation of aspects of the coping process identified in theory: appropriate appraisal, strategy selection and adjustment, and the overall appropriateness of the appraisal and coping efforts given the context and the person. Results revealed a significant positive correlation between the codes assigned to TAT stories and the codes assigned to individual teaching narratives, which suggests that there is an underlying structure in the way individuals appraise, describe, understand, and resolve tension – regardless of whether they are describing actual events or telling a fictional story. That is, although the stimulus is different, the structure of the story, the way the challenges are resolved, is what connects the two performance measures. The common and consistent structure suggests that narrative may represent a reliable and theoretically valid alternative for measuring coping, that is sensitive to the nuance and complexity of the coping process, in the way that structured Likert scales are not. Furthermore, McGrew and Teglasi (1990) found that the structural

characteristics of stories, including how individuals understand and resolve tension (i.e. cope) provides insights into mental health status and targets for therapy. The common structure across TAT stories and personal narratives suggests that the same framework for support and treatment could be extended to stories individuals tell about their own experiences.

Second, the finding that performance measures (both the composite and the TAT on its own) predicted teaching outcomes connects coping to performance and functioning in a specific context. The finding expands upon previous correlational research by Kim (2017) by establishing that performance coping positively predicts evaluations of student teacher performance. Furthermore, the findings illustrate that the coping process identified through performance measures is not only consistent across the TAT stories and the TE narratives but that identified patterns in this coping process contribute to functioning and performance in one's job. This finding contributes to a small body of research that connects self-rated coping behaviors with performance outcomes like class grades (Hsieh et al., 2012), GPA (Nounopoulos et al., 2006), or work performance (Rabenu et al., 2016). However, the current study adds a novel dimension to this research by focusing on coping effectiveness and by utilizing a performance measure of coping rather than a self-rated one.

The predictive pattern is consistent with prior research on motivation that demonstrates that performance measures predict performance outcomes (McClelland et al., 1989). However, within the current study, it is important to consider *why* performance coping predicts supervisor evaluations, especially when analysis revealed *no* correlation between self-rated coping effectiveness and supervisor

evaluations. It seems possible that the unique "read out" of experience provided through narrative reflects the problem-solving processes participants apply to their work in the classroom, and that are evaluated by the student teacher's supervisors. This could reflect the idea that the general coping schema identified through narrative play out in real life in a way that impacts job performance. Another possibility relates to the level of detail available through different measures. Self-rated measures are limited in the breadth of information they provide, while performance measures of coping allow for an evaluation of the entire process. It also seems possible that the information used to evaluate coping in performance measures is closest to the information used to evaluate performance as a teacher – context and the appropriateness of behavior are evaluated in a way that is not possible, and likely missed, when individuals are asked to evaluate their own patterns of coping.

It is crucial to examine the positive correlation between stress reactivity and the story-based performance coping measures. Although the regression coefficient between stress reactivity and performance coping within the mediation model was nonsignificant, the significant positive correlation between the two variables is of note and has implications for the field's understanding of coping and stress reactivity. Results suggest that those who rate themselves as more reactive *also* receive higher coping scores for their TAT stories and teaching narratives, suggesting that higher reactivity leads to better coping, which is contradictory to the self-rated results, and the idea that a higher level of reactivity makes it more difficult for individuals to cope appropriately.

There are some possible explanations for this pattern of results and the discrepancy between the two approaches to measurement. For example, developmental research on stress reactivity posits a bivalent "U shaped" relationship between reactivity and negative outcomes (Ellis & Boyce, 2008). In other words – the theory proposes that there is an optimal level of reactivity for adaptive functioning, that reactivity levels that are too high *or too low* are associated with negative outcomes. It is possible that the positive relation between stress reactivity and performance measures of coping align with this theory, particularly because the current population is non-clinical, and likely does not have clinically high or clinically low levels of stress reactivity.

Furthermore, it seems possible that the performance coping coding system rewards participants with an "optimal" level of reactivity. That is, the narrative coding system might be sensitive to an *adaptive* higher level of reactivity, and rate those with slightly higher levels of reactivity as better copers, due to their sensitivity to and awareness of potential problems. For example, a student teacher who is alert and sensitive to potential problems might be more equipped to cope with them effectively, and this sensitivity might result in a better evaluation of coping within the narratives, compared to a student teacher who is not sensitive to or aware of potential problems in the context of teaching. That is, there may be an optimal level of reactivity that makes individuals sensitive to problems, but not overwhelmed by them. It seems possible that the structured coding system rates individuals at this optimal level as better copers, able to cope with their "just right" emotional reactivity *and* the challenges they face in the classroom.

Stress reactivity and coping effectiveness across methods of measurement. Given the unique pattern of relation between stress reactivity and the two measures of coping effectiveness used, it seems possible that the implications of stress reactivity for one's subjective experience of coping efficacy and another's objective evaluation coping effectiveness are at odds. This complicates the "clean" interpretation of the results of the self-rated model in the current study and those identified in prior research that might suggest that higher levels of stress reactivity reduce one's coping effectiveness (e.g. Sladek et al, 2016, Wadsworth and Berger, 2006). The positive correlation between stress reactivity and performance coping suggests that a higher level of reactivity is associated with complete and effective coping in a non-clinical sample, but only when coping is evaluated by someone external to the participant. In contrast, the negative relationship between stress reactivity and self-rated coping suggests that higher reactivity contributes to lower self-perceptions of coping effectiveness. These divergent results raise important questions about where the "truth" lies when measuring one's effectiveness as a coper, and how varied approaches measurement can inform the field's understanding of individual differences in responses to stress.

First, do higher levels of stress reactivity *always* contribute to lower levels of coping effectiveness? Or do results suggest that stress reactivity affects one's appraisals of their ability to cope, their self-efficacy for coping, rather than their true performance? Given that stress reactivity is known to influence appraisals of problems and stress (Strelau, 2008), it seems possible that it could also negatively influence the ways in which individuals appraise and rate their own ability to address

the problems they face. Furthermore, the significant positive correlation between stress reactivity and performance measures of coping effectiveness suggests that there may be benefits to a certain level of reactivity, that being concerned about or alert to potential problems may benefit coping and subsequent functioning under stressful conditions.

The idea that lower reactivity might have negative impacts on functioning is consistent with results from a study by Ginty and colleagues (2015) who revealed that those who demonstrated diminished or very low levels of physiological reactivity were less likely to complete a simple follow up for a research study. The authors concluded that individuals with diminished reactivity demonstrated reduced perseverance and behavioral control. It seems possible that this effect may be captured through performance measures of coping and outcomes and warrants further research and follow up to understand the ways in which high (or low) reactivity might influence functioning and perseverance under challenging conditions.

Second, given that performance coping measures and self-rated coping are distinct, what are the theoretical implications of someone who is identified as an effective coper through performance measures, but demonstrates poor coping self-efficacy when asked to evaluate themselves? If a person experiences low coping self-efficacy, does it matter for their functioning or well-being if they demonstrate effective coping on performance measures? Given the pathways within the models above, it appears that performance coping contributes to job performance and self-efficacy for teaching, but is uncorrelated with self-efficacy for coping. There is some precedent that unique *combinations* of performance and self-rated measures as

predicting unique outcomes. For example, research that utilized performance and self-rated measures of aggression motives demonstrated that the two measures of motivation *interacted* to predict actual aggressive tendencies (Frost, Ko, & James, 2007). As the body of coping literature continues to integrate and utilize novel measures, it may be important to consider the relationship between performance and self-rated measures of coping, as they appear to capture distinct facets of the complex constructs.

Together, the discrete findings from the performance and self-rated models reinforce the call from Compas et al (2017) for expanded and novel methodology for understanding the ways in which individuals cope, and how coping contributes to outcomes. Although the body of literature on self-reported coping is robust, there is limited research examining coping through other methodology, and the current study provides a first foray into expanded methodology grounded in the definition and theory surrounding coping literature.

Exploratory Analyses: Interchangeability of Mediators

An additional model was run to explore whether performance and self-rated measures of coping are interchangeable as mediators within the models. The purpose of this analysis was to highlight the unique mediating role and mechanism of performance and self-rated measures of coping. Given a lack of correlation between self-rated coping efficacy and supervisor evaluations, it was not possible to test mediation. However, performance coping demonstrated a positive correlation with teaching self-efficacy, so it was possible to examine mediating role of performance

coping between stress reactivity and teaching self-efficacy, although results revealed no significant indirect effect.

However, examination of regression coefficients revealed a positive pathway from performance coping to teaching self-efficacy, which suggests that the performance coping measure and the self-report measure are not interchangeable within the models. Furthermore, results might suggest that the performance measure of coping captures is sensitive to many dimensions of coping, associated with both subjective self-rated and objective external evaluations of performance as a teacher, but that it does not mediate the relation between stress reactivity and teaching self-efficacy in the same way that the self-rated model does.

Implications for Early Career Teachers

Within the previous discussion, implications of the current research for coping and stress reactivity literature were identified. However, the current research also provides important insights into the experience of student teachers and for the development of supports for student teachers faced with challenges of a classroom.

Results of the current study point to the role of reactivity and one's ability to cope in one's job performance. Because didactic time is limited for student teachers, instruction is primarily focused on helping student teachers develop core competencies (Grossman, Hammerness, & McDonald, 2009) so that teachers are ready for the practical elements of the job. Although the current study recognizes that these core competencies will remain a crucial element of teacher training, results suggest that interventions tailored to a trainee's individual level of emotional reactivity, and the ability to cope with that reactivity, could be a targeted support for

teachers that could have a positive impact on their performance and efficacy in the classroom. That is, for teachers to effectively implement the skills and demonstrate the core competencies that are the focus of training programs, they must be made aware of their own reactivity to challenge and find ways to manage it.

There is emerging research on the potential effectiveness of mindfulness and guided relaxation for targeting and reducing stress reactivity. Lindsay and colleagues (2018) demonstrated that in combination, the monitoring and acceptance of emotions components of mindfulness training effectively reduce biological measures of stress reactivity, above simple monitoring alone. Furthermore, Unger (2017) noted that those who were highly reactive benefitted *more* from guided relaxation interventions when compared to individuals who were less reactive. This suggests that although those that are highly reactive may struggle more under challenging conditions, they may also benefit significantly more from interventions and targeted support.

Beyond recent mindfulness research, McClowry (1998) emphasized the potential utility of temperament focused interventions for children. Temperament based interventions have demonstrated some success in improving behavior and outcomes for child populations (e.g. INSIGHTS program, see Mccormick, Connor, Cappella, & Mcclowry, 2015). Extending the principles and insights that guide child-focused interventions may be effective in supporting student teachers who are struggling to manage their own reactions in the classroom. Overall, given that the pathway of influence in the current study *begins* with stress reactivity it follows that taking it into consideration when working to support individuals coping with stress may be especially important.

Teaching is an emotionally draining job, as teachers often find themselves balancing a broad range of responsibilities including teaching, supporting, comforting, and disciplining students. The current study highlights that for those who are more reactive to such stress, there are negative outcomes in job performance and effectiveness in the classroom. This result is consistent with the findings of a meta-analysis from Montgomery and Rupp (2005), which highlighted that teacher *emotions* play a major role in how they respond to external stressors, and that emotions in particular may "play a central role for understanding the intricate relationship between stress, burnout, personality, and support variables" (83). Although not discussing reactivity explicitly, their conclusion is consistent with the results of the current study – that addressing teacher's reactivity and emotions may be an important strategy for reducing stress and burnout. Results of the current study add to this understanding by highlighting that a pattern of stress reactivity and emotion has effects early in the careers of teachers, in fact, before a teaching career officially begins.

Results lend support to the model of a "Prosocial Classroom" introduced by Jennings and Greenburg (2013). Within the Prosocial Classroom framework, the authors emphasize the importance of social and emotional competence (SEC) for teachers for effective teaching and student learning and advocated for promoting teacher well-being and targeting social-emotional competence as an intervention to support teachers and improve student outcomes. Results of the current study lend support to the model proposed by Jennings and Greenburg (2013), as individual differences in stress reactivity were shown to have an (indirect) effect on

effectiveness in the classroom through coping. The finding, when viewed in the context of the prosocial classroom model, suggests that teacher emotional well-being and stability are a crucial foundation for building teaching skills and running an effective classroom.

Beyond the effect of stress reactivity on the practice and effectiveness of student teachers, results of the current study have implications for teacher training programs and how to *interpret* the self-ratings and described experiences of their students. Because the correlation between self and supervisor related effectiveness was only modest, it may be important to consider the factors that influence a student teacher's sense of efficacy. Literature in other fields suggests that self-efficacy is not correlated with actual skills and performance (Sharpley & Ridgeway, 1993), while other research suggests that individual differences can inflate or depress one's sense of efficacy (Bandura, 1994). Teacher training programs may benefit if they consider these nuances when asking students to self-reflect.

The utility of the narrative coding system for predicting the effectiveness of student teachers also has implications for how teacher training programs use written self-reflection. When asking student teachers to reflect on their teaching practices through writing, training programs may benefit from being alert to *how* student teachers describe their experiences in the classroom, alongside *what* experiences they describe. As teacher trainers build their awareness of the potentially problematic coping processes evident in teacher stories, they may be able to tailor supports or connect students to resources beyond a focus on core competences.

Conclusions

Overall, many aims identified at the onset of this project were achieved, and additional insights were gained. First, in line with the first aim, the current study results contributed to the field's understanding of the relation between stress reactivity and coping efficacy. The self-rated model demonstrated that stress reactivity influenced teaching self-efficacy through self-rated overall coping effectiveness. This mediation effect represents a new dimension of coping research focused on effectiveness of strategies for a specific person, expanding beyond previous studies focused on the moderating role of coping strategies on the relationship between reactivity and mental health outcomes.

The second aim of the study was to connect stress reactivity utilize novel approaches to measurement and outcomes to expand upon a body of literature based almost entirely on self-reported predictors and self-reported mental health outcomes. This aim was partially achieved. Results from the self-rated model were significant and stress reactivity and coping predicted teaching self-efficacy, a context specific variable (although still self-rated). Although the overall model was not significant, performance coping predicted external evaluations of student teacher performance. The outcomes, teaching self-efficacy and teacher performance, were both at least partially predicted by the coping variables and/or stress reactivity. This opens avenues for understanding the influence of reactivity and coping on *practical* outcomes in specific contexts, and performance under stress.

A novel and unexpected contribution of the current study was the identification of unique mechanisms across performance and coping measures. Stress reactivity demonstrated divergent patterns of correlation the two measures of coping

effectiveness. Unlike self-rated coping competence, which demonstrated a negative correlation with stress reactivity, performance coping demonstrated a positive correlation with stress reactivity. This highlights that the two measures of coping capture distinct aspects of coping, and that narrative coping measure may be sensitive to the phenomena outlined by Ellis and Boyce (2008) that there is an *optimal* level of reactivity – that extremely low or extremely high levels of reactivity are problematic. It seems possible that in a new context, being reactive and sensitive to potential new challenges may lead to a higher level of coping effectiveness, when evaluated by an outside source.

Overall, the current study highlights the role of reactivity and coping for student teachers during their training and provides a window into the complex and challenging experiences they face in the classroom. The identified pathway from stress reactivity to teacher self-efficacy may have significant implications for understanding the early origins of burnout. However, the unique correlation between stress reactivity and performance coping points to potential advantages to a certain level of reactivity, which suggests that while some students might benefit from a reduction in reactivity, a small subset might benefit from heightened awareness and sensitivity to potential challenges or stressors.

In this vein, results from this study can be used to inform individualized interventions for student teachers targeted at varying levels of reactivity, with the goal to improve one's awareness, resilience, and their ability to manage and cope with their emotional reactions. Teachers are trained to focus on the "whole child" when providing instruction. In this vein, the current study highlights that school

administrators and teacher trainers should seek to develop resources, interventions, and supports that focus on the "whole student teacher," to promote success and reduce burnout during internship and beyond.

Challenges, Limitations, and Future Direction

Challenges. A major challenge in the current study that warrants discussion is translating an ordinal and qualitative coding system for use in quantitative statistical analysis. To obtain a reliable estimate of student teacher coping, TE narratives and TAT stories were coded and averaged. This allowed for an estimate of coping over time. However, in creating the composite score, the ordinal nature of the original coding system was lost. Although the mean score provided more nuance, it also complicated decisions regarding which types of analysis were most appropriate. Although Spearman rank-order correlations were still possible with the mean scores, preserving the ordered nature of the data, it was not possible to run the mediation analysis to account for the ordinal nature of the original data. And, given the mean scores produced a broad range of values, it would likely not have been appropriate to do so.

Furthermore, similar to other ordinal data, it is not entirely clear that the "distance" between the levels of the coding systems (those used by researchers to code stories and those used by professors to evaluate the student teachers) are equal. That is, is the actual change captured between a 1 and a 2 code, equal to the change captured by between a 2 and a 3 code. Although there was a basic assumption that this was the case, this warrants further examination and exploration going forward, especially if mean scores are the continued method of calculating an overall score.

Limitations. Although the current study contributes important insights to research on coping, stress reactivity, and teacher development, there are limitations in the methodology that need to be recognized, beyond the identified challenges related to the data.

First, the adjustments made to the Coping Competence Questionnaire to develop the Adapted Coping Competence Questionnaire resulted in changes to the overall structure of the scale. Although preliminary factor analyses and validation of the new scale were conducted, it is important to recognize that the scale has not yet been validated in a comprehensive way beyond the participants in the current study. Furthermore, the adapted scale was not compared to the original measure, which limits the study's ability to conclude that it measures a comparable construct. However, changes were made because of the study's interest in coping with less extreme emotions, so it would not be expected that the original and adjusted measure would demonstrate a high level of correlation. Overall, the limitations related to the CCQ suggest that conclusions based on the self-rated model must be made with some hesitance, since further validation is necessary to inspire full confidence in the adapted measures.

Other limitations with the current study relate to participant completion of the weekly writing tasks. First, not all participants completed the same number of weekly writing prompts. Although most completed the designated number, there were others who completed fewer prompts. Thus, composite scores were created using an uneven number of scores across participants. It is not clear how the different rate of

completion affected scores, but the inconsistency across participants might introduce an unknown amount of variability to the performance assessment of coping.

Another limitation related to the weekly writing prompts relates to the amount of time spent writing. Although participants were expected to write for a full fifteen to twenty minutes, because the participants completed the prompts at home, it was not possible to verify that participants spent the full time allotted to write. In fact, giving the significant variability in the length of stories, it seems likely that all participants did not write for equal amounts of time. Finally, TE narratives provide useful insight into what is important and significant to individual teachers. However, the open-ended nature of the writing prompt presents some challenges in that there is no common stimulus to allow for objective comparison of their written responses, and they might not choose to write about their most stressful or most challenging experiences.

Although the current study was focused primarily on the *subjective* experience of stress reactivity, measured through self-report, it is important to recognize that it does not capture the biological or adrenal processes that that are assessed in other studies that examine the effects of stress reactivity. It is not known whether the current results would generalize to other measures of stress reactivity, or whether the current study's measure of stress reactivity are analogous to different biological measures of stress that capture the underlying biological processes. Future research might address this limitation by examining and utilizing different measures of stress reactivity within similarly structured models.

It is *possible* that the current study does not capture the full range of student teacher experience. First, students interested in writing or journaling to process their feelings may have been more likely to decide to participate in the study, so results may be more representative of a subset of the population interested in sharing their experiences through writing. Second, given the time demands associated with the long-term participation in the current study, it is possible that the students with the greatest demands on their time, or the highest levels of concern or stress, did not elect to participate. However, given the wide range of responses and levels of stress reactivity, it is believed that the current study captures a wide range of participants with varying levels of reactivity, coping, and teaching effectiveness.

The MPlus code used for data analysis represents a potential limitation in the current study. Adjusted error terms to account for possible clustered data were not used in the MPlus code for current analyses. Future iterations of the current study may benefit from the use of adjusted error terms to account for the potential effects for the clustering of data around different cohorts.

A final limitation of the current study is the simplification of the idea of teacher effectiveness. When asked to evaluate student teachers, supervisors were given a single item, through which they were asked to rate the participants' general effectiveness as a teacher. This simple question stands in contrast to the more complex evaluations used in literature focused on the training of skilled and effective teachers. Within teacher training literature, novice teachers are evaluated on a broad range "core competencies" (Grossman, Hammerness, & McDonald, 2009). Although within the current study the broad estimate of effectiveness provided insight into the

relationship between stress reactivity, coping, and functioning as a teacher from a psychological perspective, including metrics consistent with those used in teacher effectiveness literature would have built a stronger connection between the findings and extant literature on factors that contribute to teacher effectiveness. Future iterations of the study may benefit if literature on "core competencies" are integrated into the discussion and models.

Future Directions. Based on the results and identified limitations of the .current study, a number of avenues for future research have been identified. First, because the performance model appeared to approach significance, further exploration and examination of the variables within the performance model is warranted. Continued examination of this relationship is especially important given the unique positive association between stress reactivity and performance coping (compared to the negative association identified between stress reactivity and self-rated coping efficacy). The results of the current study point to potentially unique mechanisms of action across performance and self-rated measures and follow up with a larger number of participants may provide increasing clarity on this topic, and contribute to a field that compares distinct methods of measurement (e.g. Spangler, 1992, McClelland et al, 1989).

Although the current study follows student teachers over the course of their training year and obtains some perspective on their development over time, future research should expand upon this research by closely examining long-term teaching outcomes related to coping and stress reactivity, and answer research questions focused on the causal connections between stress reactivity, coping efficacy, and

teacher burnout. Although the current study provides important insight into the development of teachers during their training, and their effectiveness at the end of this training, it is limited in its ability to identify the ways this translates into participants' independent work as teachers afterward. Future studies will examine this connection more closely and identify whether certain patterns of coping efficacy, stress reactivity, and teaching performance contribute to job performance, job stress, and the intention to continue teaching in early career teachers.

Another dimension to consider for future iterations of this study is the kinds of teaching outcomes used. In particular, the teaching outcome measures used were not analogous across the self-rated and performance models. That is, the teaching self-efficacy scale included a range of specific teaching practices for which teachers were expected to evaluate their effectiveness. In contrast, the performance measure was a single, broad evaluation of overall effectiveness. Although the two items were correlated, they are not equivalent measures of student teacher performance, and thus may capture slightly different dimensions of student teacher effectiveness.

Given this mismatch in outcome measures, based on the results of the current study, it is unclear how individual teaching skills contribute to broad ratings of teaching efficacy or effectiveness. In future studies, it would be informative to include a single, broad self-evaluation completed by student teachers to compare to the supervisor evaluation *and* a specific, skill-based measure completed by student supervisors. Such measures could further inform the field's understanding of the relation between self-rated and supervisor rated effectiveness as a teacher. Beyond this, the research could also be informative regarding what specific skills contribute

to appraisals of one's overall level of teaching effectiveness or efficacy. Expansion of the study in this way would also align more closely with current practice in teacher training programs, through which student teachers are evaluated on a variety of core competencies considered crucial for success as a teacher (Seidel et al, 2015).

Future research should also examine the Adapted Coping Competence Questionnaire in greater depth, and work to validate it is a measure of coping self-efficacy. Doing so would potentially fill a void in coping literature, which primarily includes context specific or strategy specific coping efficacy, rather than capturing a general sense of efficacy for the ability to manage emotions or tasks, without specific consideration of the strategies used.

Lessons Learned

Findings of this project were remarkably consistent with the clinical literature on assessment and with the author's professional clinical experiences. The project highlighted the importance of using multiple approaches to measurement for understanding people, both in research and in clinical practice, that a complete story of a person is told only through multiple perspectives. This insight translates to the practice of psychology and underscores the importance of using both standardized and qualitative measures to understand clients and participants.

The project highlights the importance of narratives for a complete understanding of experience. Perhaps more telling than the content of the story is the structure and patterns of understanding apparent *across* stories, patterns that shape the ways individuals make meaning of their lives and challenging experiences. This is important for both the practice of psychology as a clinician and the conclusions

drawn about narratives from this research. The stories of student teachers provide insights into stresses and coping processes that may be relevant for any person transitioning from student to independent practitioner. What is most important to understand coping is not what the story is about, but how it is told.

Finally, although the insights gathered through narrative are important and provide a window into individual functioning, it is recognized that the integration of this methodology with more quantitative does not come without challenges and will be an ongoing process within the field of psychology. Current methods of analysis are built for the quantitative self-report measures; but staying confined within that box limits understanding of the full human experience. Future work should continue to build the bridge between quantitative methodology and qualitative evaluations of constructs for a more complete picture of individual functioning.

Appendices

Appendix A: Study Measures

Perceived Stress Reactivity Scale, Schlotz et al (2011)

	Item	Possible Responses
1	When tasks and duties build up to the extent that they are hard to manage…	○ I am generally untroubled ○ I usually feel a little uneasy ○ I normally get quite nervous
2r	When I want to relax after a hard day at work…	○ This is usually quite difficult for me ○ I usually succeed ○ I generally have no problem at all
3	When I have conflicts with others that may not be immediately resolved…	○ I generally shrug it off ○ It usually affects me a little ○ It usually affects me a lot.
4	When I make a mistake…	○ In general, I remain confident ○ I sometimes feel unsure about my abilities ○ I often have doubts about my abilities
5r	When I'm wrongly criticized by others…	○ I am normally annoyed for a long time ○ I am annoyed for just a short time ○ In general, I am hardly annoyed at all
6	When I argue with other people…	○ I usually calm down quickly ○ I usually stay upset for some time ○ It usually takes me a long time until I calm down
7	When I have little time for a job to be done…	○ I usually stay calm ○ I usually feel uneasy ○ I usually get quite agitated
8r	When I make a mistake	○ I am normally annoyed for a long time ○ I am normally annoyed for a while ○ I generally get over it easily
9	When I am unsure about what to do or say in a social situation	○ I generally stay cool ○ I often feel warm ○ I often begin to sweat
10r	When I have spare time after working hard	○ It is often difficult for me to unwind and relax ○ I usually need some time to unwind properly ○ I am usually able to unwind effectively and forget about the problems of the day
11r	When I am criticized by others	○ Important arguments usually come to my mind when it is too late to still make my point ○ I often have difficulty finding a good reply ○ I usually think of a reply to defend myself.

12	When something does not go the way I Expected	○ I usually stay calm ○ I often get uneasy ○ I usually get very agitated
13r	When I do not attain a goal	○ I usually remain annoyed for a long time ○ I am usually disappointed, but recover soon ○ In general, I am hardly concerned at all
14	When others criticize me	○ I generally don't lose confidence at all ○ I generally lose a little confidence ○ I generally feel very unconfident
15r	When I fail at something	○ I usually find it hard to accept ○ I usually accept it to a degree ○ In general, I hardly think about it
16	When there are too many demands on me at the same time	○ I generally stay calm and do one thing after the other ○ I usually get uneasy ○ Usually, even minor interruptions irritate me
17r	When others say something incorrect about me	○ I usually get quite upset ○ I usually get a little upset ○ I usually don't get upset
18r	When I fail at a task	○ I usually feel very uncomfortable ○ I usually feel somewhat uncomfortable ○ In general, I don't mind
19r	When I Argue with others	○ I usually get very upset ○ I usually get a little bit upset ○ I usually don't get upset
20r	When I am under stress.	○ I usually can't enjoy my leisure time at all ○ I usually have difficulty enjoying my leisure time ○ I usually enjoy my leisure time
21	When tasks and duties accumulate to the extent they are hard to cope with	○ My sleep is unaffected ○ My sleep is slightly disturbed ○ My sleep is very disturbed
22r	When I have to speak in front of other people	○ I often get very nervous ○ I often get somewhat nervous ○ In general, I stay calm
23	When I have many tasks and duties to fulfill	○ In general, I stay calm ○ I usually get impatient ○ I often get irritable

Coping Competence Questionnaire

Coping Competence Questionnaire (Original, Schroder and Ollis, 2013)
Rate 1-6, from Very Uncharacteristic, to Very Characteristic.

1. I become easily discouraged by failures.
2. When my performance does not satisfy, I start to question my abilities.
3. I often feel unable to deal with problems.
4. Failures can shake my confidence for a long time.
5. When I am confronted by unusual demands, I feel helpless.
6. When I do not immediately succeed in a project, I quickly lose hope for a good outcome.
7. When I can't solve a task, I blame my lack of abilities.
8. When I fail at something, I tend to give up.
9. When my work is criticized, I feel depressed.
10. I often feel overpowered by obstacles or troubles.
11. I lose faith in myself when I make mistakes.
12. If I do not instantly succeed in a matter, I am at a loss.

Modified Coping Competence Questionnaire (Version for the Present Study)
Rate 1-6, from Very Uncharacteristic, to Very Characteristic.

1. I am not easily discouraged when I fail at something. (R)
2. When my performance is lower than expected, I rarely question my abilities. (R)
3. I feel I am able to handle the problems I face most of the time. (R)
4. Failures shake my confidence for a long time.
5. When facing an unexpected requirement, I feel unprepared and at a loss for what to do.
6. Even when I am having difficulty with a project, I am hopeful that I will eventually succeed. (R)
7. When I can't solve a task, I am quick to blame myself.
8. When I fail at something, I tend to give up.
9. When my work is criticized, I find it hard to keep working.
10. I often feel on edge when I am confronted with obstacles.
11. I have confidence in myself, even when I make mistakes. (R)
12. If I am not doing well, I usually think I can turn things around. (R)

Writing Prompt

Day to day and week-to-week teachers are confronted with a variety of experiences that range from the traditional role of classroom instruction to other roles like caretaker, disciplinarian, or social mediator. Some of the experiences may be quickly forgotten or become routine, while other specific events may stand out as significant or meaningful. These events and experiences may be significant for positive or negative reasons – it depends on the teacher and the experience. We are interested in learning about what significant experiences you have encountered so far in your time as a student teacher, what you remember about them, and why they are important to you.

Please think back over the past semester and choose a single event or experience from your classroom placement that stands out as significant or as especially meaningful to you. Please write for the next 15-20 minutes about this experience and include as much detail as you can about what happened, what you were thinking, and what you were feeling as the event unfolded.

Teacher Self Efficacy

Rate your confidence level for each of the following items (1, *not at all* to – 6, *completely*)

1. I can get my students interested in the subject I teach.
2. I can get my students to value learning the subject I teach.
3. I can get my students to like the subject I teach.
4. I can get my students to make excellent progress throughout the school year.
5. I can get my students to learn the required material.
6. I can prevent my students from having very low achievement.
7. I can get my students to believe that he/she can count on me when he/she needs help with something.
8. I can get my students to believe that he/she can trust me with his/her problems in or outside of school.
9. I can get my students to believe that I truly care about him/her.
10. I can teach my lessons so that it reflects my highest ability as a teacher.
11. I can teach my lessons so that it is effective for student learning.
12. I can teach my lessons so that it is engaging for students.

Supervisor Ratings of Student Teachers

"For this task, we ask that you rate the effectiveness of the students in your class from 1 to 10. A rating from 1-3 reflects degrees of concern, a rating from 4-7 reflects the average range, and 8-10 reflects degrees of excellence. There are specific descriptions for each number within the excel sheet as well. Please fill in an X in the cell that corresponds to your rating for each student."

How would you judge the student's effectiveness as a teacher on the ten-point Likert scale below? Place an X in the box corresponding to your rating.

1. I have serious doubts about effectiveness
2. I have some misgivings.
3. Though currently performing below expectations, I see growth.
4. Below average, but meets some expectations.
5. Meets standards for an average teacher, in most respects.
6. Meets standards for an average teacher, but is above average in some respects.
7. Solidly above average.
8. A very good teacher
9. An excellent teacher
10. A truly outstanding ("gifted") teacher

APPENDIX B: Changes, Principal Components Analysis, and Validation of the Adapted CCQ

The Coping Competence Questionnaire was adapted for use in the current study, and the specific changes made to the measure are described in the methods section of this paper, and can be viewed directly in Appendix A. The purpose of this section is to describe the analyses used to provide information relevant to the validity of the updated measure for use in this study and compare its properties to the original scale described and developed by Schroder and Ollis (2013).

Principal Components Analysis

Schroder and Ollis (2013) completed exploratory and confirmatory factor analyses of the original CCQ. The principal component analysis of the original measure revealed a single factor structure, with an Eigenvalue of 6.69, that explained 54.8 % of the variance in the items (Schroder & Ollis, 2013), and internal consistency exceeding .90 (Schroder, 2005; Schroder & Ollis, 2013).

To investigate the structure and constructs measured by the adapted CCQ (ACCQ), a principal components analysis with varimax rotation was conducted on the new version of the measure. The PCA yielded three Eigenvalues above 1 which suggested the possibility of a three-component solution ($\lambda = 4.42$; $\lambda = 1.80$; $\lambda = 1.12$) for the adapted CCQ (ACCQ). Eigenvalues represent the variance (or additional variance) explained by each factor. The one factor solution explained 36.84% of the variance. The two-component solution explained an additional 15% of the variance beyond the one factor solution, for a cumulative 51.84% of the variance. The three-component solution explained an additional 9.34% of the variance for a cumulative 61.18% of the variance. Finding more than one component with Eigenvalue of 1

suggests that the overall structure differs from the original**.** Inspection of the scree plot and subsequent analyses suggested that a one or two factor solution may be more appropriate for the data than a three-component solution.

Inspection of factor loadings for the three-component solution revealed a high level of complexity, with significant cross loadings across the identified components. The loadings on the three-component solution did not appear to have an interpretable pattern, and there was no identifiable conceptual or thematic distinction across the three factors. In contrast, the two-component solution was significantly less complex and contained clearer and cleaner loadings on the two factors. For this reason, single factor and two component solutions were examined in closer detail.

Single component solution. Another PCA was run and a single factor solution was forced. The properties of the one factor solution were examined. The single factor solution yielded the largest Eigenvalue (4.42) and accounted for the greatest amount of the variance of the responses (36.89%). Calculation of internal consistency for the single factor measure revealed an internal consistency of .84, which is considered acceptable and well above the common benchmark of .70. Loadings of the twelve items onto the single factor can be viewed in Table 19 below.

Table 19
Component Matrix for One Component Solution

	Adapted CCQ	**Factor**
	Item	**1**
1.	I am not easily discouraged when I fail at something.	.64
2.	When my performance is lower than expected, I rarely question my abilities.	.44
3.	I feel I am able to handle the problems I face most of the time.	.56
4.	Failures shake my confidence for a long time (R)	.74
5.	When facing an unexpected requirement, I feel unprepared and at a loss for what to do. (R)	.59
6.	Even when I am having difficulty with a project, I am hopeful that I will eventually succeed.	.48
7.	When I can't solve a task, I am quick to blame myself (R).	.60
8.	When I fail at something, I tend to give up (R).	.60
9.	When my work is criticized, I find it hard to keep working (R).	.53
10.	I often feel on edge when I am confronted with obstacles (R).	.61
11.	I have confidence in myself, even when I make mistakes	.76
12.	If I am not doing well, I usually think I can turn things around.	.65

Two component solution. Next, to examine properties of the two-component solution, the principal components analysis was run with two factors forced. The two-component solution yielded an Eigen value of 1.8 and accounted for 15% of the variance above and beyond what was explained by the single factor solution. This means that in total, the two-component solution accounted for 51.89% of the variance of the responses. The results of the two-factor solution are displayed in Table 20. The first component included five items (items 1, 2, 4, 6, 10) with clear and independent loadings. The second component included four items (items 3, 7, 11, 12) with clear and independent loadings. Three items demonstrated significant cross-loadings across the two components and appeared to represent one's ability to handle more extreme feelings when under stress, and the ability to cope with a higher level of emotionality. Because of the items' significant cross loadings, these items were not

included in the calculation of a score for either of the two scales (but was included in calculating the total score). Examination of the cross loaded items revealed that they reflected the ability to cope with a higher level of emotional distress, and thus perhaps did not fit well with either factor.

The items for each of the two component solutions were examined for content, to identify the unique information captured by each factor. The first factor included five cleanly loaded items that demonstrated adequate internal consistency (α= .76). Review of the items (items 1, 2, 4, 6, 10) suggested that the items were especially focused on one's belief about one's ability to manage negative emotions, with direct reference to negative feelings, like being "on edge" or "at a loss" or "discouraged". One item also included reference to self-blame. Given the content of these items, this first factor was labeled *ACCQ-Emotion*, and is thought to reflect one's efficacy regarding ability to manage their daily frustrations or negative emotions.

The second component included three cleanly loaded items (3, 7, 12), and one item that demonstrated some cross loading with the first component, but demonstrated a higher loading with the second factor and was thematically consistent with the second factor (11). The second component demonstrated adequate internal consistency (α= .79). Review of individual items (items 3, 7, 11, 12) from the second component suggested that it reflects confidence about one's ongoing ability to cope with tasks and external problems, and optimism about the outcome of coping in the face of failure or a negative situation. For example, "I feel I am able to solve the problems I face most of the time" and "I have confidence in myself even when I make

mistakes," Given the content of the items in the second component, it was labeled *ACCQ-Confidence*, and is thought to reflect individual optimism and confidence for coping and resolving challenges for a positive outcome in the future. A one or two component solution was supported by Horn's parallel analysis, which will be detailed later in this section.

Table 20:
Rotated Component Matrix for Two Component Solution Using Principal Components Analysis and Varimax Rotation

	Adapted CCQ	**Component**	
	Item	**1**	**2**
1.	I am not easily discouraged when I fail at something.	**.73**	.17
2.	When my performance is lower than expected, I rarely question my abilities.	**.69**	-.09
3.	I feel I am able to handle the problems I face most of the time.	.04	**.78**
4.	Failures shake my confidence for a long time (R)	.52	.53
5.	When facing an unexpected requirement, I feel unprepared and at a loss for what to do. (R)	**.70**	.13
6.	Even when I am having difficulty with a project, I am hopeful that I will eventually succeed.	-.15	**.84**
7.	When I can't solve a task, I am quick to blame myself (R).	**.63**	.20
8.	When I fail at something, I tend to give up (R).	.31	.54
9.	When my work is criticized, I find it hard to keep working (R).	.40	.37
10.	I often feel on edge when I am confronted with obstacles (R).	**.69**	.15
11.	I have confidence in myself, even when I make mistakes	.46	.61
12.	If I am not doing well, I usually think I can turn things around.	.21	**.72**

Table 21
Internal Consistency for A-CCQ Components

Scale	Cronbach's Alpha
ACCQ-Emotion *(5 items)*	.76
ACCQ – Confidence *(4 items)*	.79
ACCQ – Total *(12 items)*	.84

Correlations between components. Pearson correlations were calculated between the two identified components from the ACCQ to examine the closeness of the relationship between the two components, and to clarify whether utilizing the two components alongside the overall score would provide unique insight. Pearson correlations were selected for these analyses because the data was normally distributed across the variables, and the variables were continuous measures. The two individual components extracted from the A-CCQ were significantly and moderately correlated with each other ($r = .37$, $p < .05$). The moderate level of correlation between the two identified components suggests that the two components (Emotion and Confidence) are related, but are likely capturing *distinct* elements of one's self-rated coping effectiveness.

Table 22
Pearson Correlation Among ACCQ Components

Scale	ACCQ-Confidence
ACCQ-Emotion	.37**

Summary. The findings regarding the ACCQ discussed above highlight that one and two component solutions appear to make theoretical sense given the review of items, and demonstrated adequate internal consistency. In contrast, the loadings of the three-component solution demonstrated a high level of complexity and cross

loading, did not appear to separate components in a way that was interpretable. The moderate correlation between the two components pointed to two distinct facets of self-rated coping efficacy. Given these results, it was decided to further examine the overall scale as a broad measure of coping competence, and examine the Emotion and Confidence scales as subscales, as components that contribute to an overall sense of coping competence.

Parallel analysis. To further investigate the appropriate number of components for the Adapted-CCQ, Parallel Analysis was conducted, using procedures and SPSS syntax for raw data ("rawpar.sps") from O'Connor (2000). The parallel analysis uses Monte Carlo simulation to generate a distribution of generated eigen values. The Eigenvalues from the actual sample are then compared to the 50th and 95th percentile Eigenvalues from the Monte Carlo distribution. Analysis revealed that the Eigen values for the one and two component solutions fell above the 95% CI of the Monte Carlo distribution, and suggested that one or two component solutions were significant, and appropriate for the adapted version of the measure. To view the Eigenvalues for the actual and generated samples, please refer to table 23 below.

Table 23:
Raw Data Eigenvalues and Random Data Eigen Values (50th and 95th percentile)

Component	Raw Data Eigenvalue	Random Data Mean	Random Data 95% CI
1	4.42	1.77	1.98
2	1.80	1.55	1.67
3	1.12	1.38	1.49
4	.84	1.24	1.34
5	.73	1.11	1.21
6	.69	1.00	1.08
7	.56	.89	.98
8	.51	.79	.88
9	.44	.70	.78
10	.41	.61	.70
11	.27	.51	.60
12	.21	.40	.49

Convergent and discriminant analyses of the CCQ and the ACCQ.

In addition to examining the component structure of the updated measure, it was important to establish a pattern of correlation with other variables that was theoretically similar to those reported about the original measure. The aim was to demonstrate convergent and discriminant patterns with other theoretically related variables. Schroder and Ollis (2013) examined convergent and divergent validity of the original CCQ by examining the scale's relationship with personality dimensions and symptoms of depression. The original scale was established to have relationships with a number of relevant variables. Specifically, a high level of coping competence measured by the original scale was negatively correlated with symptoms of depression (r = -.53), and higher levels of neuroticism (r = -.64) and stress reactions (r = -.66). Furthermore, Schroder and Ollis (2013) demonstrated that the original

CCQ was moderately and positively correlated with measures of self-regulation (r = .31) and self-control (r = .43).

To examine the convergent and discriminant patterns of the overall ACCQ and the two components, the individual scales were examined in relation to constructs comparable to those examined by Schroder and Ollis (2013). The total score and individual components (Confidence, Emotion) were correlated with measures of positive affect, negative affect, and effortful control (an index of self-regulation). All correlations can be viewed in Table 24 below. It is important to note, that in this study, the correlations with stress reactivity (report correlation-total and for the 2 components) was similar to that of the original scale. This finding supports its use in testing the proposed model.

Negative Affect. Negative Affect was measured through the short form of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), and was examined in relation to the A-CCQ total score, as well as the A-CCQ Emotion and A-CCQ Confidence components. Given patterns of correlation between the original CCQ and neuroticism, it was expected that negative affect would negatively correlate with all A-CCQ components. However, only the A-CCQ Confidence component demonstrated a significant negative correlation with negative affect (p = -.25, p <.05). The total score and Emotion component were not significantly correlated with the negative affect scores. This pattern of correlation suggests that negative affect is negatively associated with someone's perceptions about their ability to cope with challenges and tasks in the future, while the ability to cope with emotions is unrelated to one's level of negative affect.

Positive Affect. Positive affect was also measured using the PANAS. A correlation between the ACCQ and positive affect was not expected. None of the coping components demonstrated a significant correlation with this measure, which suggests that one's evaluation of their ability to cope is unrelated to their overall level of positive affect.

Effortful control. Effortful control was measured using the short form of the Adult Temperament Questionnaire (Evans & Rothbart, 2007, Rothbart, Ahadi, & Evans, 2000). Effortful control is an individual difference in temperament that refers to the ability to focus and shift attention, inhibit inappropriate behaviors, and perform challenging tasks one might prefer to avoid (Evans & Rothbart, 2007). Schroder and Ollis (2013) demonstrated a close connection between effortful control and the original CCQ, so it was expected that all components of the adapted measure would demonstrate a positive correlation with self-rated effortful control, as measured by the ATQ. As expected, the single component, as well as the components from the two-component model, demonstrated significant positive correlations with effortful control. This aligns with previous conceptualizations that one's level of effortful control is important for managing emotions and problem solving under stressful conditions (Lengua & Long, 2002).

Table 24
Pearson Correlations used to Establish Convergent and Discriminant Validity of the ACCQ

	A-CCQ Total	**A-CCQ Emotion**	**A-CCQ Confidence**
Negative Affect (PANAS)	-.12	.05	-.25*
Positive Affect (PANAS)	.19	.18	.05
Effortful Control (ATQ)	.36**	.27*	.32**

Conclusions regarding the structure and validity of the ACCQ.

Overall, results suggest that the adapted version of CCQ includes two components, but that an overall one component structure is also appropriate, and demonstrates a higher level of internal consistency than the two individual scales, and because coping is thought to include facets of coping with an external problem and with one's internal emotions. It is believed that the broad measure provides information about one's coping competence overall above and beyond what is provided by the individual scales, as additional items that cross loaded but captured the ability to cope with strong emotions were included. For these reasons, the overall scale was used for all analyses, as it appears to be a composite of both one's confidence about their ability to cope in the future, as well as their perception of their ability to manage their emotions. The two identified components were used in supplementary analyses to identify whether the unique components of and contributors to overall coping competence are mediators as well.

It is important to note that these are preliminary analyses, and that future studies should be conducted for a more comprehensive evaluations of the ACCQ.

Appendix C: Coding Manual

TAT Coding: From Teglasi Worksheet (2015)

Non-Coping or Unrealistic Coping

1. Unaware (negative emotion not recognized)
2. No changes in emotions, self-awareness, or in understanding
3. Overwhelmed (misery prevails or negative affect escalates)
4. Detached, resigned, hopeless
5. Wallowing in self-blame (shame, regret)
6. Substantially unrealistic. Magic external intervention or unlikely turn of events. Dreaming or hoping when action is warranted.

Example:

202 Story 1

So in this picture, um there's a boy and he has a violin in front of him and um he really doesn't want to practice, uh he really doesn't like playing violin, but uh his parents are forcing him to and uh he lacks the motivation to do it. And um it's right before his um violin lesson (smiling) and he hasn't practiced all week. Um so, he's just sitting there just trying his best to start playing but he just lacks the motivation to do so, so he chooses not to practice. Yay (laughs). **/B?/** Um, before the picture his mom told him, "you need to practice, you have your lesson later today" and um she kind of left him in the room to do it but he decided to sit there and just doesn't want to play, so. **/TO?/** Um, he goes to his violin lesson very unprepared and both his teacher and his mom are very disappointed that he didn't practice. **/F?/** Um, I would say he's feeling sad and just very unmotivated, feeling forced to do this and he just has no passion for it so.

Immediate or Partial Coping

1. Short sighted (temporary) decrease of negative affect or reduction of adverse impact of presenting dilemma but without fully addressing the sources of the tension, avoidance, temporary reassurance, resolving to do something, compliance with legitimate authority.
2. Short sighted increase or maintenance of positive affect or improvement of the situation, but without recognizing important issues.
3. Excessive dependence on others, seeking or getting help when independent action is warranted (blind dependence or prematurely seeking help).
4. Excessive independence from others, managing situations that typically require help.

Example:

109 Card 7

So this story is about a traditional East---no not Eastern European, but just a traditional old school mother school mother in the beginning of America. They are an upper class white family. She lives with her husband who is a businessman, probably in New England or New York. And they live in a house that contains a parlor. But right now, she and her friends are in the other room gossiping and having tea but she is running into the room next door to yell at her children for making noise and disrupting their tea party. And she is giving them a look of "How dare you disrupt your lady friends and I during our gossip?" So she is coming in to tell them to be quiet and stop acting so rambunctious and then she goes back to her room with

her lady friends and come in with the tea. But she has to come back and yell at kids again because she heard something fall over. She's thinking that she is really just annoyed with those little brats. They probably have a nanny.

Long-Term or Problem Focused coping.

1. Decreasing negative affect by effective problem solving (e.g. addressing the source of the feeling)
2. Increasing or maintaining positive affect through effective problem solving.
3. Appropriate help, advice, or reassurance provided, with or without specific request, enables the character to effectively solve the dilemma.

Example:

109 Story 1

I think that this little boy is trying to learn how to play the violin. He is feeling distressed and looking down on it like he's failed it's very frustrating to him. Maybe he just had a lesson or he is taking violin lessons and he just had a lesson and his mom wants him to practice more but he is looking at it like "oh my gosh, I can't even figure this out." He looks very upset so I think what is occurring right now is that he is just feeling that he has failed. He's unmotivated to keep trying and his mom, probably, is the one that wants him to play the violin but he just feels, he is not intrinsically motivated to play it. He doesn't care. And the story ends with him giving up on him playing him to play the violin because it was extrinsic motivation not something he wanted to do for himself so the story ends with him telling his mom "I hate the violin and I don't want to play anymore.

Story Coding: Adapted from TAT coding from Teglasi Worksheets (2015) for coding Teaching Experience Narratives

Non-Coping or Unrealistic Coping

1. No changes in (**negative**) emotions; (or changes are due to quickly moving on or ignoring important issues)
2. No changes in **self**-awareness or understanding about **teaching or own experience**
3. Overwhelmed (misery prevails, or negative affect escalates)
    a. Detached, resigned, hopeless about potentially changeable experiences
    b. Inappropriate Avoidance or overly quick recovery
4. **Reflection unproductive:** Wallowing in self-blame (shame, regret) or excessive focus on negative details of the event.
5. Substantially unrealistic. Description of abrupt change in **emotion or cognition about presented events**, rather than conscious reflection or realistic change. Dreaming or hoping about future teaching experiences when action **or problem solving** is warranted.
6. **If a lesson learned is explicitly stated—it is inappropriate given the nature of the experience, meaning that if applied, it would lead to ineffective attempts to deal with stress in the future. Furthermore, there is no match between the "lesson" as stated explicitly and as implicit in the story.**

Example:

202 Weekly Writing 3

Last Thursday, my supervisor came in for my 3rd official observation. I wanted to really impress her and make sure that she loved the lesson, so the day before I stayed at school until 6:30 pm planning and preparing the lesson. **I perfected the lesson, knowing that she would be really impressed**[1]. My mentor teacher told me earlier in the week that she would not be there for the observation and that a substitute teacher would be there to take her spot. I was a bit worried that the behavior of my students would be more out of control than usual and I was definitely right.

As soon as the lesson started, EVERYTHING started to go downhill. During the lesson itself, I had to constantly redirect behavior and keep students on task. They really seemed to enjoy the lesson, but the behavior during the lesson was getting out of control. As soon as they went back to their seats to do their work, it became pure chaos. **No matter how loud or how much I told students to follow directions and to work independently, some of my students completely ignored me**[2]. When looking at my supervisor, I could see clear disappointment on her face. This in addition to the students' behavior broke me and I was so incredibly discouraged. My supervisor pulled me aside and told me that it was a great lesson, but it was completely sabotaged by the behavior of my students. She then left me her feedback and told me to call her later so we could talk more about the lesson. After she had left, I was so incredibly discouraged to the point where I didn't even want to try anymore. I was trying everything to keep the kids under control, but they still didn't care to listen[3]. I then told the students that we were going to have a class meeting after everyone got packed up. When all the students were packed up, I started to share with them my frustrations and how

their behavior that afternoon was unacceptable. As I was talking, I could feel tears forming and tried so hard to hold it back. As I kept talking, I was overtaken by my emotions and completely broke down in front of my students. As I shared my frustrations with my students, I could see a sudden change in their faces. **Their faces were filled with concern, sympathy, and compassion**. **I believe the tears that I cried in front of them gave them the revelation of just how upset and frustrated I was**[4]. Many of them started to apologize and were giving me hugs. I thanked them and then dismissed them all to go home.

As frustrating as this moment was, it gave me a true and honest depiction of what teaching can be like. Often times we see teaching in a very idealistic light, where everything is constantly smooth and enjoyable when in reality teaching will constantly bring forth challenges, hardships, and frustration. **As much as I hated going through this moment at the time that it happened, I am thankful that it happened because it allowed me to see all the facets of teaching and gave me an incredible learning experience**[5]. Being a teacher is sometimes very hard, frustrating, and incredibly tiring, but at the end of the day, the good will always outweigh the bad and the students make it all worthwhile[6].

1. Note here that 202s lessons were non-specific, and that she is preparing the lesson for her mentor, not her students. Not appraising or approaching the situation in a way that promotes coping.
2. Note the lack of flexibility in approach to dealing with student behavior. Approach is constant, and there is no attempt to shift strategy to accommodate current circumstances.
3. All children's behavior is phrased in terms of caring or not caring for her; everything is centered on how others perceive or react to her, not on how she creates or makes the situation.
4. Impressed and surprised by the care of students; her crying felt like a successful way to show her students what went wrong with the situation.
5. The phrase "learning experience" is broad general, and does not point to a specific lesson learned. The lesson here is that "Teaching is hard, but your students will take care of you when it doesn't go well".
6. GENERAL NOTE:
    a. This story is also especially interesting when paired with earlier stories from the same participant, where telling her students to behave, and focusing on her grade was an effective strategy. Although it worked the first time it obviously did not work here. The examination of multiple stories from the same participant can also be useful for understanding the ways in which a single story can be explored as a part of an ongoing narrative as well as part of a single experience. Although it is beyond the scope of the current study, it is important to consider the trajectory of coping over time, and the ways in which lessons from one influence the next.

Immediate or Partial Coping

1. Short sighted (temporary) decrease of negative affect or reduction of adverse impact of presented experience.
    a. However, the sources of the tension are not fully addressed.
    b. The narrator may avoid certain components, **realities, or implications** of the negative events.
    c. They may experience temporary reassurance,

    d. Show some resolve to do *something* (**generic**),
    e. or comply with legitimate authority, **although aspects of the situation may still remain unresolved in some way**.
2. Short sighted increase or maintenance of positive affect or improvement of the (**immediate**) situation, but without recognition of important issues, or attempts to make changes in a broader situation in which the problem is nested.
3. Excessive dependence on others, seeking or getting help when independent action is warranted (blind dependence or prematurely seeking help).
4. Excessive independence from others, managing situations that typically require help.
5. **Explicitly stated lessons learned are non-specific and vague, may not lead to more long term problem solving or anticipation for future coping, and may contradict or not align completely the implicit lesson inferred from the narrative**

Example:

202 Teaching Experience 1

When reflecting back at this past semester, there have definitely been many experiences that are incredibly significant. One of the most memorable experiences I have had was when I had the opportunity to teach a social studies lesson to my students. Initially I was nervous that the students would not be engaged and that the lesson would not turn out well**. Surprisingly the students really enjoyed the lesson and were motivated to learn the entire time**[1]. What makes this experience so memorable was when one of my students came up to me and said that he really enjoyed the lesson. Although this may seem trivial, his words had a huge and lasting impact on me. That student often struggles to keep up in class and sometimes falls behind academically. He typically have a very indifferent attitude towards school and does not really care **The fact that he was able to enjoy the lesson sparked an interest in learning and as a result made me feel validated as a teacher, I felt so honored that he enjoyed the lesson and his zeal for learning is starting to grow**[2]. As a teacher, seeing students grow and succeed is by far one of the most rewarding things that could happen. **This student helped me to understand that no student is ever too far gone and that teachers should be setting up the classroom in a way that is both exciting and relevant**[3]. This experience has definitely become more confident in my teaching and I cannot wait to have more experiences like this in the near future**.**

1. She was surprised the lesson went well – her anticipation did not lead to specific coping or attempts to plan for a stressful experience.
2. Again, note here the external validation dictates whether situations are a success or a failure. The students and students reactions
3. Learning is *general* and not directly connected to her own actions or intentions for the situation, but instead related to events that happen as a consequence of her general sequence of events. Her confidence has increased, but not because of any specific actions she did to handle the situation. Totally reliant on others.

Long-Term or Problem Focused Coping

1. Decreasing negative affect by effective problem solving
    a. (addressing source of feelings *and* addressing broader problems)
2. Increasing or maintaining positive affect through effective problem solving that addresses the source of affect as well as the external problem in the classroom.
3. Instead of solving the problem, the individual may come to terms with unchangeable aspects of their experience (i.e. school policy, state testing, etc.), and figure out ways to proceed and function with less-than-ideal circumstances.
4. Appropriate help, advice, or reassurance provided, with or without specific request, enables the character to effectively solve the dilemma.
    a. Character recognizes importance of support.

    Learning is appropriate, **specific,** and **directly related** to the presented significant situation and the experience of the narrator. Implicit learning and explicitly stated lessons are often similar and related to the same overall schema.

Example:3

109 – Teaching Experience 1

The most significant and meaningful event I have experienced so far this semester occurred after my first observation. I was extremely nervous and unsure of how observations worked. Luckily, I knew my supervisor was supportive. This is her first year as a supervisor, so she is still learning just like the interns. **For the observation, I put a lot of thought and planning into a Social Studies lesson on Suburban communities[1]**. During the lesson, all students participated and respected me as a teacher. This lesson was on Levittown, New York. We learned about Levitt and Sons building houses for soldiers returning from WWII. Coincidently, Bowie is also a Levittown, so we compared and contrasted the houses in Levittown to Bowie. Based on their worksheets and participation, students truly understood the lesson. I was relieved that my first observation went smoothly, and I felt less nervous for the second.

What made this a meaningful experience was not that the lesson went smoothly, but that students applied their knowledge at home[2]. The next day, one students ran up to me, "Ms. Jackson, I told my parents what we learned yesterday, and they said we live in an original Levitt house!" Then another student brought in the blueprint for her home, created by Levitt and Sons. They were so excited about this lesson because it was connected to their lives. **This event was meaningful because it included academic and social connections, and students extended the learning outside of the classroom[3].**

Since then, my mentor has asked me to teach the Social Studies lesson every day I am there. I am passionate about Social Studies (it is my "Area of Emphasis") and this boosted my confidence because she trusts me to deliver these lessons daily. She also sees how engaged the kids are[4]. I do not have time to make a Prezi for every lesson, but I make sure I have videos or other visuals. Students have asked me, "Is Social Studies going to be fun today?" and I responded, "Do you think it was fun yesterday?" to which they replied yes, then I said, "Well then today will be even better."

1. Thought and planning is also included in this lesson, but it is specific – no general language of "perfecting the lesson" instead, she focuses on the details and information the students must learn.
2. Lesson is considered successful because it was successful for the students; she met her standards as a teacher because she was able to engage the students, all the students in a meaningful way.
3. Again, she is focused on the success of the lesson for learning, not on the students enjoyment or evaluation, emotions about, or support of her.
4. Although this does have external evaluation through the mentor teacher, instead of defining her success or failure, it highlights that they are working toward the same standard rather than her just hoping for success. She feels that her supervisor appreciates and holds the same expectations she does, and that is why this vote of confidence is important.

APPENDIX D: ANOVA Results Examining Differences Between Cohorts

Tables for one-way ANOVAs run to examine the differences in variables across cohorts can be viewed in Tables 25 through 34 below.

Table 25: One Way ANOVA Examining Differences in the ACCQ-Total Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	.035	.012	.023	.995
Within Groups	65	32.61	.50		
Total	68	32.65			

Table 26: One Way ANOVA Examining Differences in the ACCQ-Emotion Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	.15	.05	.06	.98
Within Groups	65	51.27	.79		
Total	68	51.42			

Table 27 One Way ANOVA Examining Differences in the ACCQ-Confidence Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	1.54	.52	.81	.49
Within Groups	65	41.36	.64		
Total	68	42.91			

Table 28: One Way ANOVA Examining Differences in Performance Coping Mean Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	1.26	.42	.86	.47
Within Groups	65	31.87	.49		
Total	68	33.13			

Table 29: One Way ANOVA Examining Differences in TAT Coping Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	.91	.30	.69	.56
Within Groups	65	28.35	.44		
Total	68	29.25			

Table 30: One Way ANOVA Examining Differences in Teaching Experience Narrative Coping Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	2.08	.69	1.17	.33
Within Groups	63	37.30	.59		
Total	66	39.37			

Table 31: One Way ANOVA Examining Differences in Teaching Self-Efficacy Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	2.01	.67	1.31	.28
Within Groups	58	29.67	.51		
Total	61	31.68			

Table 32: One Way ANOVA Examining Differences in Supervisor Rating Mean Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	2.77	.92	.27	.84
Within Groups	64	214.76	3.36		
Total	67	217.53			

Table 33: One Way ANOVA Examining Differences in School Based Supervisor Rating Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	2.52	.841	.20	.90
Within Groups	54	226.87	4.20		
Total	57	229.39			

Table 34: One Way ANOVA Examining Differences in Professor Supervisor Across Cohorts

Source	*df*	*SS*	*MS*	*F*	*p*
Between Groups	3	14.86	4.95	.10	.96
Within Groups	65	3210.39	49.39		
Total	68	3225.25			

Appendix E: MPlus Code

MPlus Code for Self-Rated Bootstrapped Mediation Models

```
TITLE: Self Rated Model;
  DATA: FILE IS FILENAME.csv;
  VARIABLE: NAMES A, B, C; !PSRS/X is A, CCQ/M is B, TSE/Y is C  ANALYSIS:
BOOTSTRAP = 5000;
  MODEL: B ON A; C ON B A;
  MODEL INDIRECT: C IND B A;
  OUTPUT: CINTERVAL(BCBOOTSTRAP); STDYX
```

MPlus Code for Performance Bootstrapped Mediation Models

```
TITLE: Performance Model;
  DATA: FILE IS FILENAME.csv;
  VARIABLE: NAMES A, B, C; CATEGORICAL ARE B, C;!PSRS/X is A, TATNarr/M is B,
Sup.Rating/Y is C
  ANALYSIS: BOOTSTRAP = 5000;
  MODEL: B ON A; C ON B A;
  MODEL INDIRECT: C IND B A;
  OUTPUT: CINTERVAL(BCBOOTSTRAP); STDYX
```

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