CENTERING EDUCATOR PSYCHOLOGICAL FACTORS TO UNDERSTAND & IMPROVE TEACHER AND CHILD EXPERIENCES IN EARLY CHILDHOOD EDUCATION

A Dissertation

Presented to

The Faculty of the School of Education and Human Development

University of Virginia

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

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by

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March 2023

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Approval of the Dissertation

This dissertation, ("Centering Educator Psychological Factors to Understand & Improve Teacher and Child Experiences in Early Childhood Education"), has been approved by the Graduate Faculty of the School of Education and Human Development in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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ACKNOWLEDGEMENTS

"From the time you were very little, you've had people who have smiled you into smiling, people who have talked you into talking, sung you into singing, loved you into loving. So, on this extra special day, let's take some time to think of those extra special people."
– Mr. Rogers

As I reflect on all that has brought me to this stage of my academic career, I have so many people to thank. Without my family, friends, community, and the immense amount of privilege I have had, I would not have accomplished this. Thank you will never be enough, but I will still try to put this into words...

First, thank you to my entire family – especially my mom, dad, brother, and sister. To my mom and dad, thank you for your endless love, support, and kind suggestions, without which I would not be where I am today. To Andrew and Cara, thank you for being my first and best friends and for always making me laugh.

To my committee, thank you for the encouragement and constructive feedback throughout my time as a doctoral student and particularly during this dissertation phase. Amanda, you have been a better mentor than I could have ever asked for through modeling being a leader, setting boundaries, and advocating for me in every sense of the word. ML, thank you for your unwavering belief in me from the moment we met when I was a first-year master's student at Vanderbilt. Jason, thank you for being a calm and welcoming presence in lab and in our other research together. Jim, thank you for sharing your expertise in structural equation modeling and shaping the way I think about measurement. Tish, thank you for sharing your commitment to and expertise in improving the well-being of educators. I hope I have a similar effect on my future students as you have all had on me, and I greatly look forward to continuing to work with each of you as I enter the next stage of my career. Thank you also to my many other teachers and mentors at Christ the King, Nardin Academy, the University of Dayton, Vanderbilt University, and the University of Virginia.

To my longtime friends, especially Rachael, Courtney, Dom, Anthony, Benny, Brandon, and Kurstyn, thank you for being there for me through so many life stages. Despite us living all over the country at this point, I know I can always count on you being a phone call or FaceTime away.

Last but certainly not least, to my UVA and Charlottesville communities, thank you for being so understanding, providing a listening ear, and reminding me to have fun. An especially big thank you to my friends in EP-ADS, VEST, book club, and lab. It is an honor to be your colleague, and I can't wait to watch you all continue to shine.

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> "Every day, in 100 small ways, our children ask,
> 'Do you hear me?
> Do you see me?
> Do I matter?'
> Their behavior often reflects our response."
> – L.R. Knost

Miss Rita, a lead preschool teacher, greets the children in her classroom at drop off on Thursday morning. She feels her stress rising as more children arrive, and she goes to get ready for morning circle time. She's already anticipating all the challenges of the day – the not listening, the tantrums, the fighting over toys. She used to love teaching, but things have been tough lately. Yesterday felt like non-stop challenging behavior in her classroom, and her assistant was out sick. One child in particular, Hunter, was not listening all morning, and Miss Rita eventually sent him to the director's office for the afternoon after he threw toy cars across the room. This was the third time this month Hunter was removed from the classroom, and everyone's patience is waning. Miss Rita doesn't know what more she can do – nothing seems to help, and it feels like Hunter is acting this way on purpose. She wishes she had more support, but her small childcare center doesn't have extra staffing and can't afford additional training or a coach.

In early childhood classrooms, experiences like Miss Rita's are all too common and illustrate the high rates of stress (Johnson et al., 2021), depression (Whitaker et al., 2013), and turnover (Wells, 2015) among early childhood educators. Early childhood leaders and teachers face structural challenges, including staffing shortages (Bassok, Smith, et al., 2021), high turnover (Bassok, Markowitz, et al., 2021; Wells, 2015), low pay (Whitebook et al., 2014), and a lack of benefits, especially in private centers (Bassok et al., 2020). In addition, there is a lack of support and training for early childhood educators related to preventing and responding to

challenging behaviors, in both pre-service (Hemmeter et al., 2008) and in-service contexts (Gomez et al., 2015; Schaack et al., 2021), which in part explains why challenging behavior is identified as a key stressor for educators (Jeon et al., 2018a). These challenges have been further exacerbated due to the COVID-19 pandemic (Markowitz & Bassok, 2022).

In the presence of such stressors and the absence of high-quality, accessible support, leaders and teachers frequently decide to informally push out or formally expel children (Clayback & Hemmeter, 2021; Gilliam & Reyes, 2018; Gilliam & Shahar, 2006). These exclusionary practices are used more frequently in response to the behavior of boys, children of color, and children with disabilities, and theory and research indicate that this disproportionality in who experiences exclusion is due to both implicit and explicit educator bias (Meek & Gilliam, 2016; U.S. Department of Education, 2014). As a result of this exclusion and other ineffective practices, young children miss out on early opportunities to learn social, emotional, and academic skills and are set on a path of increasingly negative interactions with teachers and peers (Anderson et al., 2019; Li et al., 2020).

Promisingly, interventions in early childhood classrooms can improve classroom practices and children's behavior (e.g., Downer et al., 2018; Hemmeter, Fox, et al., 2021) and reduce teacher stress and the use of exclusion (e.g., Brennan et al., 2008; Davis & Perry, 2016). These interventions include coaching and early childhood mental health consultation (ECMHC). However, these supports typically focus on a child or specific teaching practices, and comparatively little attention is paid to teacher factors, including psychological well-being such as stress, self-efficacy, and beliefs about young children. Many teachers experience daily stress and feel hopeless that children's behaviors will improve, and some place blame or view children and families negatively (Martin et al., 2017; Zulauf & Zinsser, 2019). When teacher's

psychological well-being is ignored, the effects of interventions and policy changes on early childhood systems may be attenuated. In contrast, by shifting some focus to supporting teacher's own well-being, effects can be bolstered (Sandilos et al., 2018). First, however, we must research and understand teachers' psychological experiences to know how and when it is best to intervene. As such, this dissertation centers early childhood educators to better understand their psychological well-being and inform future research and intervention efforts.

Conceptualizing Educator Psychological Well-being

Well-being is a broad term that may refer to psychological, social, financial, or physical health, all of which are key elements of educator well-being holistically (Kwon et al., 2021). This dissertation focuses on educator psychological well-being as a key construct influencing teachers, young children, and the overall classroom context. Psychological well-being can be defined as an individual's thoughts, emotions, and motivations and how an individual experiences and interprets these domains (Chen et al., 2013). In early childhood education research, psychological well-being is often measured with a deficit lens, focusing mostly on poor mental health and specifically stress, depression, and burnout (Cumming & Wong, 2019). However, psychological well-being is not just the absence of distress or negative emotions; rather, psychological well-being also includes experiencing positive emotions, feeling satisfied with one's career and life, and having strong relationships.

The prosocial classroom model posits that educator's well-being and other characteristics (referred to broadly as teacher social and emotional competence) are indirectly related to child social, emotional, and academic outcomes through healthy teacher-child relationships, effective classroom practices, and effective implementation of programs to support social and emotional development (Jennings & Greenberg, 2009). Indeed, teacher's own social and emotional well-

being is a key driver of healthy classroom environments (Jennings & Greenberg, 2009). Teachers with high social and emotional competence are better able to recognize a child's emotions and show empathy, thus creating a stronger teacher-child relationship. Socially and emotionally well teachers are also better able to use proactive teaching strategies that create and maintain a healthy classroom climate. Finally, teachers with higher well-being are more effective implementers of strategies that support social and emotional learning, as these teachers model and explicitly teach prosocial behaviors.

All of these factors are related bidirectionally and positively reinforce each other (Jennings & Greenberg, 2009). For example, the use effective social and emotional strategies improves children's behavior, which may in turn reduce teacher stress and increase a teacher's enjoyment and commitment to teaching. Notably, teachers and classrooms do not exist in a vacuum, but are instead also influenced by context including school, community, personal, and broader sociopolitical factors. Figure 1 provides an overview of the prosocial classroom model, with key constructs in this dissertation highlighted.

The Importance of Educator Psychological Well-being in Early Childhood Contexts

The well-being of early childhood educators is particularly important, given the influential role that these educators play in young children's development during the first few years of life. These first five years of life represent a critical time of development when young children are rapidly developing and rely on adults in their environment to support them as they grow and learn (Cantor et al., 2019). Educators in early childhood classrooms set the tone of the classroom, including by modeling appropriate behaviors and co-regulating when infants, toddlers, and young children are experiencing strong emotions or behaviors (Denham et al., 2012). Through these positive and supportive interactions with adults, children learn

foundational social, emotional, and academic skills and eventually learn to self-regulate (Pianta, 1999). Indeed, strong relationships with teachers in early childhood can set young children up for success in future relationships with teachers and peers (Hamre & Pianta, 2001).

An adult's ability to promote this positive child development is related to personal factors, including their own well-being. When educators are supported and psychologically well, they are better able to create high quality early learning experiences. For example, early childhood educators with higher psychological well-being are rated as higher quality (Jennings, 2015; Penttinen et al., 2020), report stronger teacher-child relationships (Becker et al., 2017; Seo & Yuh, 2021), and respond more positively to children's emotions (Buettner et al., 2016). In contrast, according to the prosocial classroom model, when teachers are not supported, children are more likely to engage in challenging behaviors, and the classroom climate suffers. These factors are related to what Jennings and Greenberg (2009) refer to as a "burnout cascade", wherein teachers become more stressed and exhausted, child behavior worsens, and teachers resort to reactive and punitive teaching practices.

This theory is also supported by empirical research. Preschool classrooms where teachers report higher levels of stress are rated as lower quality overall (Friedman-Krauss et al., 2014; Hamre & Pianta, 2004), and they engage in fewer positive interactions with children in the classroom (Sandilos et al., 2015). Preschool teachers who report higher stress report expelling children more often, compared to less stressed teachers (Silver & Zinsser, 2020; Zinsser et al., 2017). Distressed teachers are also more likely to turnover or intend to leave the field (Grant et al., 2019), which disrupts classroom functioning and children's early relationships with caregivers (Kwon et al., 2020). Teacher distress is also directly related to children's social competence, externalizing and internalizing problems, and academic achievement, over and

above child, family, teacher, and classroom characteristics (e.g., Jeon et al., 2018b; Jeon et al., 2014; Jeon et al., 2021). For example, Roberts and colleagues (2016) found that children in classrooms with more depressed teachers had increases in challenging behavior and decreases in social skills from fall to spring, as reported by both teachers and parents. Taken together, both theoretical frameworks and empirical research find that teacher psychological well-being is a key factor associated with classroom quality and children's outcomes in early childhood settings.

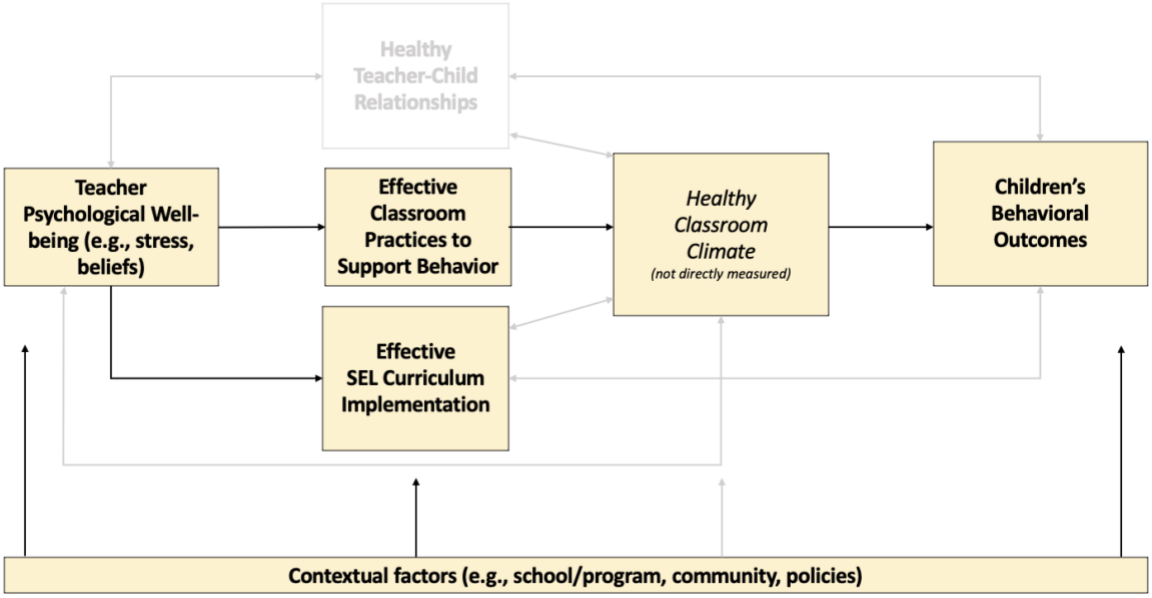

Figure 1. Dissertation framework, adapted from the Prosocial Classroom Model (Jennings & Greenberg, 2009). Relationships studied in the current dissertation are highlighted.

Overview of the Papers

To fully support educators and ultimately improve early childhood education, researchers, policymakers, and practitioners must better understand teacher experiences and specifically how to address stress and improve well-being. However, most early childhood research to date has focused on child or classroom factors, and relatively little work has focused on teacher factors, including psychological well-being. In this three-paper dissertation, I add to the existing literature on early childhood educator psychological well-being. All three papers tackle different aspects of the prosocial model (Jennings & Greenberg, 2009; See Figure 1).

Paper 1 considers factors related to teacher psychological well-being, namely stress. Paper 2 considers how teacher psychological well-being is related to implementation of a comprehensive curriculum. Paper 3 examines how an often-overlooked aspect of teacher psychological well-being, attributions about behavior, are related to teaching strategies and children's behavior.

Taken together, findings from the three papers can guide future intervention development and implementation to support educators and young children by furthering the field's knowledge of teacher psychological well-being, including correlates of stress and how these experiences relate to classroom functioning. Further, though data for these three papers were collected prior to COVID-19, findings are relevant for how we support early childhood educators and young children in the aftermath of the pandemic. Next, I summarize the key findings from each paper.

Paper 1

In Paper 1, *Teacher and Classroom Predictors of Preschool Teacher Stress* (Clayback & Williford, 2021), we explored correlates of preschool teacher stress, using secondary baseline data from 427 educators participating in a professional development intervention in early childhood education. Paper 1 focused on a comprehensive set of individual (e.g., income, experiences, emotions, beliefs) and environmental factors (e.g., setting, support staff, classroom challenging behavior) that may, based on previous research, be related to teachers' experiences of stress in early childhood education. We found that teacher anger, child behavior, and presence of classroom support staff (such as a classroom aide or teaching assistant) were consistently related to teacher's experience of stress in the classroom, over and above teacher's personal and professional backgrounds. These findings suggest that teacher daily experiences in the classroom, such as frustration and perception of challenging child behavior, may be most proximal to teaching-related stress and thus prime targets for intervention.

Paper 2

In Paper 2, *Identifying Teacher Beliefs and Experiences Associated with Curriculum Implementation Fidelity in Early Childhood Education* (Clayback et al., 2023), we explored how teacher beliefs and experiences were related to initial uptake and later implementation of a novel comprehensive curriculum, *STREAMin*^{3}, in a sample of 87 infant, toddler, and preschool educators. This study focuses on micro- and individual-level factors associated with teachers' implementation (specifically dosage and responsiveness) of the *STREAMin*^{3} curriculum. We found that, across teacher dosage, classroom dosage, and teacher responsiveness, teachers with more positive initial perceptions of the curriculum had higher implementation. Teacher stress, self-efficacy, and perception of center climate were inconsistently related to implementation fidelity. These findings suggest that training and professional development may be more effective if teacher interest and commitment are gained from the very beginning of implementation. This could be accomplished through leaders and intervention developers involving teachers in the decision making around designing, selecting, and implementing an intervention or curriculum to ensure teachers are on board.

Paper 3

Finally, for Paper 3, *Behavior Is in the Eye of the Beholder: The Role of Preschool Teacher Beliefs about Children's Behavior* (Clayback & Williford, in preparation), we investigated the associations between teacher beliefs (specifically attributions about children's behavior), social and emotional teaching practices, and children's behavior in preschool. Very limited research has explored preschool teacher attributions and how these attributions relate to teaching practices and children's challenging behavior. To address this gap, we used secondary data from 183 preschool teachers and 470 children collected as part of a relationship-based

dyadic intervention (i.e., *Banking Time*). Using structural equation modeling, we explored the direct relationship between attributions and children's behavior, the direct relationship between attributions and teaching practices, and how attributions may relate to children's behavior indirectly through teaching practices. We found that teachers' responsibility attributions were related to their reports of the frequency of their use of exclusionary practices, but not proactive practices. Contrary to hypotheses, attributions were not directly or indirectly related to their reports of selected children's challenging behavior at the end of preschool. Findings shed light on how attributions are one factor shaping some teaching practices, specifically teachers' use of exclusionary discipline. These findings can help guide future research and intervention efforts, including coaching and consultation, to support early childhood educators and young children's positive social and emotional development.

Positionality Statement

My program of research stems from a firm belief in the power and promise of early childhood education to positively impact children, families, educators, and communities. To fulfill this promise, early childhood education programs and classrooms must be accessible, equitable, and of high-quality, including using developmentally appropriate and culturally responsive practices. Unfortunately, this is not the average experience in early childhood programs in the United States, due to many systematic inequities, including racism, poverty, and ableism. To me, supporting the early childhood workforce is at the center of improving early childhood education. Educators need to be psychologically, financially, and physically well in order to support the young children for whom they care. Further, supporting early childhood educators is important in and of itself, as these passionate and committed educators deserve a living wage and resources they need to support their well-being.

In addition, my identities and experiences have informed my analytic decisions and interpretations of findings in my quantitative research. For example, my research has been influenced by my own privileged social identities as a U.S.-born, non-disabled White woman, as well as my experiences as a student, classroom aide, and time teaching children with disabilities. I continue to actively reflect on these identities in my professional and personal life to disrupt my own biases. Though I focus on quantitative methods in this dissertation, I deeply value the use of qualitative methods to more comprehensively understand the lived experiences of educators, leaders, and families. Finally, this dissertation focuses more so on the stressors and challenges of teaching young children, but I must note that early childhood educators also have a set of unique individual and collective strengths that must be understood, appreciated, and leveraged.

Significance

In the past several decades, researchers and policymakers have heavily invested in better understanding early childhood education to improve the early learning experiences of children, families, and educators. Most previous work has centered around changing teaching practices to ultimately improving children's social and emotional skills, behavior, and early academic skills. Though these efforts are important, they fail to meaningfully address teacher factors that may be important for classroom functioning, including teacher psychological well-being. Early childhood educators face a variety of structural, classroom, and personal stressors that can make supporting young children difficult. Despite these challenges, these educators are also dedicated, resilient, and have other unique strengths that we are just beginning to research.

With this in mind, my dissertation centers teacher experiences, in particular stress, self-efficacy, and beliefs about children's behavior, to add to the knowledge base of educator psychological well-being. Findings can inform how we intervene to improve early childhood

systems broadly and support educators in particular. For example, interventions that support teachers to implement new practices (such as coaching or consultation) may be improved by addressing teacher stress and beliefs, especially in the beginning stages of intervention. Coaches and consultants can form strong relationships and support teachers by understanding specific challenges and stressors, offering new ideas and strategies, and encouraging teacher reflection on their beliefs about children and families. These findings can also guide the development of other interventions and policies, such as by prioritizing educator input in new initiatives, like curricula, and offering support to decrease stress. Mindfulness, coping skills, and other stress management practices offer promise in improving teacher well-being at the individual teacher level (Biglan et al., 2013; Jennings et al., 2017; Lang et al., 2020).

In contrast, if we continue to largely ignore teacher factors, interventions and policies may have limited impact without addressing underlying challenges educators are facing. This is particularly true in the wake of the COVID-19 pandemic, given how the pandemic has negatively impacted the well-being and livelihood of early childhood leaders, educators, families, and young children (Bassok et al., 2020; Bassok, Smith, et al., 2021; Markowitz & Bassok, 2022). Finally, though this dissertation focuses on individual teacher and program factors, systems-level change is necessary and long overdue to create and sustain a more accessible and equitable childcare system. This includes adequately funding the early childhood sector and improving educator wages and benefits. Supporting the well-being of all adults in the early childhood workforce is paramount to building an emotionally well, high-quality early childhood workforce that positively impacts each and every young child.

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Teacher and Classroom Predictors of Preschool Teacher Stress

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Published in *Early Education and Development* (2021)

Acknowledgements

This study is a secondary analysis of data from The National Center for Research on Early Childhood Education (NCRECE) Professional Development Study (Pianta & Burchinal, 2007-2011) funded by the United States Department of Education Institute of Education Sciences (R305A060021).

Abstract

Research Findings: Better understanding the correlates of teacher stress is critical to develop effective, targeted prevention and intervention efforts to decrease early childhood educator stress and ultimately improve outcomes for educators and young children. Previous studies of early childhood educator stress have mostly focused on teacher professional background and child behavior in relation to stress and rarely simultaneously considered other teacher, classroom, and center factors that may also be related to teacher stress. The current study examined multiple individual and environmental correlates of preschool teacher stress using secondary baseline data from a study of 427 teachers participating in a professional development intervention in early childhood education. Findings indicated that teacher anger, child behavior, and presence of classroom support staff were consistently related to teacher's experience of stress in the classroom, over and above teacher's personal and professional backgrounds. *Practice or Policy*: Implications for better supporting preschool teachers and young children are discussed. Taken together with previous research on teacher stress, these findings can guide future prevention and intervention work to decrease stress and promote teacher well-being in early childhood education.

Keywords: Teacher stress, Teacher beliefs, Preschool, Early childhood education, Challenging behavior, Head Start

Introduction

Early childhood educators frequently experience low pay and resources, high rates of challenging behavior in their classrooms, and a lack of professional development and training opportunities compared to K-12 teachers (Barnett, 2003; Gomez et al., 2015). These experiences place teachers at an increased risk of experiencing poor psychological health, including high levels of stress, depression, and turnover. For example, 37.0% of teachers in Head Start settings reported a diagnosis of depression or scored in a clinical range on a depression scale compared to 6.0% of the general population (Whitaker et al., 2013).

A high level of teacher stress is both theoretically and empirically linked to lower classroom quality in preschool classrooms (Friedman-Krauss et al., 2014; Hamre & Pianta, 2004; Jennings & Greenberg, 2009). Further, teacher stress is directly related to negative child behavioral outcomes (Jeon, Buettner, Grant, & Lang, 2018; Roberts et al., 2016). For example, Jeon and colleagues found that teachers' personal stress and job-related emotional exhaustion were positively associated with their report of children's behavior problems, even after controlling for teachers' professional background and observed classroom quality (Jeon, Buettner, Grant, & Lang, 2018). Teacher stress is also positively related to teacher use of exclusionary discipline practices, including expulsion. In fact, preschool teachers who report higher stress report expelling more children compared to less stressed teachers (Gilliam & Shahar, 2006; Zinsser et al., 2017).

Despite this understanding that teacher stress is related to lower classroom quality and poorer child outcomes, less is known about factors related to early childhood educator stress. Previous research has tended to focus narrowly on a limited number of teacher factors, such as compensation, education level, and job satisfaction, and far less is known about other teacher and

classroom factors that may be related to teacher stress in early childhood education (Cumming, 2017; Hall-Kenyon et al., 2014). A thorough examination of predictors of teacher stress is critical to better support teachers, including those who may be more likely to experience high levels of stress.

Additional research is needed to explore a breadth of factors related to teacher's experience of stress to better understand the psychological well-being of early childhood educators. In doing so, prevention and intervention can be better tailored to target teachers most at risk of experiencing high levels of stress. Since less work has focused specifically on predictors of teacher stress, exploratory and descriptive research is still needed. Guided by social learning theory, the current study expands upon previous research by exploring a breadth of individual teacher and environmental classroom factors associated with three types of preschool teacher stress: work-related stress, professional investment stress, and student discipline-and-motivation related stress. We examined a number of individual and environmental factors, some of which have been previously explored and some of which have not (e.g., Cumming, 2017; Jeon, Buettner & Grant, 2018). Understanding factors related to teaching stress is particularly important, since teaching-related stress may be especially salient in influencing classroom functioning and child outcomes.

Theoretical Orientation: Reciprocal Determinism and Teacher Stress

Reciprocal determinism, and social learning theory more broadly, posit that psychological functioning is affected by continuous, bidirectional interactions between behavioral, individual, and environmental influences (Bandura, 1978). As Bandura states, "behavior is influenced by the environment, but the environment is partly of a person's own making" (Bandura, 1978, p. 345). Further, a person's individual characteristics and their

environment are not independent, and the relationships between these variables are not unidirectional.

This theory is particularly relevant in a classroom setting, where teacher behavior is simultaneously influencing and influenced by teachers' individual characteristics, both child and teacher behaviors, and the classroom environment. For example, a stressed teacher may employ less effective strategies to prevent challenging behavior in the classroom. As a result, children in the classroom may exhibit higher levels of challenging behavior, and these difficult behaviors may increase the teacher's stress and/or frustration. In this example, the individual factor of stress impacts the teacher's behavior and then the overall classroom environment. As another example, a program or school may not offer adequate support or professional development for handling challenging behavior. As a result, a teacher may have a lower sense of self-efficacy related to challenging behavior, and children in this classroom may exhibit more behavior challenges. Teachers in this situation may experience higher stress as a function of the lack of environmental support, lower efficacy, and higher challenging behavior. These interactions are complex, particularly in classroom settings, and relationships between these factors can vary across teachers and settings.

Using reciprocal determinism as a theoretical framework, the current study focuses on a comprehensive set of individual and environmental factors that may be related to teachers' experiences of stress in early childhood education. Individual and environmental factors in the current study were chosen based on previous early childhood education literature and theory. Individual teacher predictors include teacher personal and professional background and beliefs. Environmental predictors in the present study include center setting and classroom demographics. This study extends previous research by exploring a wide variety of individual

and environmental characteristics simultaneously to build a more thorough understanding of factors related to teacher stress. In the review that follows, previous literature on these teacher and classroom factors theorized to be related to stress are reviewed.

Individual Predictors of Teacher Stress

Teacher Personal and Professional Background

Personal characteristics may be particularly proximal to teacher stress, and certain teachers may be more likely to experience high levels of stress. For example, cross-sectional survey studies have found that older teachers tend to be less stressed than younger teachers (Jeon, Buettner & Grant, 2018; Roberts et al., 2019). Additionally, female preschool teachers may experience less stress compared to male teachers (Friedman-Krauss et al., 2014), and some evidence suggests that white preschool teachers report higher levels of stress than teachers of color (Roberts et al., 2019). The current study, therefore, considers the role of teacher demographics, including age, gender, and race, in predicting stress. Understanding how these personal characteristics are related to stress is important to tailor and target prevention and intervention to teachers who may be more likely to experience high stress.

Professional background characteristics, such as education, experience, and compensation, are also theorized to be related to teacher stress (Cumming, 2017; Hall-Kenyon et al., 2014). However, empirical evidence on their relation to early childhood teacher stress is limited and mixed. For example, in a cross-sectional study of over 1,100 teachers, Jeon and colleagues (2018) examined teacher educational attainment, college major, years of experience, income, and teacher role in the classroom, and found that none of these characteristics were related to teacher stress after controlling for other factors. In contrast, another recent large survey study found that early childhood teacher hourly wage was significantly, though modestly,

positively related to workplace stress (Roberts et al., 2019). In this study, teachers with higher hourly wages tended to report less control and more demands at work than teachers with lower hourly wages. Roberts and colleagues (2019) also found that teachers with more education (i.e., a bachelor's degree or higher) report less stress, as measured by fewer demands and greater control and resources. Relatedly, new Head Start teachers with higher education are less likely to turn over in the first six months of teaching, an outcome that is likely related to levels of stress (Wells, 2015).

Adding to previous research, the current study considers professional background characteristics, including education level, college degree major, teaching income, and years of experience, in predicting stress. Teacher education, experience, and compensation may be related to stress through a number of mechanisms. Preschool teachers with more education may have a better understanding of child development and thus have more appropriate expectations of children in their classroom, which may be related to less stress (Lang et al., 2017). Further, teachers with more teaching experience may have more strategies for managing stress or behavior and feel more confident in their teaching (von Suchodoletz et al., 2018). Teachers who have higher salaries may experience less stress related to meeting their financial needs, and this may in turn be related to less stress in their workplace (King et al., 2016). However, as mentioned above, research on the relation between stress and salary is mixed (Roberts et al., 2019). A more thorough understanding of which professional characteristics are related to teacher stress can help guide future intervention and policy work.

Teacher Beliefs and Personality

Individual beliefs and personality characteristics of teachers may be most proximal to their experiences of stress. Certain teachers may be more likely to experience maladaptive levels

of stress based on their own traits, such as individual personality or beliefs. Teaching efficacy, or teacher beliefs about their ability to teach, has emerged as one such belief that significantly predicts teacher stress. In fact, higher self-efficacy is associated with lower levels of depression and stress among early childhood educators (Jeon, Buettner, & Grant, 2018). This suggests that teachers who are more confident in their teaching abilities may also be less stressed than less confident teachers.

Beliefs about child development and teaching may be related to teacher stress, given some evidence that teachers with more adult-centered beliefs report higher depressive symptoms (Roberts et al., 2019). However, another study surveyed 207 early childhood educators and did not find a significant relation between teacher stress and adult-centered beliefs or beliefs about development (Jeon et al., 2019). Reciprocal determinism would suggest that efficacy, beliefs of child development, and stress are influencing and influenced by behaviors and environment. For example, a teacher with a strong knowledge of child development may be more likely to recognize some challenging behavior as developmentally appropriate, which could influence how a teacher responds to these behaviors. This could in turn improve the teachers' sense of efficacy handling these behaviors and thus decrease teacher stress. Additional work is needed to better understand how teacher beliefs are related to stress.

Personality, often measured using the NEO Personality Inventory (i.e., Big Five: neuroticism, extraversion, openness, agreeableness, and conscientiousness), may also be related to preschool teacher stress. Some argue that that high-quality teachers may have a distinct personality profile, characterized by sensitivity, optimism, and openness (Ripski et al., 2011). Importantly, in the classroom, teacher disposition and personality may influence the way teachers interact with students, especially in response to challenging behavior. Previous research

in the general population has found that personality characteristics are related to individual's perceptions and behaviors, including how a person copes with stress (Afshar et al., 2015). Further, a meta-analysis on 25 studies that included over 6,200 K-12 educators found that higher levels of extraversion and conscientiousness were associated with higher teacher effectiveness and lower levels of burnout (Kim et al., 2019). Agreeableness was also associated with lower levels of burnout, but not related to teacher effectiveness. These authors theorize that extraversion may be particularly protective for teachers, given the social and energy demands of the profession. To our knowledge, no research has explored relations between personality and stress among preschool teachers.

Additionally, teacher's emotional states, such as experiences of anger or anxiety, may also be related to teachers' reports of stress. Unlike personality traits, which are thought to be generally stable, emotional states are temporary experiences of an emotion that vary by environment and across time (Ripski et al., 2011). In the classroom, teacher states of anger may emerge as a result of children engaging in challenging behavior. Teacher anxiety may also emerge when teachers lack self-efficacy or adequate support to teach effectively. Further, some teachers are likely more or less reactive to classroom experiences that may elicit anger or anxiety. In both of these examples, higher levels of state anger and anxiety may be associated with higher teacher stress. We have not found previous research exploring state emotions and their relations to preschool teacher stress.

Previous work has not examined preschool teacher personality factors or emotions related to teacher stress, and evidence on how self-efficacy and beliefs are related to stress is limited. Exploring how these individual characteristics relate to teacher stress is important, since teacher beliefs and emotions may be malleable and thus a prime target for intervention. For example,

changing teacher attitudes towards teaching, child development, or challenging behavior may decrease teacher stress. Changing teachers' state experiences of anger and anxiety may be especially suited for intervention, given that states are more variable than traits (Ripski et al., 2011). Further, understanding how individual characteristics relate to teacher stress may also help future interventions appropriately tailor levels of support to teachers who may be more or less stressed. The current study, thus, examines teacher personal and professional background characteristics in addition to teacher's personality, beliefs, and emotions.

Environmental Predictors of Teacher Stress

Classroom-level Predictors

Previous research has demonstrated that challenging behavior and teacher stress are related, with most work being cross-sectional and correlational. Friedman-Krauss and colleagues found that child behavior problems were significantly and positively associated with teacher job stress at the same time point, after controlling for additional classroom and preschool center factors (Friedman-Krauss et al., 2014). As children's behavior difficulties increased, so too did teachers' reported stress levels. This suggests that the role of child behavior is important to consider when examining teacher stress. Another study specifically examined predictors of depression, stress, and emotional exhaustion at one time point among 1,129 preschool teachers and found that teacher reports of children's challenging behaviors were positively associated with teachers' job-related emotional exhaustion, though child behavior was not related to stress or depression (Jeon et al., 2018).

Much of the research reviewed here is correlational and cross-sectional, and some limited longitudinal research further supports the notion that challenging behavior and teacher stress are related in important ways. For example, higher classroom-wide challenging behavior at the

beginning of the year predicts higher levels of teacher job stress at the end of the year, controlling for child and teacher characteristics (Jeon, Buettner, & Grant, 2018). Relatedly, children in classrooms with more depressed teachers make fewer developmental gains across the school year (Roberts et al., 2016). Roberts and colleagues found that children in classrooms with more depressed teachers had increases in problem behavior and decreases in social skills from fall to spring compared to children in classrooms with less depressed teachers, as reported by both teachers and parents.

Taken together, these findings suggest that teacher stress and challenging behavior are related in significant and important ways that may influence child outcomes and classroom functioning. However, work on classroom factors related to teacher stress has predominately considered challenging behavior and has rarely examined other classroom factors. A notable exception is the work of Friedman-Krauss and colleagues (2014), who found that teachers with larger class sizes reported higher levels of stress. This same study did not find a relation between teacher stress and the classroom percentage of children who were male or percentage of children who were Black. Additional work on classroom factors related to teacher stress is warranted, as classroom composition, such as age and gender of the children, may be also related to teacher stress. Thus, the current study examines classroom factors theorized to be related to stress, including child behavior, class size, percent of girls, percent of 3-, 4-, and 5-year-olds, and percent of the class with an individualized education plan (IEP).

Center-level Predictors

Various characteristics of early childhood centers are related to stress and teacher experiences more broadly. Center-level support for teachers, such as access to curriculum support, mental health consultation, or behavioral aides, are likely related to teacher stress.

Teachers who report more frequent use of these supports, including more meetings with their supervisor, tend to report lower levels of stress (Zinsser et al., 2017). Additionally, Zinsser, Christensen, and Torres (2016) used a nationally representative sample of 419 Head Start teachers to examine depression, job satisfaction, experiences of workplace climate, and support. This study found that depressed teachers were less satisfied and reported having less access to social and emotional supports and supports for challenging behaviors. Depressed teachers also experienced a more negative workplace and reported children as being less well behaved (Zinsser et al., 2016). Though this study focused on depression, these results likely have similarities to stress, given the demonstrated positive correlation between stress and depression among teachers (Jeon et al., 2019; Roberts et al., 2019). Replicating this work, Jeon and colleagues (2018) found that perceptions of work environment were consistently predictive of teacher stress, over and above teacher background and efficacy. In this study, teachers with more access to professional development opportunities were less stressed and depressed. Related to this literature on teacher stress, Wells (2015) found that Head Start teachers who reported liking their work environment more and a stronger relationship with their center director were less likely to leave their teaching job.

Based on these studies, center support, resources, and climate are important factors related to teacher experiences of stress. The type of center in which a teacher is teaching may also be related to stress (Roberts et al., 2019; Rusby et al., 2013). Early childhood education is provided through a variety of auspices, including public prekindergarten, Head Start and Early Head Start, private preschools, and faith-based preschools. These centers vary by funding, regulations, support provided, ages served, and families served, all factors that may be related to experiences of stress. Previous studies found that Head Start teachers experience high

psychological stress (Whitaker et al., 2013) and high rates of turnover (Wells, 2015), though these studies did not compare stress across various settings. Public preschools tend to have more resources than other early education settings, which may lead to public teachers having lower levels of stress. Further, teachers in private child-care settings have lower pay, lower levels of education, and higher stress and turnover (Bassok et al., 2020; U.S. Department of Education, 2016). Therefore, the current study examined whether teacher stress varied as a function of the type of center where they worked.

Current Study

Previous studies have mostly focused on teacher professional background and child behavior in relation to teacher stress. Findings have been mixed regarding the role of teacher characteristics, including pay and education, in predicting teacher stress. Additionally, previous work has rarely simultaneously considered other teacher, classroom, and center factors that may also be related to teacher stress. The current study builds upon previous research by more thoroughly considering individual teacher and classroom environmental factors that may be related to teacher stress in early childhood education. Based on the exploratory nature of the study, no directional associations were hypothesized.

Better understanding the correlates of teacher stress is critical to develop effective, targeted prevention and intervention efforts to decrease early childhood educator stress and ultimately improve outcomes for teachers, classrooms, and young children. In line with this goal and guided by social cognitive theory, the current study examines multiple individual and environmental correlates of preschool teacher stress using baseline data from a study of teacher professional development in early childhood. Individual teacher factors included: race, gender, education, income, teaching experience, personality characteristics, anger, anxiety, beliefs about

children, and teaching efficacy. Environmental factors included: setting, years at current center, presence of a classroom aide, classroom behavior, class size, percent of girls, percent of 4-year-olds, and percent of children with an IEP/IFSP. Overall, this study examined how teacher personal and professional characteristics and classroom and center environmental characteristics are related to teacher stress.

Method

The current study was a secondary analysis, and data included were from The National Center for Research on Early Childhood Education (NCRECE) Professional Development Study (Pianta & Burchinal, 2016). Data were accessed and downloaded from the Interuniversity Consortium for Political and Social Research (ICPSR 34848). This study was a randomized controlled trial evaluating two forms of professional development delivery for preschool teachers. Participating teachers were recruited from ten geographic sites and randomly assigned to take coursework on effective instructional strategies or receive video-based coaching. The goal of the larger study was to improve preschool teachers' use of language and literacy activities and improve teacher-child interactions. For a more complete description of the NCRECE Professional Development Study, see Hamre et al. (2012). The professional development intervention was not of interest in the current study. For the current study, only baseline data from the larger study were analyzed to examine predictors of teacher stress.

Participants

The National Center for Research on Early Childhood Education study included a total of 497 early childhood teachers. The current sample included the 427 teachers who participated in Phase 1 of the study. On average, participants were about 42.3 years old (*SD* = 10.4), and 94% were female. About a third (30.6%) of teachers were White, 44.4% were Black, and 16.4% were

Hispanic/Latinx. Almost 60% of the teachers had a bachelor's degree or higher, and teachers had an average of approximately 14.1 years total of teaching experience (*SD* = 9.1). The average teacher income was about $32,927 (*SD* = $11,377), and teachers had been in their current position for an average of approximately 7.1 years (*SD* = 5.8). Most teachers (63.2%) taught in Head Start centers, 25.45% of teachers taught in publicly funded preschool programs other than Head Start, and an additional 11.38% taught in other settings, such as non-profit and for-profit private centers. The average number of children per classroom was about 20 (*SD* = 6.5), and 90.7% of classrooms had a classroom aide. Additional classroom descriptive statistics are reported in Table 1.

Procedures

Teachers were recruited from large community preschool and Head Start programs across the United States. Teachers were eligible to participate if they were the lead teacher in a classroom in which the *majority* of children 1) were eligible for kindergarten the following school year, and 2) did not have an IEP at the start of the current school year. Additionally, classrooms instruction had to be in English for the majority of the day. Despite this inclusion criteria, 31 classrooms had more than 50% 3-year-olds, and one classroom had more than 50% of children on an IEP. This is a secondary analysis so we cannot be certain, but there are several plausible explanations for why these classrooms serving mostly 3-year-olds were in the sample. Some of these teachers may have taught in a classroom serving mostly 4-year-olds at initial recruitment, but at the time of data collection were teaching in a classroom with a different composition. These classrooms also may have included children who started school in the fall at the age of three and turned four soon after. Thus, these children could have turned five by the kindergarten cut-off date, which varies from state to state and in some places is as late as

December of the kindergarten year. We included these classrooms in our sample because our questions were unrelated to the original study that required those inclusion criteria.

Participating teachers received stipends for completing surveys and activities. The current study only examined baseline data for the 427 teachers who enrolled in Phase 1 of the RCT. These teachers completed baseline surveys in January 2008 (cohort 1) and January 2009 (cohort 2). Baseline data were collected prior to teacher's being informed of their randomization condition. More information is available on the ICPSR website (https://www.icpsr.umich.edu/web/ICPSR/studies/34848/summary).

Measures

Teacher Variables

Teacher variables included personal and professional background characteristics, teacher characteristics, teacher beliefs, and teacher stress. Personal and professional background variables included gender, race, teacher's highest education, teaching experience, and annual teaching income. These variables were collected through teacher demographic surveys. Descriptive statistics for teacher variables are reported in Table 1. The following section describes each of the other teacher variables of interest in the current study.

Teacher Characteristics. Teacher characteristics of interest included personality traits (i.e., extraversion, agreeableness, conscientiousness). Personality traits were measured using three subscales of the NEO Five-Factor Personality Assessment (Costa & McCrae, 1992). We were only able to use three of the five subscales in our secondary analysis because that was all that was collected in the original study. Example items include "I like to be where the action is" (extraversion); "I would rather cooperate with others than compete with them" (agreeableness); "When I make a commitment, I can always be counted on to follow through"

(conscientiousness). Items are rated on a response scale from strongly disagree (1) to strongly agree (5). For each subscale, the Cronbach's alphas were .60 (extraversion), .66 (agreeableness), and .80 (conscientiousness). The average scores for extraversion, agreeableness, and conscientiousness were used in analyses.

Teachers also reported on their anger and anxiety using the State of Anxiety and Anger Expression Inventories (Spielberger, 1989; Spielberger et al., 1983). Both subscales included ten items to assess teachers' emotional state during the past week on a response scale from not at all (0) to very much (3). The anger subscale included questions such as "I was furious" and "I felt like banging on the table". The anxiety subscale included questions such as "I feel tense" and "I was worrying over possible misfortune". Each subscale demonstrated good reliability (anger α = .83, anxiety α = .80), and averages for anger and anxiety were used in analyses.

Teacher Beliefs. Teacher beliefs were measured using Ideas about Children (Schaefer & Edgerton, 1985). Ideas about Children measures teacher's level of adult-centered perspectives (e.g., "Children should be treated the same regardless of differences among them"; "Children learn best by doing things themselves rather than listening to others"-reverse coded). This measure included 16 items rated on a scale from strongly disagree (1) to strongly agree (5), with higher scores representing *less* child-centered perspectives. The measure demonstrated adequate reliability in this sample (α = .77), and the average score across the items was used in analyses.

Teacher beliefs were further measured using the Teacher's Sense of Self Efficacy (Tschannen-Moran & Woolfolk Hoy, 2001). This scale measured teacher's self-efficacy across three subscales: 1) efficacy for instructional strategies (e.g., To what extent can you use a variety of assessment strategies?), (2) efficacy for classroom management (e.g., How much can you do to control disruptive behavior in the classroom?), and (3) efficacy for student engagement (e.g.,

How much can you do to help your students value learning?). This measure included 12 items rated on a scale from nothing (1) to a great deal (9). Overall, the scale Cronbach's alpha was .93, and subscale reliabilities were .85 (student engagement) .85 (instructional strategies), and .87 (classroom management). The average score was used in analyses.

Teacher Stress. Teacher stress was measured using the Teacher Stress Inventory (TSI; Fimian & Fastenau, 1990). The TSI includes three subscales of stress specifically related to teaching: (1) work-related stressors (e.g., There is little time to prepare for my lessons/responsibilities), (2) professional investment (e.g., I lack opportunities for professional improvement), (3) discipline and motivation (e.g., I feel frustrated because of discipline problems in my classroom). The measure includes 16 items, and teachers responded on a scale of no stress (1) to highly stressful (5). For each subscale, the Cronbach's alphas were .75 (professional investment stress), .80 (work related stress), and .80 (discipline and motivation stress). The average score for each subscale was used as the outcome variable in regression analyses.

Classroom Variables

All of the classroom variables were collected through a teacher survey. Classroom variables of interest included center setting (Head Start, Public, Private), presence of a classroom aide, class size, and overall classroom behavior. Additionally, age and gender of students in the classroom were considered. For age, percent of 3-, 4- and 5-year-olds in the classroom was examined. Additional child characteristics included percent of students in the classroom receiving special education services (i.e., have an Individualized Education Plan or Individual Family Service Plan). Finally, teachers reported on the rate of behavior problems in the classroom measured through a survey question: "At this point in the preschool year, how would

you rate the behavior of children in your class?". Teachers responded on a Likert scale from 1 (behaves exceptionally well) to 5 (misbehaves very frequently), with higher ratings indicating more classroom behavior problems.

Missing Data

Of the sample of 427 teachers in phase one, 332 teachers had completed a measure of teacher stress at pretest. To determine how this subsample of teachers differed from teachers who did not complete the measure of teacher stress, missing at random (MAR) analyses were performed. Results indicated that teachers with stress information had significantly lower teaching income ($F = 6.36$, $p = .012$). Teachers with stress information did not significantly differ from teachers without stress information in terms of age, education, or years of teaching experience. Teachers with stress information also did not significantly differ in terms of center setting, having a classroom aide, classroom behavior, class size, percent of girls in the classroom, percent of four-year-olds in the classroom, or percent of children with an IEP. Missing data were handled using multiple imputation.

Analytic Strategy

Categorical variables were dummy coded. These variables included race (White as the reference group, due to sample sizes), education (Associates or lower as the reference group), center setting (Head Start as the reference group), and presence of a classroom aide (No aide as the reference group). All variables were screened for normality, and all skew values were in an acceptable range (skew $< \pm 2$; Trochim & Donnelly, 2006).

Correlations among the three types of teacher stress and teacher and classroom variables of interest were first examined. Three separate regression analyses were then performed to predict each individual type of teacher stress. Correlations among the predictor variables were

examined to assess potential multicollinearity issues. The three subscales of teaching efficacy were highly correlated, ranging from $r = .697$ (student engagement efficacy and class management efficacy, $p < .001$) to $r = .777$ (student engagement efficacy and instructional strategies efficacy, $p < .001$). Average teaching efficacy across all items was used as a predictor in regression models predicting stress to avoid issues of multicollinearity among the efficacy subscales. Intraclass correlation coefficients at the site-level were small (8.0% for work-related stress, 3.7% for professional investment stress, 2.3% for discipline and motivation stress); robust standard errors were clustered at the site level to account for the nesting of teachers within sites. Variance inflation factors (VIFs) were examined for each variable in all three regressions, and all VIFs were less than 2.0, indicating multicollinearity was not an issue (Menard, 2001).

Results

Correlations among stress subscales, teacher variables, and classroom variables were first examined (Tables 2 and 3). The three types of stress were moderately positively correlated with one another, ranging from $r = .561$ (work related and professional investment, $p < .001$) to $r = .658$ (professional investment and discipline-and-motive, $p < .001$). In order to examine each type of stress independently, regressions were run with each stress type as the dependent variable.

All three regression models are reported in Table 4. Work related stress was significantly associated with anger, beliefs about children, center setting, and classroom behavior. Race, income, and conscientiousness were also approaching significance ($p = .05$ for race and income; $p = .07$ for conscientiousness). Teachers who reported more state anger in the past week reported more stress. Teachers who held more adult-centered perspectives tended to report less stress. Teachers from Head Start centers reported higher stress compared to teachers in both public and

private preschool settings. Teachers who reported more behavior problems (i.e., higher classroom behavior scores) reported more work-related stress. Teachers with higher incomes reported slightly higher levels of stress. More specifically, a $1,000 increase in income was associated with a .01 increase in work-related stress. Black teachers reported slightly less work-related stress than White teachers, and teachers with higher levels of conscientiousness reported slightly less stress. Overall, this model accounted for 23.9% of the variance in work-related stress.

Professional investment stress was significantly associated with anger, not having a classroom aide, and classroom behavior. Teachers who reported more state anger in the past week also reported more professional investment stress. Teachers who had a classroom aide reported significantly less professional investment stress compared to teachers without a classroom aide. Teachers who reported higher behavior problems also reported more professional investment stress. Overall, this model accounted for 17.9% of the variance in professional investment stress.

Discipline-and-motive stress was significantly associated with anger, not having a classroom aide, and classroom behavior. Conscientiousness was also approaching significance (p = .09), such that teachers with higher levels of conscientiousness reported less stress. Teachers who reported more state anger in the past week reported more stress. Teachers who had a classroom aide reported significantly less discipline related stress compared to teachers without a classroom aide. Teachers who reported higher behavior problems reported more discipline-and-motive stress. Overall, this model accounted for 26.2% of the variance in stress related to classroom discipline-and-motive stress.

Discussion

The current study examined associations between preschool teacher stress and a variety of teacher, classroom, and center factors. This study was guided by reciprocal determinism and an understanding that teacher behavior is simultaneously influencing and influenced by the classroom environment and teachers' individual characteristics and behavior. We examined both individual and environmental correlates of stress using a secondary analysis of baseline data from 427 teachers enrolled a study of an online professional development program. Results indicated that both individual and environmental factors are related to teacher reports of three types of stress.

Two variables were consistently related to all three of the different types of stress. Across all three types of stress, teacher anger and classroom behavior emerged as significant correlates. Teachers who reported more anger in the past week also tended to report higher stress related to work, professional investment, and classroom discipline. To our knowledge, no previous research has explored teacher anger in early childhood settings. Teachers who experience more feelings of anger may have a lower frustration tolerance, which may contribute to teachers feeling more stressed by the demands of teaching. Conversely, teachers who are more stressed may be quicker to anger. Though the current study is unable to unpack directionality, we theorize that these relations are likely bidirectional, in line with reciprocal determinism.

Further, teachers who reported higher rates of challenging behavior in the classroom also tended to report higher stress related to work, professional investment, and classroom discipline. Other work has also demonstrated a link between teacher stress and challenging behavior (Friedman-Krauss et al., 2014; Jeon et al., 2018). Challenging behavior has been previously documented as a highly stressful aspect of teaching, particularly for early childhood educators who often have less resources and support for managing these behaviors (Lambert et al., 2006;

Snell et al., 2012). Stressed teachers may use strategies that are less effective at preventing and responding to challenging behavior. It is also possible that children's challenging behavior is causing teacher stress, or that teachers with high levels of stress perceive challenging behavior as being more intense or frequent than less stressed teachers. We theorize that challenging behavior and stress are likely related bidirectionally. As such, interventions should focus on addressing both teacher stress and children's behavior.

Given the prevalence of challenging behaviors in preschool settings and the relationship to stress, providing support to teachers to address social-emotional development and challenging behaviors may be one way to address teacher stress. Currently, several evidence-based interventions explicitly target child challenging behavior in ECE (e.g., Downer et al., 2018; Hemmeter et al., 2021; Williford et al., 2017). However, it remains to be seen how these interventions affect teacher stress, and future research should investigate this. Additionally, no interventions to our knowledge explicitly mention or target teacher anger. Given our correlational findings, the potential of targeting teacher anger to decrease teacher stress overall warrants further exploration.

Two variables, conscientiousness and having a classroom aide, were related to two of the three types of stress. Conscientiousness was marginally associated with both work-related stress and discipline-and-motive stress. Teachers who were more conscientiousness reported less stress. This aligns with previous research of K-12 educators that found that more conscientious teachers were more effective and reported less burnout (Kim et al., 2019). Perhaps conscientious teachers are more likely to be efficient and organized, thus decreasing stress related to these work demands, such as preparing lessons and handling paperwork. Having a classroom aide was also significantly associated with two of the types of stress. Teachers who did not have a classroom

aide reported higher levels of professional investment and discipline related stress. Classroom aides, co-teachers, or assistant teachers provide teachers with an extra person to help handle teaching responsibilities and children's behaviors. This additional staff support likely helps teachers cope with many of the stressors commonly experienced in early childhood education settings.

Work-related stress also had several unique correlates, including teacher race, income, and the center setting. We found that teachers who were White reported higher levels of work-related stress, compared to teachers who were Black. Teachers with higher incomes reported higher stress. The coefficient was small: a $1,000 increase in income was associated with a .01 increase in work-related stress. Though we cannot examine possible mechanisms for this association in the current study, we theorize that teachers who make more money may have additional responsibilities at work, thus creating more work-related stress. Notably, this stress is specific to teaching and the coefficient was very small. It is possible that, though teachers with lower incomes may experience slightly less work-related stress, they may experience more personal life stress as a result of financial insecurity (Bassok et al., 2020).

Additionally, teachers who taught in Head Start settings reported higher levels of work-related stress, compared to teachers in both public preschools and private preschool settings (e.g., non-profit and for-profit private centers). Previous research with Head Start teachers has also shown high rates of psychological stress among teachers in these settings (Whitaker et al., 2013). Head Start teachers may be under more work-related stress due to the demands common in these settings, including being part of and working with families and children who have been historically marginalized and who experience systemic social inequities, including poverty and racism (Head Start Program Performance Standards, 2016). Further, Head Start is different than

other child care systems, including that the program was designed to support children's overall health and well-being and is federally regulated. A core component of Head Start is an emphasis on family engagement and collaboration, as described in the Head Start Program Performance Standards (2016). Without appropriate support and time allocated to family engagement, teachers may experience more work-related stress as a result. Notably, our sample of private child care centers was small, thus not well representative of private center teachers, who tend to have lower wages and less education (Bassok et al., 2020). Additionally, because of the small sample of private settings, we are unable to differentiate between non-profit and for-profit, which differ in important ways. The finding that stress varied by setting should thus be interpreted with caution, since more research is needed. Understanding how stress differs across settings is particularly important since settings differ in terms of regulations, requirements, and resources.

Additionally, teachers who had more adult-centered views about children reported less work-related stress than teachers with more child-centered views. Teachers who hold more adult-centered views generally agree with statements such as children should all be treated the same, regardless of differences, and children should always obey parents and teachers (Schaefer & Edgerton, 1985). Conversely, teachers with more child-centered views generally agree with statements such as children learn best by doing things, rather than listening to others, and children should be allowed to express their own point of view. Perhaps teachers with more adult-centered perspectives experience less work-related stress because they do not feel as much pressure to individualize classroom activities to the interests and needs of children. In contrast, teachers with more child-centered perspectives may engage in extra work and preparation in order to adapt activities to the children in their classroom, thus resulting in more work-related stress. Indeed, child-centered approaches to teaching can be emotionally taxing for teachers,

particularly in the absence of a supportive workplace (Hur et al., 2015). Though not studied previously, teachers with more child-centered beliefs may also engage in more self-reflection and be more critical of their practices as they strive to use child-centered approaches in their classroom, which may create more stress if a teacher does not have adequate support to improve based on their reflections. Importantly, child-centered approaches to teaching are generally seen as more desirable and developmentally appropriate than adult-centered approaches (National Association for the Education of Young Children, 2020) and are associated with greater student academic achievement (Lerkkanen et al., 2016). Given this and the link between beliefs and stress, attention should be given to ensuring teachers have enough time, resources, and support to individualize activities and practices to the unique needs of children in their classroom without adding to levels of teacher stress.

Interestingly, teacher personal and professional background and characteristics of children in the classroom were largely unrelated to teacher reports of stress. We did not find any significant associations between stress and teacher gender, education level, years of experience, or teaching efficacy. Demographic characteristics of the children in the classroom, including class size, gender, age, and disability status, also did not significantly predict any of the three types of stress. Previous research has also found that personal and professional characteristics are largely unrelated to teacher stress (Jeon et al., 2018). It appears as though teacher daily experiences in the classroom, such as frustration and perception of challenging child behavior, may be more proximal to teaching related stress and thus more prime targets for intervention. Two of the personality characteristics, extraversion and agreeableness, also did not significantly predict stress. It is worth noting that the reliability of the extraversion and agreeableness subscales in the current sample were lower than recommended ($\alpha < .70$), and this may have led

to a null result. Future research should examine other beliefs and personality characteristics, perhaps using a different or additional measure.

Limitations and Future Directions

The current study built on previous work by examining multiple teacher and classroom characteristics related to teacher stress in early childhood education. Despite this contribution, this study had several limitations that warrant mention. First, the current study analyzed baseline data collected at one time point. As a result, directionality of these associations is unclear. For example, it is possible that challenging behavior is related to teacher stress, such that higher rates of challenging behavior cause more stress for teachers. Conversely, teacher stress may cause more challenging behavior, as stressed teachers may employ less effective behavior management techniques, such as using exclusion (Zinsser et al., 2017). More likely, it is possible that child challenging behavior and teacher stress are related bidirectionally. Future research should examine teacher stress and its correlates over time to better understand how these variables influence each other.

Second, this study relied on teacher report and may, as a result, be influenced by informant bias and shared method variance. Teacher reports are used frequently in education research, and teacher perspectives are critical, especially when considering a teacher's own background and beliefs. For some variables, however, teacher perception and bias may have played a role in influencing teacher reports. It is possible that teachers who are stressed may have different and more negative perceptions of aspects of the classroom, such as child behavior. Future research should include additional reports of classroom behavior to provide another perspective on behavior.

Finally, the variance explained in our models was relatively low (14.5 to 24.5%). This is likely because we could not include other center-level factors, such as center climate or support available to teachers. The current study only examined the type of center (i.e., Head Start, public, or private). Previous work has found that center climate is related to teacher psychological stress (Zinsser et al., 2016). Other individual factors that may be related to stress would likely also explain additional variance, such as teacher use of coping skills or mindfulness practices. Future work should incorporate additional variables, especially center-level factors, to better understand the role of environment in teacher stress.

Conclusions

The current study built upon previous research by examining associations between teacher stress and a broad range of teacher, classroom, and center characteristics. Findings indicate that teacher anger, child behavior, and additional classroom staff were consistently related to teacher's experience of stress in the classroom. Taken together with previous research on teacher stress, these findings can guide future prevention and intervention work related to promote teacher well-being. In order to address teacher psychological stress, teachers need support to address social-emotional development and challenging behavior in their classrooms. Additionally, teachers need resources to address their own stress and social-emotional competencies, such as mindfulness and cognitive behavioral strategies. In order to improve social, emotional, and academic outcomes for our youngest learners, we must first support the adults who care for and teach them.

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Table 1. Descriptive Statistics of Teacher and Classroom Characteristics

Teacher Characteristics	***M***	***SD***	**Sample Range**
Work-Related Stress	2.13	0.73	1 to 4.17
Professional Investment	1.58	0.61	1 to 4.50
Discipline-and-Motive	1.74	0.62	1 to 3.67
Extraversion	3.64	0.40	2.50 to 4.67
Agreeableness	4.14	0.40	2.92 to 5
Conscientiousness	4.09	0.49	2.42 to 5
State Anger	.32	0.39	0 to 2.40
State Anxiety	.77	0.48	0 to 2.90
Ideas About Children	2.52	0.61	1.19 to 4.06
Student Engagement Efficacy	7.69	1.05	4 to 9
Instructional Strategies Efficacy	7.36	1.07	3.75 to 9
Class Management Efficacy	7.46	1.13	3.50 to 9
Classroom Characteristics			
Classroom Behavior	2.50	.80	1 to 5
Class Size	19.95	6.52	0 - 45
% 3-year-olds	20.55	22.41	0 - 100
% 4-year-olds	57.38	23.07	0 - 100
% 5-year-olds	21.65	19.03	0 – 88.89
% Girls	47.67	11.51	0 - 80
% IEP/IFSP	8.49	11.01	0 - 100

Notes. Two classrooms had 100% 3-year-olds. One classroom had 100% IEP.

Table 2. Correlations among Stress and Teacher Variables

Teacher-Level Variables	Work-Related Stress	Professional Investment Stress	Discipline-and-Motive Stress
Teacher Background			
Age	.053	-.004	-.065
Gender	.006	.073	.037
Race - Black	-.190***	-.105	-.151**
Race - Latinx	.073	.135*	.140*
Highest Education	.031	-.038	.052
Teaching Income	.066	-.091	-.033
Years of Experience	.019	-.066	-.062
Teacher Characteristics			
Extraversion	.031	-.057	-.099
Agreeableness	.004	-.118*	-.116*
Conscientiousness	-.189***	-.134*	-.185***
State Anger	.251***	.315***	.294***
State Anxiety	.232***	.258***	.214***
Teacher Beliefs			
Ideas about Children	-.139*	.040	.016
Student Engagement Efficacy	-.097	-.094	-.155**
Instructional Efficacy	-.139*	-.064	-.100
Class Management Efficacy	-.160**	-.096	-.199***
Overall Efficacy	-.147**	-.094	-.169**

Notes. Gender (0 = female, 1 = male). Race - Black (0 = white, 1 = black). Race - Latinx (0 = white, 1 = Latinx). Highest education (0 = Associates degree or less, 1 = Bachelor's degree or higher). Degree Major (0 = Early Childhood, 1 = Not Early Childhood).
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. Correlations among Stress and Classroom Variables

Classroom-Level Variables	Work-Related Stress	Professional Investment Stress	Discipline-and-Motive Stress
Head Start Center	.173**	.016	.000
Years at Current Center	.018	-.072	-.043
Years in Current Position	-.002	-.069	-.034
Classroom Aide	-.065	-.175***	-.175***
Classroom Behavior	.289***	.193***	.385***
# of Children in Class	.063	-.095	-.062
% of Class Girls	.025	-.005	-.084
% of Class 3-year-olds	.126*	.005	.017
% of Class 4-year-olds	-.143**	.003	-.009
% of Class 5-year-olds	.035	.007	-.001
% of Class has IEP/IFSP	.070	-.069	.002

Notes. Head Start Center (0 = not Head Start, 1 = Head Start). Classroom Aide (0 = No Classroom Aide, 1 = Has Classroom aide).
* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Multiple Linear Regression Predicting Three Types of Teacher Stress

	Work-Related Stress [a]		Professional Investment Stress [b]		Discipline-and-Motive Stress [c]	
Model Variables	B (SE)	*t*	B (SE)	*t*	B (SE)	*t*
Teacher Factors						
Teacher is Black	-.18 (.09)†	-1.94	-.08 (.08)	-1.07	-.11 (.08)	-1.50
Teacher is Latinx	-.00 (.11)	.00	.06 (.09)	.72	.10 (.09)	1.16
Teacher is male	.09 (.15)	.59	.22 (.14)	1.60	.15 (.13)	1.11
Teacher has BA or Higher	-.10 (.10)	-1.04	-.09 (.08)	-1.11	.02 (.08)	.19
Income	.01 (.00)*	2.10	-.00 (.00)	-.05	.00 (.00)	.36
Years of Teaching Experience	-.00 (.00)	-.54	-.00 (.00)	.74	-.00 (.00)	-.98
Extraversion	.09 (.10)	.92	-.07 (.09)	-.72	-.09 (.08)	-1.09
Agreeableness	-.00 (.10)	-.02	-.05 (.09)	-.53	-.03 (.09)	-.39
Conscientiousness	-.16 (.08)†	-1.97	-.06 (.08)	-.81	-.12 (.07)†	-1.69
State Anger	.28 (.11)*	2.46	.33 (.11)**	2.93	.35 (.10)***	3.47
State Anxiety	.15 (.11)	1.56	.12 (.09)	1.30	-.02 (.08)	-.30
Ideas About Children	-.14 (.07)*	-2.01	.01 (.06)	.22	.01 (.06)	.12
Overall Teaching Efficacy	-.03 (.04)	-.82	-.00 (.04)	-.03	-.03 (.04)	-.87
Classroom Factors						
Setting - Public	-.25 (.10)*	-2.61	-.01 (.08)	-.15	-.00 (.08)	-.03
Setting - Private	-.24 (.12)†	-1.96	-.07 (.11)	-.64	-.03 (.11)	-.33
Years at Current Center	.00 (.01)	.18	-.01 (.01)	-.95	.00 (.01)	.23
Classroom Aide	-.09 (.13)	-.68	-.24 (.11)*	-2.15	-.22 (.11)*	-1.99
Classroom Behavior	.21 (.05)***	4.08	.09 (.04)*	2.09	.24 (.04)***	5.59
Class Size	.00 (.00)	.46	-.01 (.01)	-1.35	-.01 (.00)	-1.27
% of Girls	.00 (.00)	1.48	.00 (.00)	1.03	.00 (.00)	.37
% of 4-year-olds	-.00 (.00)	-1.26	.00 (.00)	.10	.00 (.00)	.37
% of children with IEP/IFSP	.00 (.00)	.56	-.00 (.000	-1.37	-.00 (.00)	-.43

Notes. Site-level robust clustered standard errors are in parentheses. All variables were entered on one step. Race reference group is White. Gender reference group is female. Income was rescaled such that a one-unit increase equates to a $1,000 increase in annual income. Setting reference group is Head Start. Classroom Aide (0 = No Classroom Aide, 1 = Has Classroom aide).

[a] $F = 4.14$, $R^2 = .239$, $p < .001$. $df = (22, 405)$.

[b] $F = 5.08$, $R^2 = .179$, $p < .001$. $df = (22, 405)$.

[c] $F = 6.53$, $R^2 = .262$, $p < .001$. $df = (22, 405)$.

†$p \leq .1$, * p < .05, ** p < .01, *** p < .001

Identifying Teacher Beliefs and Experiences Associated with Curriculum Implementation Fidelity in Early Childhood Education

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Published in *Prevention Science* (2022)

Acknowledgements

The research reported here was supported by the Virginia Department of Social Services, the Alleghany Foundation, and the Obici Healthcare Foundation through grants provided to the University of Virginia. The opinions expressed are those of the authors and do not represent views of the funders. Special thanks to Kate Matthew, Lilian Hummer, Erin Vines, Marissa Bivona, and the research team for their contributions to the project and implementing *STREAMin*^{3}, as well as to the participating coaches, program leaders, teachers, children, and families.

Abstract

Implementation science research points to the importance of improving implementation fidelity to improve outcomes and sustainability of interventions. Despite our growing understanding of factors related to implementation in K-12 settings, much less is known about factors influencing implementation in early childhood education contexts. Understanding factors related to how well early childhood educators implement an intervention is critical to develop ways to improve implementation fidelity and ultimately education quality. The current study explored how teacher beliefs and experiences were related to initial uptake and later implementation in a sample of 87 early childhood educators implementing a novel comprehensive curriculum, *STREAMin*^{3}. Across teacher dosage, classroom dosage, and teacher responsiveness, teachers with more positive initial perceptions of the curriculum had higher implementation. Teacher stress and perception of center climate were inconsistently related to implementation. Public preschool teachers and teachers with fewer years of teaching experience also reported higher levels of implementation. Implications for supporting teachers to improve implementation fidelity are discussed.

Keywords: Implementation, Early childhood, Preschool, Curriculum, Teacher beliefs, Teacher Stress

Evidence-based practices often fail to be successfully implemented in applied settings such as schools. This problem is referred to as the research to practice gap. Recently, the field of education has recognized the need to better understand this gap, including factors that influence how well practices and interventions are implemented in school settings. Implementation fidelity refers to the degree to which an intervention is implemented as intended (Elliott & Mihalic, 2004). In schools, interventions are most often implemented by educators, who face barriers such as a lack of resources and support, that may impede their ability to effectively implement evidence-based or novel practices (Han & Weiss, 2005; Forman et al., 2009). When practices and curricula are implemented, implementation fidelity varies widely within and across educational settings. Previous work has consistently demonstrated that positive outcomes increase when effective interventions are implemented with higher fidelity (e.g., Hamre et al., 2010; Pas & Bradshaw, 2012).

To increase fidelity, we must thoroughly understand educator and school factors that influence implementation. Levels of implementation fidelity in K-12 settings are related to both organizational and individual variables, including teacher characteristics, attitudes, and school climate (e.g., Domitrovich et al., 2015; Han & Weiss, 2005; Ringwalt et al., 2003). Common barriers to implementation in schools include lack of resources, competing priorities, educator beliefs, and lack of support from school leadership (Forman et al., 2009; Kincaid et al., 2007). Relatively little is known about factors that influence levels of implementation fidelity among early childhood educators. Early childhood education, which includes infant, toddler, and preschool classrooms, is an important context in which teachers scaffold children through increasingly complex social, emotional, and cognitive experiences. As a result, interventions and policy in early childhood education settings have focused on improving education quality to

foster positive early development. However, little is known about individual educator and school characteristics that may be related to how well these teachers implement new practices or curricula. Understanding these factors is critical to developing ways to improve implementation fidelity and ultimately education quality. Malleable factors, such as educator beliefs and experiences, may be prime targets to improve implementation (Owens et al., 2014; Cook et al., 2015). The current study, thus, sought to explore factors related to early childhood educators' implementation of a novel comprehensive curriculum, *STREAMin*^{3}.

Implementation Fidelity

Implementation fidelity is complex and multidimensional, including components such as dosage, adherence, and responsiveness (Dane & Schneider, 1998). Dosage refers to the quantity of intervention delivery, whereas adherence refers to the quality of delivery. Responsiveness refers to how implementers perceive the intervention, such as if they enjoyed it or if they perceived it as effective. Prevention researchers across fields have developed numerous frameworks for studying implementation fidelity (e.g., Feldstein & Glasgow; Keith et al., 2017). Domitrovich and colleagues (2008) proposed a three-level conceptual framework specifically for examining factors that influence implementation fidelity of school-based interventions. In this framework, the macro level refers to federal, state, and district policies that impact individual schools. The micro level includes factors related to the school and classroom setting include size, school climate, funding, and leadership. The individual level includes factors related to the teacher implementing the intervention, such as professional characteristics, psychological characteristics, and beliefs about the intervention itself. The framework has been used in previous implementation research in education settings, including work exploring predictors of implementation, and we used this framework to guide the current study. The current study

focuses on micro and individual level factors influencing teachers' implementation (specifically teachers' dosage and responsiveness) of the *STREAMin*^{3} curriculum. Micro level variables of interest include funding, classroom ages, and perception of school climate. Individual level variables include background, role, stress, efficacy, and perception of the curriculum.

Predictors of Implementation Fidelity

Individual-Level Factors

Teachers, as implementers, ultimately decide whether and how well to deliver interventions (Han & Weiss, 2005). Some studies have found that less experienced teachers report higher implementation fidelity, though other background characteristics such as education are largely unrelated to implementation (Rohrbach et al., 1993; Domitrovich et al., 2015). Teacher attitudes and beliefs, such as enthusiasm, self-efficacy, and beliefs about evidence-based practices, appear critical to successful implementation (Forman et al., 2009; McGoey et al., 2014; Rohrbach et al., 1993). Teachers with higher self-efficacy report a greater willingness to adopt new practices (Evers et al., 2002). Likewise, initial beliefs about new programs and practices are associated with higher implementation dosage over time (Cook et al., 2015; Domitrovich et al., 2019), as are teachers' perceptions of the new program's fit with their teaching style (Domitrovich et al., 2015).

Teacher distress may be another critical factor influencing a teacher's implementation. Stressed teachers report more barriers to implementing behavior interventions in their classrooms (McGoey et al., 2014). Teachers' burnout is associated with lower dosage and adherence to a new curriculum (Domitrovich et al., 2015; Ransford et al., 2009), and may be particularly problematic when teachers also report low administrative support or low curriculum support, including coaching (Ransford et al., 2009). Further, evidence from a recent study found that a

stress reduction program resulted in decreases in elementary teacher stress, which then resulted in increases in teacher reports of intervention fidelity (Larson et al., 2018). Taken together, previous work suggests that individual teacher factors, such as beliefs and experiences of stress, may be key proximal factors influencing implementation dosage. The current study, thus, considers early childhood teachers' initial beliefs, teaching efficacy, and stress as individual characteristics that may predict curriculum implementation over time.

Micro-Level Factors

Evidence also suggests that environmental characteristics, such as school climate and leadership support, are related to implementation fidelity in school settings. Teachers who report that their school has a more positive social-emotional learning (SEL) climate also report implementing an SEL intervention with higher adherence (Cook et al., 2015). In schools with a less positive climate, teachers may view a new intervention more negatively, and thus implement the intervention with lower fidelity (Beets et al., 2008). Alternatively, teachers who report higher levels of principal support exhibit higher implementation fidelity compared with teachers who perceived lower principal support (Rohrbach et al., 1993; Gottfredson & Gottfredson, 2002). The current study considers early childhood teachers' report of their center's climate as micro-level factors that may predict curriculum implementation over time.

Implementation in Early Childhood Education Settings

Several characteristics of ECE settings make these classrooms different than K-12 settings, warranting a separate exploration of implementation in these unique settings (Stipek et al., 2017). Early childhood education is provided through a variety of auspices, including public prekindergarten, Head Start/Early Head Start, private, and faith-based preschools. Each setting has different regulations, requirements, and resources (Bassok et al., 2020). Stress and turnover

in early learning settings is high, with nearly a third of ECE teachers leaving the field each year (Wells, 2015). These differences and more result in early childhood educators having different training and professional development needs than K-12 teachers (Gomez et al., 2015). These teachers may have unique strengths and barriers when implementing new practices.

Three notable studies have explored predictors of implementation specifically in ECE. The first examined individual factors associated with instructional coach ratings of preschool teacher implementation in Head Start classrooms (Domitrovich et al., 2009). The second study investigated teacher implementation dosage of a school readiness curriculum among 49 Head Start and center-based childcare teachers (Baker et al., 2010). The third study examined teacher and program factors related to implementation of Banking Time, an intervention to improve teacher-child relationships with children who exhibit challenging behavior (Williford et al., 2015). All three studies found associations between teacher beliefs and implementation. Coach perceptions of teachers' openness to consultation was associated with adherence (Domitrovich et al., 2009), while teachers who had more concerns at the beginning of implementation had lower dosage (Baker et al., 2010). Teachers who reported higher levels of burnout prior to implementation were rated as by coaches as more effective implementers, though efficacy and depression were not related to implementation (Domitrovich et al., 2009). All three studies were limited in several ways that the current study addresses. For example, the first sample only included Head Start teachers, the second relied on teacher-report and only considered dosage, and the third did not examine teacher distress or center climate.

In sum, teacher beliefs and experiences may be malleable targets to improve intervention adoption, implementation, and eventual outcomes (Owens et al., 2014). The current study builds upon previous research by examining several teacher beliefs and experiences related to

implementation fidelity reported by both teachers and their instructional coaches over time in a sample of early childhood educators implementing a new comprehensive curriculum.

STREAMin^3 Curriculum Model

The *STREAM: Integrated, Intentional, Interactions* (*STREAMin*^{3}; Williford et al., 2018, 2021) Curriculum model is a comprehensive, integrated curriculum package that focuses on the use of high-quality interactions (teacher-child and peer) to promote children's development of school readiness skills, including language, literacy, math, self-regulation, social-emotional, and motor skills. The curriculum includes classroom activities, routines, games, and formative assessments implemented by teachers in classrooms serving children from birth to five. The model embeds professional development and instructional coaching to support teachers' implementation. *STREAMin*^{3} follows practice-based coaching, centered around collaborative teacher-coach relationships to support teachers to use evidence-based practices in their classroom (Snyder et al., 2015). To implement this curriculum, teachers are tasked with adopting an entire curriculum package that affects all aspects of the classroom, rather than adopting a specific practice or targeted intervention. Teacher efficacy, stress, and center climate may be especially important in predicting teacher uptake of a completely new early childhood curriculum package, such as *STREAMin*^{3}. This study, therefore, investigates how teacher beliefs, efficacy, stress, and center climate relate to initial and longitudinal implementation of *STREAMin*^{3}.

Current Study

The current study addresses the following research questions: 1) How are teacher perceptions, efficacy, stress, and center climate related to initial implementation of a novel comprehensive curriculum? and 2) How are teacher perceptions, efficacy, stress, and center climate related to change in implementation fidelity, over and above initial fidelity? We

hypothesized that teachers who report more positive initial perceptions and efficacy, less stress, and a more positive center climate will have higher implementation initially and over time.

Method

Participants

Data were collected as part of a larger pilot evaluation study of *STREAMin*^{3} including teachers across Virginia (see Williford et al., 2021 for the evaluation report). Programs were initially recruited to participate in an evaluation study of the curriculum in spring 2019, and implementation data collection for the current study occurred during fall 2019 and spring 2020. Early childhood program leaders were invited to a recruitment session to learn about the curriculum, materials, implementation supports, and evaluation and completed an interest form to indicate interest in participating. From the possible pool of programs that expressed interest, 37 programs (112 lead teachers) were invited to participate. These programs represented both public (state-funded and Head Start) and private programs and educators teaching a mix of infant, toddler, and preschool children, with preschool teachers purposely over-represented.

The current study included data from teachers who completed the intake survey, at least one fidelity survey, and the final survey at the end of the evaluation (n=87 teachers, 34 programs; Table 1). On average, teachers had 14.72 years of ECE teaching experience (SD = 8.85, range = 1 to 37). Compared to the 25 lead teachers who did not complete all three of these components, the teachers in the current study had slightly more years of education (15.9 years vs. 14.4 years, $p < .001$) and were more likely to be teaching in a public setting ($p < .001$). Teachers in this sample did not differ significantly from the full sample in years of experience, gender, or race.

Coaching Procedure

Eleven highly qualified coaches were hired to support *STREAMin*^{3} implementation. Coaches participated in extensive training before and during coaching, including an online course, a one-day in-person workshop, a site visit to the school where the curriculum was developed and in use, and ongoing supervision from the research team. Coaches were assigned at the center-level and had eight teachers on their caseload, on average. Coaches interacted with teachers and programs regularly through check-ins, meetings, observations, and professional development. Approximately every two weeks, the coach observed the classroom, focusing on a specific aspect of implementation. Coaches met with the teachers after for about 30 minutes to provide feedback and action plan.

Measures

Implementation Fidelity

STREAMin^3 curriculum implementation fidelity data were collected across fall 2019 (time 1) and spring 2020 (time 2), prior to center closures due to COVID-19. Several aspects of implementation fidelity were measured, including teacher coaching attendance, classroom activity completion, and responsiveness to curriculum. Descriptive statistics for the implementation variables are reported in Table 1.

Teacher Attendance. Teacher attendance (i.e., coaching dosage) included the total number of coaching sessions/monthly meetings that teachers attended, reported by coaches. Time 1 teacher attendance included meetings from August 2019 to December 2019. Time 2 included meetings from January 2020 to March 2020, prior to center closures due to COVID-19.

Activity Completion. Teachers completed two surveys reporting on how many days a week they used various *STREAMin*^{3} components in their classroom. The first fidelity survey (Time 1) was completed in October 2019 during weeks 7 and 8 of implementation. The second

fidelity survey (Time 2) was completed in February 2020 during weeks 17 and 18 of implementation. The proportion of days that teachers reported implementing core skill supports was used as a classroom dosage outcome in analyses.

Responsiveness. Teachers also completed a measure of their responsiveness to the curriculum in the fidelity survey 1 (Time 1) and in the final study survey in March 2020 (Time 2). This survey included eight items that teachers rated on a scale of zero (strongly disagree) to ten (strongly agree). Items included "*STREAMin*^{3} is helping me be a better teacher" and "Participating in *STREAMin*^{3} has been manageable for me this year." Reliability in the current sample was good (Time 1 Cronbach's $\alpha = .94$; Time 2 Cronbach's $\alpha = .94$), and the average responsiveness score across items was used as an outcome in analyses.

Individual Teacher Beliefs

Teachers reported on their initial perception of the curriculum, efficacy, stress, and center climate through an intake survey at entry into the program (See Table 1).

Initial Perception. Teachers reported on their initial perception of *STREAMin*^{3} using two items ("How much do you enjoy participating in the *STREAMin*^{3} pilot?" and "How likely are you to recommend the *STREAMin*^{3} curriculum to a colleague?") at the beginning of their implementation. Teachers rated the curriculum on a scale of zero (not at all) to ten (very much), with higher scores indicating more positive initial impressions of the curriculum. The two items were highly correlated ($r = .92$, $p < .001$), and the average was used in analyses.

Teacher Efficacy. Efficacy was measured using classroom management, instructional support, and student engagement subscales (Tschannen-Moran & Hoy, 2001). Teachers reported on 12 items using a zero to ten scale, with anchors at zero (no influence), five (some influence), and ten (a great deal of influence). Example items included "How much can you do to control

disruptive behavior in the classroom?" and "To what extent can you provide an alternative explanation or example when children are confused?" Higher scores indicated a higher sense of efficacy. Reliability in the current sample was good (α = .94). Analyses used average efficacy.

Stress. Stress was measured using the Teacher Stress Inventory (TSI; Fimian & Fastenau, 1990). Teachers reported on 15 stress items using a zero to ten scale, with anchors at zero (no stress), five (moderately noticeable stress), and ten (extremely noticeable stress). Example items included "I feel frustrated because of discipline problems in my classroom" and "My class is too big". Higher scores on the stress scale indicated more stress, and reliability in the current sample was good (α = .90). Average stress was used in analyses.

Micro-Level Teacher Experiences

Teacher report of center climate was measured using three aspects of climate: professional teacher behavior (5 items; Hoy et al., 2002), collegial leadership (5 items; Hoy et al., 2002), and psychological safety (7 items; Edmondson, 1999). Teachers responded to 17 items on a zero to ten scale, with anchors at zero (never), five (sometimes), and ten (frequently). Example items included "Teachers provide strong social support for colleagues" (professional teacher behavior), "The director is friendly and approachable" (collegial leadership), and "Working with teachers at this center, my unique skills and talents are valued and utilized" (psychological safety). Higher scores indicated a more positive center climate, and reliability in this sample was acceptable (Cronbach's α = .82). Average center climate was used in analyses.

Additionally, we were interested in determining if implementation varied by other characteristics of the environment. In all models, we included center type, defined as center is public (reference group), private, or faith-based. Nearly 64% of the teachers were in publicly

funded centers. We also included a variable indicating if the classroom age level was preschool (reference group), toddler, or infant to examine implementation by the classroom ages.

Data Preparation & Analytic Plan

All data preparation and analysis were conducted using STATA 16. Each implementation fidelity outcome variable was screened for normality using skew and kurtosis variables. Since attendance outcomes were count variables, we conducted Poisson regressions for those outcomes (Coxe et al., 2008). We used ordinary least squares regressions for the continuous outcomes (activity completion and responsiveness). For each model, standard errors were clustered to account for the nesting of teachers within programs (Cameron & Miller, 2015; Huang, 2016; Primo et al., 2007). This was necessary to account for the nonindependence of teachers within the same child care program. Based on previous literature, teacher years of experience was also included in all models (Domitrovich et al., 2015; Rohrbach et al., 1993). In models predicting implementation at time 2, we controlled for implementation at time 1.

Missing Data

In order to be included in the current study, teachers needed to have completed the intake survey, at least one fidelity survey, and the final survey. Teachers who completed these three components were included to ensure that our analytic sample was teachers who received the full curriculum package, including coaching and professional development, across the year of evaluation. Teachers who were missing these data did not receive full training in the curriculum, because they either left their program or joined later, and differences in implementation fidelity are likely due to these teachers having less coaching and training opportunities. Among the 87 teachers in the current study, the majority of teachers (83.91%) were not missing any relevant data. Missing data on the outcome variables were as follows: 0% (meeting attendance), 2.29%

(activity completion), and 19.54% (responsiveness). Little's CDM test comparing teachers with and without complete data indicated that missing at random (MAR) could be assumed, so we used multiple imputation using STATA's chained command to handle missing data.

Results

Correlations between implementation fidelity, individual characteristics, and micro-level characteristics are presented in Table 2. Implementation fidelity variables were significantly correlated across time, suggesting that implementation was somewhat stable. Dosage and responsiveness were overall significantly and moderately correlated with each other, suggesting that the variables were related but measuring distinct aspects of implementation fidelity.

Predicting Teacher Meeting Attendance

In predicting initial teacher attendance, initial perception was significant, and teaching efficacy was approaching significance (p = .09; Table 3). Teachers with more positive initial perceptions of *STREAMin*[3] had significantly higher meeting attendance; a one unit increase in a teacher's initial perception was related to a .13 increase in the number of full meetings attended in the fall, holding all other factors constant. Teachers with higher teaching efficacy also had higher meeting attendance. A one unit increase in a teaching efficacy was related to a .14 increase in the number of full meetings attended in the fall, holding all other factors constant. Attendance significantly varied by classroom age; holding all other factors constant, meeting attendance was 1.84 times higher for toddler teachers compared to preschool teachers. Initial attendance was not significantly predicted by teaching experience, center type, stress, or center climate. Overall, the model accounted for 14.5% of the variance in initial teacher attendance.

In predicting teacher attendance in the spring, center climate approached significance (p = .07). Teachers who reported a more positive center climate attended more meetings in the

spring; a one-unit increase in center climate was associated with a .04 increase in spring meeting attendance. Attendance in the fall, teaching experience, and center type also emerged as significant. Teachers who attended more meetings in the fall tended to also attend more meetings in the spring; a one unit increase in fall attendance was associated with a .05 increase in spring attendance, holding all other factors constant. Teachers with more experience attended significantly more meetings; a one unit increase in years of teaching experience was associated with a .01 increase in spring attendance, holding all other factors constant. Teachers at private and faith-based centers attended significantly fewer meetings in the spring compared to teachers at public centers. Attendance was not significantly predicted by classroom age, perception, stress, or efficacy. The model accounted for 8.8% of the variance in spring attendance.

Predicting Classroom Activity Completion

In predicting initial activity completion, initial perception was significant, and center climate was marginally significant (Table 4). Teachers with more positive initial perceptions of *STREAMin*[3] reported implementing significantly more curriculum activities. Teachers who reported a more positive center climate reported implementing less frequently. Teaching experience was also a significant predictor, and classroom age level was marginally significant. More experienced teachers reported implementing the curriculum less frequently, and toddler teachers reported implementing slightly more frequently than preschool teachers. Initial activity completion was not significantly predicted by center type, teacher stress, or teaching efficacy. Overall, the model accounted for 30.2% of the variance in initial activity completion.

In predicting activity completion over time, initial activity completion and teaching experience were significant, and center type was marginally significant. Teachers who reported implementing more activities in the fall tended to also implement more activities in the spring.

Teachers with more teaching experience reported implementing the curriculum less frequently in the spring. Teachers in private centers reported implementing slightly fewer activities, compared to teachers in public centers. Classroom activity completion over time was not significantly predicted by classroom level, initial perception, stress, efficacy, or center climate. Overall, the model accounted for 33.1% of the variance in spring activity completion.

Predicting Responsiveness

In predicting initial responsiveness, initial perception was significant (Table 5). Teachers with more positive initial perceptions of the curriculum reported higher responsiveness. Teaching experience and classroom level also significantly predicted initial responsiveness. Teachers with more experience reported lower levels of initial responsiveness. Teachers in infant and toddler classrooms reported significantly higher initial responsiveness than preschool teachers. Initial responsiveness was not predicted by center type, teacher stress, teacher efficacy, or center climate. Overall, the model accounted for 43.8% of the variance in initial responsiveness.

In predicting responsiveness over time, initial perception and stress were significant. Teachers with more positive initial perceptions of the curriculum tended to increase their levels of responsiveness over time. Teachers who reported lower levels of stress had increased levels of responsiveness over time. Responsiveness in the fall and center type also predicted responsiveness in the spring. Teachers with higher fall responsiveness and teachers at private centers had higher spring responsiveness, compared to public teachers. Responsiveness over time was not predicted by teaching experience, classroom level, teacher efficacy, or center climate. The model accounted for 82.5% of the variance in responsiveness over time.

Discussion

We explored teacher beliefs and experiences related to implementation of the *STREAMin*^{3} curriculum in early childhood classrooms. Previous research on teacher factors influencing implementation fidelity has focused on K-12 school settings, and less is known about different aspects of implementation fidelity in early childhood settings. We extended prior work by exploring how teacher beliefs and experiences are related to initial curriculum uptake and later implementation dosage and responsiveness in a sample of 87 early childhood educators.

Findings point to the importance of individual teacher beliefs and experiences in predicting implementation. Across teacher dosage, classroom dosage, and teacher responsiveness, teachers with more positive initial perceptions of the curriculum had higher implementation. This finding supports the importance of gaining teacher buy-in and commitment at the beginning of implementation. Previous work has similarly found that teacher beliefs about an intervention are predictive of implementation fidelity. For example, elementary teachers with more positive initial beliefs demonstrate higher quality implementation, as measured by reported dosage over time (Domitrovich et al., 2019) and observed implementation (Cook et al., 2015). It is possible that teachers with more positive initial perceptions may have higher initial engagement with the curriculum, which in turn leads to sustained or increased positive perceptions and engagement. Future research is needed to understand how to best target teacher perceptions of new interventions, particularly at the beginning of implementation.

Other individual teacher experiences, namely stress and perception of center climate, were inconsistently related to implementation. Teacher stress was only related to responsiveness; teachers who were less stressed at the beginning of implementation increased their responsiveness over time. Due to the new and comprehensive nature of the curriculum, *STREAMin*^{3} may have caused some teachers more stress, especially for teachers already

experiencing high levels of stress at the beginning of implementation. This additional stress may have led teachers to view the curriculum more negatively over time. It is surprising that stress was not related to other implementation variables, given that teachers perceive stress as a serious barrier to implementation and stressed teachers report more barriers (McGoey et al., 2014). Further, teachers who reported a more positive center climate increased their attendance at coaching meetings (i.e., dosage) over time. It is possible that centers with more positive climates had leaders who were more engaged with *STREAMin*^{3} implementation and encouraged their teachers to attend meetings. Previous research has identified high leader engagement and support as a facilitator of effective teacher implementation (Forman et al., 2009; Kincaid et al., 2007).

Teachers' sense of self-efficacy was not a significant predictor in any models. Previous research in early childhood has found similar results. For example, Domitrovich and colleagues (2009) found that self-efficacy did not predict coach ratings of preschool teacher adherence and quality of implementation in Head Start classrooms. However, it is notable that teachers themselves and intervention developers identify self-efficacy as an important component influencing ability to implement well (Forman et al., 2009; McGoey et al., 2014). Future research should further explore how teachers perceive connections between impelmentation and efficacy, and how coaching and other professional develop can improve teachers' self-efficacy.

Teacher experience was a relatively consistent predictor of implementation. We found that teachers with more years of teaching experience implemented fewer classroom activities initially and over time and were less responsive to the curriculum initially. Previous work has similarly found that more experienced teachers implement with lower levels of fidelity (Rohrbach et al., 1993; Domitrovich et al., 2015). More experienced teachers may be more hesitant to try new practices, especially if they perceive that what they are currently doing in

their classroom is working well for them and meeting the needs of their students. Implementation supports may need to use different approaches to more effectively engage teachers with varying levels of experience. Future work is needed to understand how we can support and encourage more experienced teachers in implementing new practices with fidelity.

Finally, implementation fidelity differences emerged over time based on whether the teacher taught in a public, private, or faith-based child care center. Teachers at public centers reported higher levels of implementation compared to private and faith-based teachers. Williford and colleagues (2015) similarly found that teachers at public centers had higher implementation dosage and quality, compared to Head Start and private preschool teachers. Public child care settings tend to have more resources than other early education settings, which may lead to public teachers being better able to implement new practices. Further, teachers in private child-care settings have lower pay, lower levels of education, and higher stress and turnover, factors that undermine implementation fidelity (Bassok et al., 2020; U.S. Department of Education, 2016). Notably, our sample of teaches in private child care was small, and future research should explore implementation specifically in these settings. Teachers in child care settings may need higher levels of coaching and other support (e.g., additional teaching staff, materials, access to support staff) in order to improve implementation. Leaders and coaches should be aware of the unique needs of teachers in their setting. Additional research is needed to understand and meet the needs of teachers across settings to support high-quality implementation and teaching.

Limitations and Future Research

This study was limited in several ways that warrant mention. First, the current sample was a small convenience sample and only included lead teachers. It is unclear if these results would generalize to assistant or co-teachers, or if teachers in these other roles may face different

barriers or facilitators to their implementation. This represents an important area of future research, since much of early childhood education research focuses on lead teachers. Self-selection is also an issue in the current sample, as programs who chose to participate in this evaluation study may differ from programs who declined. Second, though we considered dosage and responsiveness, the current study did not include adherence. It is possible that teacher beliefs and experiences are particularly relevant in predicting a teacher's adherence, and future research should explore this. Third, we explored implementation fidelity in the context of the uptake of a new and comprehensive curriculum model, intended to replace existing curricula and be implemented at the program-level. It is unclear if results would be similar for other interventions, especially at different stages of the implementation process or for interventions that focus on a specific practice or are implemented at the classroom/teacher level. More research is needed to understand implementation at various stages of implementation, including examining additional program-level and coach characteristics.

Conclusions and Implications

Findings from this study point to the importance of individual teacher beliefs and experiences in predicting implementation. In terms of practice implications, training and professional development should gain teacher interest and commitment from the very beginning of implementation. Additionally, leaders and intervention developers should involve teachers in the decision making around designing, selecting, and implementing an intervention or curricula to ensure teachers are on board. Leaders, coaches, and researchers should continue to work to understand and address why some teachers have lower levels of engagement and motivation, as it is critical to support every teacher to work towards high quality implementation.

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Table 1. Sample Descriptive Statistics (n = 87)

Demographic Variables	**%**		
% Female	98.85	---	---
Race			
% White	65.12	---	---
% Black	30.23	---	---
% Other race	4.65		
Level of Education			
% Lower than bachelor's degree	25.29	---	---
% Bachelor's degree	40.23	---	---
% Higher than bachelor's degree	34.48	---	---
Classroom Age Level			
% Infant Classroom	10.34		
% Toddler Classroom	13.79		
% Preschool Classroom	75.86	---	---
Center Type			
% Public	64.37	---	---
% Private-not faith affiliated	24.14	---	---
% Private-faith-based	11.49	---	---
Teacher Beliefs & Experiences Variables	**Mean**	**SD**	**Range**
Initial Perception of Curriculum	5.95	2.49	0 – 10
Teacher Stress	2.24	1.90	0 – 7.67
Teacher Efficacy	8.42	1.30	4.27 – 10
Perception of Center Climate	8.49	1.57	3.97 – 10
Implementation Variables	**Mean**	**SD**	**Range**
Attendance (T1)	5.59	2.57	0 – 14
Attendance (T2)	4.89	2.70	1 – 12
Activity Completion (T1)	0.76	0.32	0 – 1.00
Activity Completion (T2)	0.66	0.37	0 – 1.00
Responsiveness (T1)	5.87	2.70	0.07 – 9.89
Responsiveness (T2)	6.37	2.35	0 – 9.97

Notes. Teacher reported demographic, belief, and experience variables in table 1 were collected at intake into the evaluation study (Spring 2019/Fall 2019). Other races and ethnicities included Asian (2.33%), Hispanic/Latinx (1.16%), and Multiracial (1.16%). Six Head Start teachers were in the sample and classified as "public" due to funding. T1 = Time 1 (Fall 2019). T2 = Time 2 (Spring 2020). Activity completion is proportion of days implemented in the classroom.

Table 2. Correlations between Implementation Outcomes, Teacher Beliefs, and Environmental Characteristics

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. Attendance (T1)	---																
2. Attendance (T2)	.68***	---															
3. Activity Completion (T1)	.14	.23*	---														
4. Activity Completion (T2)	.19†	.20†	.43***	---													
5. Responsiveness (T1)	.26*	.34**	.58***	.48***	---												
6. Responsiveness (T2)	.29*	.35**	.59***	.43***	.85***	---											
7. Teacher Experience	.13	-.04	-.25*	-.30**	-.28*	-.21†	---										
8. Preschool Classroom	-.09	-.15	-.28*	-.14	-.42***	-.33**	.18†	---									
9. Toddler Classroom	.12	.10	.21†	.11	.30**	.21†	-.22*	-.71***	---								
10. Infant Classroom	-.00	.10	.15	.07	.25*	.22†	-.01	-.60***	-.14	---							
11. Public Center	.33*	.17†	-.15	.04	-.26*	-.27*	.31**	.48***	-.33*	-.30**	---						
12. Private Center	-.27*	-.13	.17	-.18†	.17	.20†	-.22*	-.37***	.24*	.25*	-.79***	---					
13. Faith-based Center	-.14	-.09	-.01	.19†	.16	.15	.17	-.22*	.17	.11	-.48***	-.20†	---				
14. Initial Perception	.20†	.20†	.36**	.16	.49***	.58***	-.01	-.18†	.10	.14	-.18†	.09	.16	---			
15. Teacher Stress	-.13	-.01	-.27*	-.25*	-.35**	-.33**	.14	.15	-.13	-.07	.16	-.10	-.10	-.21†	---		
16. Teacher Efficacy	.11	-.03	-.01	.00	-.08	-.03	.10	.37***	-.17	-.32	.14	-.09	-.10	.09	-.27*	---	
17. Center Climate	.27*	.04	-.08	.14	.04	.04	-.06	.13	-.00	-.19†	.08	-.19†	.13	.14	-.35**	.47***	---

Notes. T1 = Time 1 (Fall 2019). T2 = Time 2 (Spring 2020).
†$p \leq .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 3. Regression Analyses Predicting Implementation Teacher Attendance (i.e., Coaching Dosage)

	Teacher Meeting Attendance (T1) [a]			Teacher Meeting Attendance (T2) [b]		
	IRR (SE)	***t***	***p***	**IRR (SE)**	***t***	***p***
Individual-Level Factors						
Time 1 Attendance	---	---	---	1.05 (.02)*	2.77	.01
Teaching Experience	.99 (.01)	-1.44	.15	1.01 (.00)*	2.23	.03
Initial Perception	1.13 (.03)***	4.02	<.001	1.01 (.02)	.79	.43
Teacher Stress	1.02 (.04)	.61	.54	.99 (.02)	-.57	.57
Teacher Efficacy	1.14 (.09) †	1.66	.09	.98 (.03)	-.75	.45
Micro-Level Factors						
Center Climate	1.07 (.08)	.82	.41	1.04 (.03) †	1.79	.07
Toddler Classroom	1.85 (.44)*	2.57	.01	1.18 (.13)	1.44	.15
Infant Classroom	1.05 (.41)	.12	.90	1.19 (.14)	1.46	.15
Private Center	.78 (.19)	-.99	.32	.69 (.09)**	-2.81	.005
Faith-based Center	.76 (.21)	-1.02	.31	.68 (.07)***	-3.77	< .001

Notes. Coefficients are reported in incident risk ratio (IRR) for ease of interpretation (George et al., 2020). Preschool was used as the reference group for classroom age, and public was used as the reference group for center setting. Standard errors were clustered by center/program and reported in parentheses. All variables were entered on one step. **[a]** Total model $F = 9.46$, $p < .001$, Pseudo $R^2 = 0.145$. **[b]** Total model $F = 8.34$, $p < .001$, Pseudo $R^2 = 0.088$. †$p \leq .1$, * p < .05, ** p < .01, *** p < .001

Table 4. Regression Analyses Predicting Implementation Activity Completion (i.e., Classroom Dosage)

	Classroom Activity Completion (T1) [a]			Classroom Activity Completion (T2) [b]		
	***B* (SE)**	***t***	***p***	***B* (SE)**	***t***	***p***
Individual-Level Factors						
Time 1 Activity Completion	---	---	---	.41 (.17)*	2.38	.02
Teaching Experience	-.01 (.00)*	-2.32	.03	-.01 (.00)*	-2.24	.03
Initial Perception	.05 (.02)**	2.88	.008	-.00 (.02)	-.02	.98
Teacher Stress	-.03 (.02)	-1.13	.27	-.03 (.02)	-1.26	.22
Teacher Efficacy	.02 (.04)	.52	.61	-.01 (.03)	-.34	.74
Micro-Level Factors						
Center Climate	-.04 (.02)†	-1.97	.06	.02 (.04)	.49	.63
Toddler Classroom	.17 (.09)†	1.91	.07	.04 (.09)	.48	.64
Infant Classroom	.12 (.09)	1.31	.21	.11 (.13)	.88	.39
Private Center	-.04 (.08)	-.47	.64	-.28 (.14)†	-1.95	.06
Faith-based Center	-.15 (.13)	-1.17	.25	.05 (.11)	.44	.66

Notes. Standard errors were clustered by center/program and reported in parentheses. Preschool was used as the reference group for classroom age, and public was used as the reference group for center setting. All variables were entered on one step. **[a]** Total model $F = 2.56$, $p = .026$, $R^2 = .302$. **[b]** Total model $F = 6.89$, $p < .001$, $R^2 = .331$. †$p \leq .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5. Regression Analyses Predicting Implementation Responsiveness

	Responsiveness (T1) [a]			Responsiveness (T2) [b]		
	***B* (SE)**	***t***	***p***	***B* (SE)**	***t***	***p***
Individual-Level Factors						
Time 1 Responsiveness	---	---	---	.65 (.07)***	9.17	< .001
Teaching Experience	-.07 (.02)**	-2.95	.006	.00 (.02)	.23	.82
Initial Perception	.46 (.10)***	4.83	< .001	.24 (.06)***	4.38	< .001
Teacher Stress	-.23 (.17)	-1.35	.19	-.19 (.08)*	-2.36	.03
Teacher Efficacy	-.15 (.26)	-.59	.56	-.13 (.14)	-.92	.37
Micro-Level Factors						
Center Climate	-.03 (.15)	-.18	.86	-.04 (.08)	-.46	.65
Toddler Classroom	1.66 (.86) †	1.93	.06	-.49 (.33)	-1.49	.15
Infant Classroom	1.78 (.69)*	2.58	.02	-.35 (.57)	-.62	.54
Private Center	-.24 (.56)	-.43	.67	.60 (.27)*	2.19	.04
Faith-based Center	-.13 (.71)	-.18	.86	.79 (.53)	1.50	.17

Notes. Standard errors were clustered by center/program and reported in parentheses. Preschool was used as the reference group for classroom age, and public was used as the reference group for center setting. All variables were entered on one step. **[a]** Total model $F = 8.43$, $p < .001$, $R^2 = .438$. **[b]** Total model $F = 20.44$, $p < .001$, $R^2 = .825$.

Behavior Is in the Eye of the Beholder: The Role of Preschool Teacher Beliefs about Children's Behavior

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Acknowledgements

This manuscript was supported by a grant awarded to Amanda P. Williford by the Institute of Education Sciences, U.S. Department of Education, through Grant R324A100215, respectively, to the University of Virginia. The opinions expressed are those of the authors and do not represent views of the U.S. Department of Education

Abstract

Much of young children's behavior is in the "eye of the beholder", with contextual, teacher, and child factors influencing how behavior is interpreted in early childhood settings. Teacher attributions about behavior are the beliefs that teachers have about why children behave in certain ways. Attributions about children's behavior can include seeing challenging behavior as unlikely to change, done on purpose, and related to factors internal to the child. Research in parenting and K-12 settings has found that these attributions are related to responses to children's behavior and ultimately children's behavioral outcomes. Despite this, very limited research has explored preschool teacher attributions and how these attributions relate to social and emotional teaching practices and children's challenging behavior. To address this, we used structural equation modeling to examine how teacher attributions related to proactive and exclusionary teaching practices and child behavior in a sample of 183 preschool teachers and 470 children perceived by their teacher as showing high rates of challenging behavior. Teachers' responsibility attributions were related to their reports of the frequency of their use of exclusionary practices, but not proactive practices. Neither causal nor responsibility attributions were directly or indirectly related to their reports of selected children's challenging behavior at the end of preschool. Implications for future research and intervention efforts to support early childhood educators and young children's positive social and emotional development are discussed.

Keywords: Teacher attributions, Teacher perception, Challenging behavior, Teaching practices, Preschool

Introduction

Preschool children are beginning to develop advanced social and emotional skills, like recognizing and expressing emotions, building relationships with peers and adults, following directions, and solving problems. To develop these skills, young children rely on support from adults, including teachers, who model and teach children social and emotional skills in the context of consistent and positive interactions and relationships (Cantor et al., 2019; Silkenbeumer et al., 2016). As they learn these skills, preschool children often engage in behaviors that adults find challenging, such as having tantrums, not following directions, and various forms of aggression (e.g., biting, hitting; Snell et al., 2012). Though these behaviors are often developmentally appropriate, they can cause a great deal of frustration for early childhood educators, who identify child behavior as a central challenge of their profession (Haslip & Donaldson, 2021). Indeed, child behaviors that teachers find challenging (henceforth referred to as challenging behavior) are a key predictor of teacher stress (Clayback & Williford, 2021; Friedman-Krauss, Raver, Morris, et al., 2014) and emotional exhaustion (Jeon et al., 2018; Schaack et al., 2020). Children's challenging behavior also has negative implications for overall classroom quality through complex and bidirectional interactions between teachers and young children (Curby et al., 2014; Myers & Pianta, 2008; Partee et al., 2019; Williford & Vitiello, 2020). Given the associations between child behavior and teacher and classroom outcomes, researchers, policymakers, and practitioners have been keenly interested in how to effectively support teachers to promote children's positive behavior in early childhood classrooms.

Much of child behavior is in the "eye of the beholder", and not all behavior is interpreted equally. Perception of behavior varies substantially across teachers and even within teachers (Dobbs & Arnold, 2009; Yoder & Williford, 2019). Perception of child behavior varies based on

teacher characteristics (Yoder & Williford, 2019; Jeon et al., 2014), child characteristics (Arbeau & Coplan, 2007; Brady & Woolfson, 2008), and characteristics of the behavior itself (Coplan et al., 2015; Nungesser & Watkins, 2005). For example, one teacher may view a child grabbing a toy from a peer as aggressive and challenging, whereas another teacher may see this behavior as a typical interaction between two preschoolers, or an opportunity to work more with the class on social skills like sharing and turn taking. Further, an individual teacher may attribute similar behaviors differently, depending on the child or context. These different interpretations are influenced by a variety of factors, such as teacher stress (Friedman-Krauss, Raver, Neuspiel, et al., 2014), experience (Brady & Woolfson, 2008), and both implicit and explicit bias related to a child's disability status, gender, race, or other social identities (Davis et al., 2020; Gilliam et al., 2016). For example, a teacher may perceive a White boy interrupting to ask a question during book reading as excited and engaged, whereas a Black girl showing the same behavior may be perceived as loud and disruptive.

In this paper, we focus on preschool teacher attributions about behavior, defined as teacher beliefs about why children behave in certain ways (Nemer et al., 2019). Teachers may hold attributions that are characterized by beliefs that a child behaved the way they did on purpose, was motivated to get something for themselves, was intentional in trying to annoy the teacher, and is deserving of blame (i.e., high level of child responsibility), as well as beliefs that the reason the child's behavior comes up often, the behavior is not likely to change, and has to do with something internal to the child (i.e., high level of child causality). These are sometimes called hostile or negative attributions. In contrast, teachers may hold attributions characterized by beliefs that the child made a mistake or behaved in way that was accidental, did not realize the impact of their behavior, and is not deserving of blame (i.e., low level of child responsibility) and

the belief that the child's behavior was contingent upon the environment, does not happen all the time, is likely to change, and that the teacher has some control on how the child might behave in the future (i.e., low level of child causality). When teachers hold attributions that put high levels of responsibility on the child for the behavior, they may be more likely to blame children and families (Martin et al., 2017) and less likely to use practices that support positive behavior (Carter et al., 2014; Miller et al., 2017). Teacher attributions about children's behavior have major implications for how we intervene to support both teachers and children, as well as how we measure child behavior to reduce bias and measurement error (An et al., 2019; Mashburn et al., 2006). Despite the importance of teacher attributions, few studies have examined attributions in early childhood contexts. In this study, we begin to address this gap by examining preschool teacher attributions and how these attributions relate to social and emotional teaching practices and children's behavior over time.

Defining Teacher Attributions about Children's Behavior

Teacher beliefs is a broad term that can refer to beliefs about their work environment, specific interventions, children, and themselves. In this paper, we focus on teacher beliefs about why children behave in certain ways (i.e., attributions; Nemer et al., 2019). Put simply, attributions about behavior are the beliefs that teachers have about why children behave the way that they do. When a child shows a behavior, teachers make judgments about why the behavior occurred and what the behavior means – including interpreting if a behavior is challenging. For any child behavior, teachers' attributions may vary. These judgments are often quick, rely on past information about children's behavior (de Ruiter et al., 2020), and can be heavily influenced by teachers own perception and biases (Myers & Pianta, 2008). According to attribution theory,

we make sense of the world through these attributions (Weiner, 1980, 1985), and these attributions influence our emotional states and responses to other's behaviors (Weiner, 2005).

Three components of attributions emerge in most attribution theory and research: locus, stability, and controllability (Weiner, 1985; Nemer et al., 2019). A teacher may see the cause of behavior as internal to the child (e.g., due to temperament, disability, gender, race) or external to the child (e.g., due to home or classroom factors). In education, the locus of behavior is sometimes also measured at the school/family, child, or teacher level (Mavropoulou & Padeliadu, 2002; Nemer et al., 2019). A teacher may see a behavior as unlikely to change (i.e., stable). Finally, a teacher may see a child's behavior as completely controllable by the child (as many teachers do; Nash et al., 2015), or less under a child's control. Notably, most of the research on attributions within the school context has focused on elementary and upper grades, and very few studies have examined these attributions in early childhood classrooms. In the preschool context, a series of factor analyses of the Preschool Teacher Attributions (PTA) scale found two factors: Causal (included the subscales globality, stability, internal locus) and Responsibility (included the subscales purposefulness, motivation, blame, negative intent), which were moderately correlated and predicted classroom practices (Carter et al., 2014). In line with previous preschool research, this study uses the Preschool Teacher Attributions measure to explore how attributions are related to teaching practices and children's behavior.

Understanding Attributions from the Parenting Literature

Though research on attributions within preschool settings is very limited, research on parenting suggests that parents' attributions play an important role in child behavior. Parent attributions about behavior is theorized to be one key contributor to the negative interactions between parents and children when children show disruptive behavior, in particular for children

with persistent and clinically significant externalizing behavior (Johnston & Ohan, 2005). In particular, the social-cognitive model theorizes that parent attributions and child behavior have a dynamic and reciprocal relationship. Johnston and Ohan (2005) propose that child behavior influences attributions and attributions influence parents' reactions to behavior, but the reverse is also true in this feedback loop. Specifically, attributions and parents' reactions also influence children's behavior over time. These interactions are complex and also influenced by other characteristics, such as child temperament, parent personality and beliefs, and the social and cultural context (Johnston & Ohan, 2005).

This model is supported by the extant parenting literature. For example, Nix and colleagues (1999) found that mothers' hostile/negative attributions prior to their children's kindergarten entry predicted more externalizing behavior in children during their early elementary years, and this relation was in part mediated by the use of harsh discipline practices. More recent research similarly found that children had more behavior problems when their parents endorsed attributions that blamed the child for their negative behavior (Park et al., 2018). Longitudinally, maternal attributions of their infants predicted child internalizing behavior in first grade, and this was fully mediated by harsh parenting practices at ages one to three (Wagner et al., 2018). This parenting research can help us understand how attributions may operate in early childhood classrooms. Scholars have increasingly argued that teachers and other adults in learning settings act as strong attachment figures for young children (Denham et al., 2012; Pianta et al., 2003). Indeed, much of the research on teacher-child relationships in early childhood has stemmed from key conceptual models of parent-child relationships and socialization (Sabol & Pianta, 2012). It is likely that teacher attributions and child behavior may be related in similar ways as parent attributions.

Teacher Attributions and Children's Behavior

Teacher attributions about child behavior may be associated with children's outcomes, including behavior, though research specifically on teacher attributions and child behavior is limited. Correlational research has found that preschool teachers who perceive children's behavior as more stable and done on purpose tend to rate children's disruptive behavior higher (Yoder & Williford, 2019). However, the direction of many of these associations are unclear. For example, teachers who attribute behavior to stable and internal causes may rate children differently; in contrast, more challenging child behavior may be driving teachers to view behavior more negatively or make certain attributions.

Evidence from teacher-child relationships can also shed light on how attributions may relate to child behavior. Research has consistently found that positive teacher-child relationships, characterized by high closeness and low conflict, are key predictors of young children's social skills and positive behavior in preschool (Doumen et al., 2008; Pianta & Stuhlman, 2004) and beyond (Burchinal et al., 2008; Hamre & Pianta, 2001), in particular for young children perceived as having higher challenging behavior (Wolcott et al., 2019). Further, a close teacher-child relationship is associated with a lower risk of expulsion in preschool (Loomis et al., 2022).

In contrast, children perceived as showing challenging behaviors are more likely to experience poor teacher-child relationships, and often these teachers and children are stuck in a cycle of negative interactions (Sabol & Pianta, 2012). When early elementary teachers perceive more negative consequences of children's behavior, they report more conflictual relationships (Thijs & Koomen, 2009). Additionally, Doumen and colleagues (2009) found that when kindergarten teachers had lower levels of perceived control (i.e., less efficacy and rated children's behavior as more controllable), children with more aggressive behavior experienced

higher levels of conflict with their teacher. Carter and colleagues (2014) found that preschool teachers with higher causal and responsibility attributions reported less positive teacher-child relationships. This study builds on this previous research by examining direct relationships between preschool teacher attributions and children's behavior, and a potential mechanism for this relationship, namely social and emotional teaching practices.

Teacher Attributions and Teaching Practices

Teacher attributions are related to what happens in the classroom, including the quality of teacher-child interactions and social and emotional teaching practices. High-quality teaching practices related to behavioral outcomes include fostering strong teacher-child relationships, using positive descriptive feedback, giving effective instructions, offering choice, and explicitly teaching social problem solving and emotion regulation. Many studies have found that these sensitive and responsive practices are associated with more positive child outcomes in preschool, including higher social skills (Pakarinen et al., 2020) and academic outcomes (Downer et al., 2010; Mashburn et al., 2008). In the preschool context, higher causal and responsibility attributions are linked to lower classroom quality (Carter et al., 2014). Specifically, when preschool teachers saw the causes of challenging behavior as internal to the child and did not expect behaviors to change, they were observed to provide less emotional support.

Teacher attributions are also theorized to play a role in the high rates of inappropriate and exclusionary discipline in early childhood (Davis et al., 2020; Gilliam & Reyes, 2018). Teachers who view children's challenging behavior as internal to the child, stable, and done on purpose may be less understanding and feel more hopeless that they can improve the behavior; consequently, teacher with these attributions may be more likely to resort to exclusionary practices (Martin et al., 2017). Indeed, teachers with more causal and responsibility attributions

about children's disruptive behavior tend to use more punitive responses (Robertson et al., 2021). In a sample of elementary teachers in Greece, when teachers attributed behaviors to student causes, they were less likely to use rewards or individualize their teaching and more likely to use threats or refer the child to a counselor (Andreou & Rapti, 2010). Preschool teachers with causal and responsibility attributions about children's behavior report using more inappropriate behavior strategies, including yelling, using physical restraint, and sending a child home in response to challenging behavior (Carter et al., 2014). Zulauf and Zinsser (2019) found that teachers who requested a child be expelled attributed children's challenging behavior to the parents in interviews far more often than teachers who had not requested any expulsions. Notably, these reviewed studies were observational, and as such cannot make claims about causality. Similar to theories from the parenting literature, it is likely that attributions, practices, and child behavior are related bidirectionally over time.

This previous research demonstrates that teacher attributions are related to teacher-child interactions, relationships, and some inappropriate teaching practices. However, less work has explored specific teaching practices, in particular practices that may prevent or reduce challenging behavior. The current study builds on this work by exploring how attributions are related to both proactive and exclusionary teaching practices in preschool classrooms.

Teaching Practices and Children's Outcomes

Previous research has consistently found that high quality social and emotional teaching practices can positively impact children's cognitive, social, emotional, and behavioral outcomes. In order to effectively implement these strategies, teachers need meaningful training and support, such as coaching, consultation, or another type of professional development (Snyder et al., 2018). Experimental research has found that children in classrooms where teachers receive

coaching and implement high-quality social and emotional practices showed higher social skills and less challenging behavior, compared to children in classrooms where teachers were not trained in these practices (Conroy et al., 2019; Downer et al., 2018; Hemmeter et al., 2016; Hemmeter et al., 2021).

Unfortunately, many early childhood educators do not have access to professional development in these practices and report feeling unprepared to sufficiently support children's social and emotional development (Snell et al., 2012; Tebben et al., 2021). As a result, educators may be using less effective practices, such as threats, time out, and other forms of ineffective or exclusionary practices to respond to challenging behavior. These practices are ineffective and related to children's challenging behavior in preschool (Brophy-Herb et al., 2007) and later grades (Weyns et al., 2017). Further, these ineffective practices can create cycles of negative interactions between teachers and young children. For example, Williford and Vitiello (2020) found that conflict between teachers and children displaying challenging behavior predicted lower quality teacher-child interactions over the course of a preschool day.

Teaching Practices as a Mediator

Teaching practices may in part explain any association between teacher attributions and perception of children's challenging behavior. Teachers make attributions about children's behavior daily, and these attributions can at times assign blame or negative intent to children's behavior, especially when challenging behavior occurs. These attributions, in turn, may impact the teaching strategies a teacher uses related to supporting children's behavior, as suggested by attribution theory (Weiner, 2005). Overtime, these differences in teaching strategies may ultimately result in changes in children's behavior, for better or for worse.

When teachers perceive a child's behavior as challenging, teachers who feel the problem is internal to the child may be less likely to reflect on the role they play, and instead attribute behavior to child or family causes (Brady & Woolfson, 2008). In contrast, teachers who see their own role in the behavior may feel more hopeful that they can improve the child's behavior (Pas & Bradshaw, 2014) and thus motivated to change their practices to support children's positive behavior (Poulou & Norwich, 2002). For example, if a preschool teacher believes that a child is throwing food during mealtime on purpose to annoy the teacher and does not think the behavior will change, that teacher may be less likely to think about their role in contributing to the behavior or consider strategies they can try that may prevent or stop the behavior. Instead, this teacher may see the behavior as deserving punishment and send the child to time out alone. In contrast, if a teacher believes that the child throwing food was doing so because they have not learned that food should stay on the table and believes the behavior can change, the teacher may be more likely to use teaching strategies that support positive behavior and prevent challenging behavior from happening in the future. In this case, the teacher may remind the child about expectations before mealtime or offer to sit next to the child and help if needed. In this example, attributions are shaping how a teacher responds to a child's behavior. As these interactions continue over the course of the year, these differences in teaching strategies may be associated with more challenging behavior in the case of the first teacher (who is using exclusionary practices), and less challenging behavior in the case of the second teacher (who is using proactive and inclusive practices). However, no research to our knowledge has quantitatively explored these complex associations in early childhood education. The current study, thus, explored teaching practices as a potential mediator that may explain how teacher attributions relate to children's outcomes.

Current Study

More work is needed to better understand the role of teacher attributions in shaping classroom, teacher, and child outcomes. Much of the research on teacher attributions focuses on elementary and upper grades, with a few notable exceptions reviewed (e.g., Carter et al., 2014). Early childhood settings are unique from K-12 settings in many ways, including educators having lower wages, less formal education, and difficulty accessing effective professional development (Hindman & Bustamante, 2019). Given the demonstrated importance of high-quality early education to promote young children's development, more work is needed on teacher attributions specifically in early childhood settings. Further, we found no studies that have explored how attributions may be related to child outcomes through both proactive and exclusionary teaching strategies in preschool classrooms. Understanding if and how attributions are related to teaching practices and children's behavior can help guide future intervention efforts, including coaching and consultation, to support early childhood educators and young children's positive social and emotional development.

The current study addressed the following research questions: 1) How do preschool teacher's attributions relate to young children's challenging behavior at the end of preschool?, 2) How do preschool teacher's attributions relate to teaching practices?, and 3) Do teaching practices mediate the relationship between teacher attributions and child challenging behavior? Related to research question one, we hypothesized that when teachers have higher causal and responsibility attributions, they will rate children as showing more challenging behavior at the end of preschool. Related to research question two, we hypothesized that teachers with higher causal and responsibility attributions will use less proactive and more exclusionary teaching practices. Finally, related to research question three, we hypothesized that teacher attributions

will be related to child behavior, through the relationship between attributions and teaching practices. More specifically, we hypothesized that teachers with higher causal and responsibility attributions will use less proactive and more exclusionary teaching practices, and these differences in teaching practices will relate to reports of more challenging child behavior.

Method

Participants

This study used secondary data collected as part of a relationship-based dyadic intervention (i.e., *Banking Time*). Though not the focus of this study, *Banking Time* is designed to improve the quality of interactions between teachers and young children perceived by their teacher as exhibiting elevated challenging behaviors. Data were collected from 2010 to 2013 as part of an intervention study examining the efficacy of *Baking Time* (see Williford et al., 2017). Participants included 183 preschool teachers and 470 children across 94 programs in two mid-Atlantic states. Programs included private non-profit centers (31.91%, n = 30), private for-profit centers (12.77%, n = 12), Head Start centers (26.60%, n = 25), and publicly funded programs (28.72%, n = 27). Data were collected at the beginning and end of the preschool year. At the beginning of the year, child and family characteristics were collected through a family survey. Teachers completed a teacher survey that included teacher and classroom characteristics. See Tables 1 and 2 for teacher and child characteristics.

Selection Procedure

Within each participating classroom, three children were selected based on teacher reports of children's behavior at the beginning of the school year. Teachers rated each child in the classroom with parental consent on two externalizing behavior measures (Attention Deficit/Hyperactivity Disorder Rating Scale, 4th ed., DuPaul et al., 1998; Oppositional Defiant

Disorder Rating Scale, Hommersen et al., 2006). To ensure gender distribution, the two boys and one girl with the highest teacher perception of challenging behavior on these scales were selected to participate in the study. Teachers were then randomized into one of three groups: 1) Banking Time, 2) Child time, and 3) Business-as-Usual (BAU). Teachers in the Banking Time and Child time conditions engaged in seven weeks of one-on-one sessions with each selected child, while teachers in the BAU condition did not participate in an intervention. The current study used data from teachers across all three groups and included condition as a covariate in analyses to control for any intervention effect.

Data Collection

Procedures for full data collection are published elsewhere (Williford et al., 2017). Related to this study, at the beginning of the year, families of participating children completed a survey on child demographics, and teachers completed a survey on teacher and classroom characteristics, as well as the behavior of the selected children. At the end of the year, teachers again reported on children's behavior. For this study, we leverage baseline data (for teacher attributions, teaching practices, child behavior at the beginning of the year, and control variables) and end of year data (for child behavior at the end of the year).

Measures

Teacher Attributions

Teacher attributions were measured at the beginning of the preschool year, using the Preschool Teacher Attributions measure (PTA). The PTA is a vignette style measure that is designed to capture teacher general attributions about various types of challenging behavior, adapted from the Attributional Style Measure for Parents (ASMP; O'Brien & Peyton, 2002). This study included five types of child behavior: noncompliance to teacher requests, aggression

towards peers, aggression or disrespect towards the teacher, interruption, and noncompliance with the routine (See Appendix A for scenarios and responses). For each behavior, the teacher was asked to think about a recent time this occurred in their classroom. The teacher rated the behavior across eight dimensions (purposefulness, globality, stability, motivation, internal-external locus, blame, negative intent, and controllability), using a 6-point Likert scale ranging from strongly disagree (1) to strongly agree (6).

Previous research, using this same sample, found that the PTA reliably captured attributions across two main factors, Causal and Responsibility (Carter et al., 2014), and the two latent factors were moderately positively correlated (r = .74). This measure has also been used in other preschool samples with good reliability (Causal α = .83; Responsibility α = .84; Downer et al., 2018) and was recently adapted for elementary samples (McCullough et al., 2022). Higher scores on the PTA indicate more negative attributions. More specifically, higher scores on the causal subscale suggest that the teacher views the behavior as caused by factors internal to the child, likely to be stable, and likely to occur across contexts. Higher scores on the responsibility subscale suggest that the teacher views the behavior as done on purpose, done for selfish reasons, done to annoy the adult, and deserving of discipline. We conducted a series of confirmatory factor analyses and used the resulting latent factors as the teacher attribution predictor.

Teaching Practices

Teaching practices were measured at the beginning of the preschool year, using a subset of items from the Teacher Strategies Questionnaire (TSQ; Webster-Stratton et al., 2003). Teachers reported on their frequency of use of 26 specific teaching strategies, including positive strategies and inappropriate strategies (Williford & Shelton, 2008). For each item, teachers

reported on how often they used each strategy within their classroom on a scale from rarely/never (1) to very often (5). See Appendix B for all TSQ items in the current study.

The TSQ was designed to be split into the following subscales: 1) coaching, praise, and incentives (e.g., comment on good behavior), 2) proactive strategies (e.g., prepare children for transitions), 3) limit-setting strategies (e.g., use timeout; use verbal redirection), and 4) inappropriate strategies (e.g., single out a child for misbehavior; use physical restraint). Past research has also combined the coaching, proactive, and limit-setting strategies for a total "positive strategies" score (Carlson et al., 2011; Williford & Shelton, 2008). However, reliability, as measured by Cronbach's alphas, has generally been low for some of these subscales (e.g., as low as .17 for limit-setting [Carlson et al. 2011] and .62 for inappropriate strategies [Carter et al., 2014]). This low reliability may be because of the way the items are grouped. For example, some items (e.g., timeout; warn of consequences) could be interpreted as positive or inappropriate, depending on context, implementation, and beliefs about how children learn. As such, we conducted a series of factor analyses to examine factor loadings and better understand how the measure is operating in this sample; the resulting latent factors (proactive and exclusionary) were then used in analyses.

Child Behavior

Children's behavior was measured at the beginning and end of the preschool year, using a teacher report. Teachers completed the Sutter-Eyberg Student Behavior Inventory-Revised (SESBI-R; Eyberg & Pincus, 1999) for each focal child. The SESBI-R included 38 items, rated on a scale from never (1) to always (7), with higher scores indicating more challenging behavior. Items included "Has temper tantrums", "Is easily distracted", and "Fails to listen to instructions" (See Appendix C for items). In previous studies with preschool samples, the SESBI-R has

demonstrated strong reliability and validity (average α = .96; Querido & Eyberg, 2003), and reliability in the current sample was excellent (α = .97). We used the total problem behavior score aggregated at the teacher-level, given the high amount of variability at the teacher-level (ICC_{pre} = .62; ICC_{post} = .50).

Analytic Plan

Analyses were conducted using Mplus. Confirmatory factor analyses (CFA) were used to examine the latent variables of teacher attributions and teaching strategies as a first step to better understand how these measures are operating in the current sample. These CFAs explored how observed variables were related to underlying latent variables and if these latent variables are in line with how the measure has been previously used (Gallagher & Brown, 2013). Results from the CFAs guided the specification of paths in later structural equation models. For all models, model fit was assessed via commonly used fit indices (Kline, 2005): root mean square error of approximation (RMSEA < .08 indicates good fit), standardized root mean square residual (SRMSR < .08 indicates good fit), and comparative fit index (CFI ≥.90 indicates good fit).

Next, structural equation models were used to examine the relationship between teacher attributions and child outcomes (research question one) and teacher attributions and teaching practices (research question two). To address research question three, mediation analyses examined the direct relationship between teacher attributions and child behavior and the extent to which this relationship operates indirectly through teaching practices (Figure 1). Given the high amount of variance in child behavior at the teacher/classroom-level (SESBI-R ICC_{pre} = .62; ICC_{post} = .50) and the attributions and practices being measured at the teacher-level, child behavior was aggregated to the classroom-level using the mean behavior score of the three

selected children in each classroom. This results in a mediation model with the predictor, mediator, and outcome all at level 1 (teacher-level).

An alternative approach for research question three was to conduct a 2-2-1 mediation model, keeping child behavior at the child-level (level 1) and the other variables at the teacher level (level 2). In a 2-2-1 mediation model, the variance is decomposed to within and between variance (in this case, within a teacher and between teachers; Preacher et al., 2010). However, given the small number of children per teacher in this study (i.e., small clusters), a multilevel structural equation mediation model would not produce reliable and accurate estimates; cluster sizes of at least 20 are recommended for multilevel SEM (Preacher et al., 2011). Accordingly, aggregating child behavior to the teacher-level was the best approach. Previous research also supports the approach of aggregating child behavior to the classroom or teacher-level (Friedman-Krauss, Raver, Morris, 2014; Hoglund et al., 2015; Partee et al., 2019; Yoder & Williford, 2019), including specifically with the SESBI-R measure (e.g., Carter et al., 2014).

Covariates

Based on previous research, we controlled for a variety of teacher and child characteristics associated with teaching practices and/or child behavior to better isolate the association of teacher attributions in particular. We also controlled for intervention status (0 = Control group, 1 = Banking Time, 2 = Child Time) in all analyses that included measures collected after baseline to remove any intervention effect.

Teacher covariates included years of teaching experience (continuous), education (0 = Bachelor's Degree, 1 = Less than a BA, 2 = Higher than a BA), race (0 = White, 1 = Black, 2 = other race, due to sample sizes). Previous research has found that teaching experience and education are related to teaching practices, such that teachers with more experience are more

likely to attribute the locus of control to the child and family, rather than the teacher (Andreou & Rapti, 2010; Brady & Woolfson, 2008). Further, teacher race is a predictor of ratings of children's behavior (Wymer et al., 2022), such that White teachers rate disruptive behavior higher compared to Black teachers (Yoder & Williford, 2019).

We also included child-level covariates previously found to be correlated with child behavior, including age (average of the three selected children), gender (% of selected students who were boys), and race (% of children who were White). Previous research has found that boys and Black children are on average rated by teachers as having more challenging behavior (Arbeau & Coplan, 2007; Wymer et al., 2022). In predicting child behavior at the end of preschool, we also controlled for child behavior at the beginning of preschool to understand change over the year.

Finally, in this sample, teachers were nested within programs, but some programs had very few or even just one teacher (M = 1.8, range = 1 to 7). Because of these cluster sizes, we could not conduct multilevel modeling or cluster standard errors at the program-level. Instead, we controlled for program type, given differences in policies, requirements, and experiences of teachers in different settings. This was entered as an indicator variable (0 = Private, 1 = Public/state funded, 2 = Head Start).

Missing Data

Missing data for each key variable is summarized in Tables 1 and 2. Missingness ranged from 0% (some demographic variables) to 32.13% (child behavior at the end of the year). Missingness at the beginning of the year is likely due to teachers not completing surveys, and missingness on child behavior at the end of the year was largely due to attrition, as some teachers and children left the classroom or school. We handled missingness using full information

maximum likelihood (FIML). FIML accounts for missing data by using all available information while accounting for bias in patterns of missingness due to data missing completely at random or missing at random (Enders & Bandalos, 2001).

Results

Preliminary Results: Confirmatory Factor Analyses

Teacher Attributions

For teacher attributions, we first tested a unidimensional factor, with all items loading onto one factor. Next, we tested a two-factor model (Causal and Responsibility) that allowed the two factors to correlate, replicating the model examined by Carter and colleagues (2014). In line with previous work using the PTA, controllability items and items for scenario two were excluded from models. Finally, we tested a higher order model, with Causal and Responsibility loading onto a higher order latent factor of Attributions. The best fitting model was used as the main predictor of interest in analyses. Though all three models fit the data acceptably, model fit indices indicated that the two-factor model fit best, replicating the findings of Carter et al. (2014; See Appendix A Table A1). The two latent variables were highly correlated (0.852).

Teaching Strategies

We also used a series of confirmatory factor analyses to examine the measurement of teaching strategies, using the TSQ items. First, we tested a unidimensional factor, with all items loading onto one factor. From there, we performed a CFA to test a two-factor model, using the original item groupings. We then tested a two-factor CFA, with slightly different groupings based on the current understanding in the field regarding supporting positive development and preventing challenging behavior. For each model, item loadings and model fit were assessed;

none of these models demonstrated adequate fit (RMSEA = .091 - .109; SRMSR = .122 - .147; CFI = .580 - .802).

We next ran a series of separate CFAs with the positive and inappropriate items. For the positive strategies, the best fitting model only included items from the proactive strategies subscale (See Appendix B Table B3, Model 6). For the inappropriate strategies, model fit indices suggested that none of the proposed models fit the data well. Accordingly, we revisited the item groupings and only included items that were explicitly exclusionary. This resulted in five exclusionary practices; the model with these five items fit well (See Appendix B Tables B4 and B5). These CFA models (Proactive and Exclusionary) were used as the outcomes (research question two) and mediators (research question three).

Structural Equation Models

Next, structural equation models explored the relationship between teacher attributions and child outcomes, teacher attributions and teaching practices, and attributions, practices, and child behavioral outcomes. Results for each question are described below.

Teacher Attributions → Child Behavior

The first structural equation model tested the direct relationship between the latent factors of attributions and child behavior at the end of preschool, controlling for teaching experience, teacher education, teacher race, center type, as well as child age, gender, race, and behavior at the beginning of preschool (Table 4). Model fit was good, RMSEA = .05, CFI = .89, SRMSR = .08. Contrary to our hypothesis, neither causal (ß = 0.219, *SE* = 0.164, *p* = .181) nor responsibility (ß = -0.065, *SE* = 0.161, *p* = .686) attributions were associated with child behavior at the end of preschool.

In terms of covariates, teachers with lower than a bachelor's degree reported less challenging behavior at the end of preschool, compared to teachers with a bachelor's degree (ß = -0.169, *SE* = 0.071, *p* = .016). When teachers reported more challenging behavior in the fall, they also reported higher challenging behavior at the end of the year (ß = 0.646, *SE* = 0.052, *p* < .001). Percent of selected children who were boys also predicted end of year behavior, such that a higher percent of boys was associated with higher teacher reported behavior (ß = 0.143, *SE* = 0.057, *p* = .012). Finally, intervention condition also predicted behavior. Teachers in classrooms assigned to child time (ß = -0.203, *SE* = 0.068, *p* = .003) or Banking Time (ß = -0.116, *SE* = 0.068, *p* = .087) reported lower challenging behavior at the end of the year, compared to teachers in the business-as-usual group. Teaching experience, teacher race, center type, average child age, and child race did not predict end of year behavior.

Teacher Attributions → Teaching Strategies

The next structural equation model tested the direct relationship between the two latent factors of attributions and the two latent factors of teaching strategies, controlling for teaching experience, teacher education, teacher race, and center type (Table 3). Model fit was good, RMSEA = .04, CFI = .90, SRMSR = .09. In partial support of our hypothesis, responsibility attributions predicted exclusionary practices (ß = 0.678, *SE* = 0.250, *p* = 0.007). Teachers who had higher responsibility attributions tended to also report more frequent use of exclusionary practices. However, causal attributions were not related to exclusionary practices (ß = -0.231, *SE* = 0.261, *p* = 0.376), and neither causal nor responsibility attributions predicted proactive teaching strategies (ß = 0.193, *SE* = 0.270, *p* = 0.476 and ß = -0.290, *SE* = 0.259, *p* = 0.263, respectively).

In terms of covariates, teacher race and center type predicted use of exclusionary practices; years of teaching experience and education were not related to exclusionary practices. White teachers reported slightly more frequent use of exclusionary practices (ß = -0.209, SE = 0.126, p = 0.09). Teachers at private centers reported more frequent use of exclusionary practices, compared to Head Start teachers (ß = -0.346, SE = 0. 138, p = 0.012). No covariates predicted teachers' use of proactive practices.

Teacher Attributions → Teaching Strategies → Child Behavior

To address research question three, mediation analyses examined the direct relationship between teacher attributions and child behavior and the extent to which this relationship operates indirectly through teaching practices. In this model, attributions were not directly or indirectly related to children's behavior after controlling for teacher and child covariates (Table 4).

Several covariates did predict children's behavior at the end of preschool, following the same pattern found in research question one. Specifically, teachers with lower than a bachelor's degree reported less challenging behavior at the end of preschool, compared to teachers with a bachelor's degree (ß = -0.171, *SE* = 0.058, *p* = .003). When teachers reported more challenging behavior in the fall, they also reported higher challenging behavior at the end of the year (ß = 0.664, *SE* = 0.070, *p* < .001). A higher percent of boys was associated with higher teacher reported behavior (ß = 0.147, *SE* = 0.056, *p* = .009). Finally, teachers in classrooms assigned to child time (ß = -0.206, *SE* = 0.068, *p* = .002) or Banking Time (ß = -0.116, *SE* = 0.065, *p* = .075) reported lower challenging behavior at the end of the year, compared to teachers in the business-as-usual group. Teaching experience, teacher race, center type, average child age, and child race did not predict end of year behavior.

Discussion

Much of child behavior is in the "eye of the beholder", with contextual, teacher, and child factors influencing how behavior is interpreted in early childhood settings (Dobbs & Arnold, 2009; Gilliam et al., 2016; Jeon et al., 2014; Yoder & Williford, 2019). One important factor related to how teachers perceive behavior are the attributions teachers make when children engage in challenging behavior. Research in parenting and K-12 settings has found that these attributions are related to responses to children's behavior and ultimately children's behavioral outcomes. Despite this, very few studies have explored how these attributions relate to teaching practices and children's behavior in early childhood education contexts. To address this, we used structural equation modeling to examine how teacher attributions related to proactive and exclusionary teaching practices and child behavior in a sample of 183 preschool teachers and 470 children perceived by their teacher as showing high rates of challenging behavior. Teachers' responsibility attributions were related to their reports of the frequency of their use of exclusionary practices, but not proactive practices. Attributions were not directly or indirectly related to their reports of selected children's challenging behavior at the end of preschool. These findings and their implications for research and practice are discussed in further detail below.

We found that teachers' responsibility attributions were positively related to their reports of using of exclusionary practices. More specifically, when teachers endorsed that they believed children engaged purposefully in challenging behavior to annoy adults and believed children were deserving of blame for their behavior, they reported more frequent use of practices that excluded children from engaging within the classroom. These practices included sending a child to the principal's office or home for behavior. Causal attributions, on the other hand, were not related to teacher reports of their use of exclusionary practices. This may be explained by the

different aspects of attributions each subscale captures. High causal attributions are characteristized by believing a child's behavior occurs across contexts and time (i.e., is global and stable), and because of something internal to the child (i.e., high internal locus). These attributions may not be as related to differences in exclusionary practices compared to the harsher responsibility attributions, which are characterized by believing a child's behavior occurs on purpose, for selfish reasons, and is deserving of blame and punishment.

The finding that responsibility attributions relate to exclusionary practices is in line with qualitative research that found that teachers who request expulsion have different beliefs about children and families (Martin et al., 2017; Zulauf & Zinsser, 2019). For example, teachers who requested the expulsion of a child in their classroom were more likely to blame parents for children's behavior, compared to teachers who had not requested any expulsions (Zuluaf & Zinsser, 2019). Given the high rates of soft exclusion, suspension, and expulsion in early childhood settings generally, and in particular for boys, children of color, and children with disabilities (Meek & Gilliam, 2016; Zeng et al., 2020; Zinsser et al., 2022), understanding how attributions may work to push teachers towards using exclusionary practices is an important area of future research. Changing teacher attributions to be more supportive may be a promising target for reducing and ultimately eliminating the use of exclusion (Davis et al., 2020).

Our other hypotheses were largely not supported within this sample. We expected that teacher attributions would relate to both exclusionary and proactive practices. However, in this sample, teachers' attributions did not relate to their reported use of proactive teaching strategies, such as using problem solving strategies, preparing children for transitions, and giving clear directions. Unlike the exclusionary practices, these practices are likely used universally and not only in response to challenging behavior. In contrast, the exclusionary practices are likely to be

used only in response to specific children when they are perceived as showing challenging behavior. This may explain why attributions related to exclusionary practices but not proactive practices, since the attributions measure captured attributions only related to challenging behavior. Perhaps more supportive attributions, such as believing that a child's behavior can change or viewing behavior as communication, are more related to proactive teaching practices.

We also expected that when teachers had more causal and responsibility attributions about behavior, they would also report higher challenging behavior at the end of the year for children they perceived as showing challenging behavior. We expected this relationship to be mediated through teaching practices. However, attributions were not related directly to child behavior or indirectly through proactive or exclusionary teaching practices in this sample. These null findings were surprising, given previous research with parents and young children that has found that parent attributions are related to parenting practices and children's behavior over time (Nix et al.,1999; Wagner et al., 2018).

Other factors may be buffering any relation between attributions and child behavior. Additional teacher psychological factors that we did not measure, such as stress, self-efficacy, or emotion regulation, may be more directly tied to teaching practices and child outcomes. For example, teachers' coping skills and emotional regulation skills may mitigate any effect their attributions might otherwise have on proactive teaching practices or children's behavior. Teachers who can emotionally regulate, especially in the presence of child behavior that is causing them stress, may be more likely to pause and reflect when they are making harsh attributions about children's behavior. This awareness and regulation may in turn prevent quick judgments and attributions from influencing their use of certain teaching practices and ultimately children's behavior over time. Support within programs, such as supportive leaders, access to

professional development, and having a colleague to talk to about these challenges, may be another factor. This represents an area of future research.

It is worth noting the preliminary results related to measurement and the implications for the field. We used a previously established teacher-report measure of teaching practices, but our confirmatory factor analyses showed that the measure was not operating as expected in the current sample. Specifically, the items within the original measure's positive and inappropriate subscales were not highly correlated with one another, resulting in low reliability and poorly fitting CFA models. To address this, we iterated several models and ultimately selected a subset of proactive and exclusionary practices from the full measure, resulting in models that better fit these data. Though we as early childhood and applied developmental researchers often take averages of similar measures or constructs and use a sum score as an outcome or predictor in analyses (rather than using measurement models), this approach has limitations. These limitations include ignoring the error present in measures and assuming all items on a measure uniformly capture the underlying construct (McNeish & Wolf, 2020). Our measurement findings underscore the importance of examining reliability and validity of measures in our research, even if previous studies report on psychometrics. This is especially true in social science research, where we are trying to understand unobservable constructs (e.g., attributions, beliefs, stress). We cannot trust our findings if our measures are unreliable and not capturing the constructs we intend to capture. We recommend that researchers carefully select and examine the psychometric properties of measures in their samples beyond reliability.

Limitations

The current study had several limitations. First, these findings are correlational, and as such, we cannot make claims about causality or direction. Though we hypothesized specific

directions of associations in this paper (e.g., attributions predict teaching practices), it is likely that these relationships operate bidirectionally and in complex ways over time. Additionally, we had to use an aggregate of selected children's behavior rather than using multilevel structural equation models, given the small number of children per cluster/classroom. Therefore, we were unable to examine within classroom variation in how attributions may relate to children's behavior. Future research is needed to answer questions of directionality and within classroom variance more comprehensively.

Related to measurement, we used a teacher-report of social and emotional teaching strategies. Though teacher reports are often used in education research, teachers' own reports of their use of these strategies are prone to social desirably bias. For example, teachers may have over reported their use of proactive strategies and underreported their use of exclusionary practices. Additionally, in the final set of teaching practices, we only included a small set of practices, specifically proactive and exclusionary practices. Future research should consider using multiple measures of more comprehensive social and emotional teaching practices, including observational measures and more reliable teacher report measures. For example, the Teaching Pyramid Observational Tool (TPOT; Hemmeter et al., 2017), an observational measure of implementation of strategies to support social and emotional development and prevent challenging behavior in line with the Pyramid Model (Hemmeter et al., 2021), is one well suited option to better understand how attributions relate to practices that support children's positive behavior. Other teacher reports, such as the behavior subscales of the Classroom Strategies Scale (Reddy et al., 2016), may also provide a more comprehensive understanding of the use of these practices in early childhood settings, though again it is important to determine validity and reliability of these measures in each sample.

Future Research

There are many opportunities for future research related to teacher attributions in early childhood education settings. Related to sampling, this study used a sample of children who, on average, were perceived by their teacher as having elevated challenging behavior. We were interested in this sample of children specifically, given that teacher attributions may be most harsh for children perceived as challenging. Accordingly, these findings may not generalize to samples of preschool children who are not perceived as having challenging behavior. Future research should explore attributions and behavior in a sample of children with varying levels of challenging behavior to understand how attributions may differentially relate to children's outcomes.

In this study, we used a measure of attributions at the teacher-level, rather than attributions about specific children. Future research should consider within teacher variability in attributions. For example, research could explore how attributions may vary based on child, behavior, and contextual characteristics. This is especially important related to equity, as teachers may hold different attributions about behavior based on a child's race, gender, and disability. If teachers hold different attributions depending on the child or context, interventions such as coaching and consultation can support teachers to view children and behavior from a more strengths-based and solution-oriented lens. For example, in the Learning to Objectively Observe Kids (LOOK) consultation model, consultants support teachers to observe children's positive and challenging behavior in context, to help teachers notice the role of the classroom and teaching strategies in influencing child behavior (Downer et al., 2018). This guided video review may indirectly change how teachers view behavior, including their attributions about why children are behaving certain ways.

Teachers' attributions may play a central role in exclusionary discipline, as indicated by these findings and other studies (Martin et al., 2017; Zulauf & Zinsser, 2019). Future research should investigate how attributions relate to other types of exclusionary discipline, including suspension and expulsion, as well as how attributions relate to other teacher psychological factors such as stress and burnout. Qualitative and mixed methods research are particularly important in centering teacher voices and better understanding how these complex constructs are operating in classroom settings.

Finally, future research should consider if and how interventions, such as coaching and mental health consultation, may be addressing these attributions. Very few studies to date have examined the effect of interventions on early childhood educator attributions (e.g., Downer et al., 2018; Rosati & Lynch, 2022). Rosati and Lynch (2022) found that teachers who participated in a two-day training on the neuroscience of behavior had more open and less negative attributions of children's behavior, compared to the control group. However, Downer and colleagues (2018) did not find any effect of early childhood mental health consultation on preschool teacher attributions. Understanding how interventions may directly or indirectly change teacher attributions, as well as other beliefs, is a promising area of future research.

Conclusion

In early childhood classrooms, young children are developing foundational social and emotional skills and learning to regulate their behavior in the context of supportive relationships with their educators. In these contexts, children often engage in behavior teachers find challenging, and in turn, teachers make attributions about why these behaviors occur. We found that teachers' attributions about a child's responsibility for their behavior were related to their reported use of exclusionary discipline, but not proactive teaching practices or children's

behavioral outcomes. More research is needed to understand how teacher attributions and other psychological factors are related to social and emotional teaching practices and young children's outcomes to inform future interventions and policies to better support educators and children in early childhood contexts.

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Table 1. Sample Demographics

Teacher Demographics (N = 183)	**Mean**	**SD**	**Range**	**N Missing**	**% Missing**
Age (years)	40.84	11.82	21 – 67	20	10.92%
Preschool Teaching Experience (years)	9.15	7.73	0 – 38	21	11.48
% Female	96.34%	---	---	19	10.38%
Teacher Race	---	---	---	19	10.38%
% White	53.05%	---	---	---	---
% Black	41.46%	---	---	---	---
% Multiple races	2.44%	---	---	---	---
% Other race*	3.66%	---	---	---	---
Teacher Education	---	---	---	19	10.38%
% Lower than Bachelor's Degree	34.15%	---	---	---	---
% Bachelor's Degree	51.83%	---	---	---	---
% Higher than Bachelor's Degree	14.02%	---	---	---	---
Child Demographics (N = 470)					
Age (months)	48.74	6.71	30 – 66	7	1.49%
% Male	65.53%	---	---	0	0.00%
Child Race	---	---	---	22	4.68%
% Black	41.74%	---	---	---	---
% White	37.72%	---	---	---	---
% Multiple races	10.04%	---	---	---	---
% Latinx	7.81%	---	---	---	---
% Other race**	2.69%	---	---	---	---

Notes. *Other teacher races included Latinx (1.22%, n = 2), Native American (1.22%, n = 2), and Asian (.61%, n = 1). **Other child races included Asian (1.79%, n = 8), Native American (.45%, n = 2), and Other (not specified; .45%, n = 2)

Table 2. Descriptive Statistics of Key Variables

Key Variables	Mean	SD	Range	*N*	% Missing
Teacher Attributions about Behavior Subscales (Baseline)					
Purposefulness	3.93	1.08	1 – 6	157	14.21%
Globality	4.32	.85	2 – 6	157	14.21%
Stability	2.90	.93	1 – 5.2	157	14.21%
Motivation	3.24	1.11	1 – 5.8	157	14.21%
Internal/External Locus	4.13	.95	1 – 6	157	14.21%
Blame	3.03	1.10	1 – 5.6	157	14.21%
Negative Intent	1.89	.83	1 – 6	157	14.21%
Control	4.10	.93	1.4 – 6	157	14.21%
Teaching Practices (Baseline)*					
Coaching, Praise, and Incentives	3.73	.85	1.5 – 5	162	11.48%
Proactive Strategies	3.54	.58	2 – 4.86	162	11.48%
Limit Setting-Strategies	3.12	.64	1.8 – 5	163	10.93%
Inappropriate Strategies	1.57	.37	1 – 3	163	10.93%
Child Behavior Key Variables					
Child-Level Challenging Behavior, Baseline	143.54	42.27	38 – 256	394	20.21%
Child-Level Challenging Behavior, End of Year	134.61	48.79	38 – 252	333	32.13%

Notes. *Teaching Practices (from the Teaching Strategies Questionnaire) are reported here in the previously defined subscales of the measure. I proposed to use confirmatory factor analyses to determine subscales in the current study (see Methods section).

Table 3. Direct Associations between Attributions and Teaching Practices

	Proactive Practices			Exclusionary Practices		
	***ß* (SE)**	***t***	***p***	***ß* (SE)**	***t***	***p***
Attributions						
Causal	0.193 (.270)	0.713	.476	-0.231 (.261)	-0.885	.376
Responsibility	-0.290 (.259)	-1.118	.263	0.678 (.250)**	2.706	.007
Covariates						
Teaching experience	0.112 (.101)	1.105	.269	-0.181 (.123)	-1.467	.142
Lower than a BA	0.011 (.100)	0.106	.916	-0.018 (.119)	-0.155	.877
Higher than a BA	0.086 (.102)	0.839	.401	0.128 (.111)	1.150	.250
Teacher race	-0.018 (.102)	-0.173	.863	-0.209 (.126) †	-1.658	.097
Public Center	0.093 (.109)	0.855	.393	-0.021 (.123)	-0.172	.864
Head Start Center	0.002 (.109)	0.023	.982	-0.346 (.138)*	-2.501	.012

Notes. Due to sample sizes, White teachers are the reference group for teacher race, Bachelor's degree is the reference group for education, and private centers are the reference group for center type. Standardized beta coefficients are reported. The mean of the latent variables is constrained to 0, and the variance is constrained to 1.

†$p < .1$, * $p < .05$, ** $p < .01$

Table 4. Direct and Indirect Associations between Attributions, Teaching Practices, and Child Behavior

	End of Preschool Behavior					
	***ß* (SE)**	***t***	***p***	***ß* (SE)**	***t***	***p***
Attributions						
Causal	0.219 (.164)	1.337	.181	0.222 (.172)	1.295	.195
Responsibility	-0.065 (.161)	-0.405	.686	-0.088 (.177)	-.495	.620
Teaching Practices						
Proactive	---	---	---	-0.007 (.093)	-0.077	.938
Exclusionary	---	---	---	0.048 (.149)	0.326	.745
Child covariates						
Age	0.017 (.063)	0.274	.784	0.020 (.063)	0.317	.751
Gender	0.143 (.057) *	2.522	.012	0.147 (.056)**	2.631	.009
Race	-0.064 (.074)	-0.864	.387	-0.063 (.089)	-0.715	.475
Banking Time	-0.116 (.068) †	-1.712	.087	-0.116 (.065) †	-1.778	.075
Child Time	-0.203 (.068)**	-2.988	.003	-0.206 (.068)**	-3.027	.002
Baseline behavior	0.646 (.052)***	12.484	< .001	0.644 (.070)***	9.246	< .001
Teacher covariates						
Teaching experience	-0.003 (.063)	-0.048	.962	0.002 (.060)	0.034	.973
Lower than a BA	-0.169 (.071)*	-2.402	.016	-0.171 (.058)**	-2.925	.003
Higher than a BA	-0.004 (.061)	-0.060	.952	-0.008 (.062)	-0.129	.897
Teacher race	-0.015 (.067)	-0.217	.828	-0.012 (.075)	-0.166	.869
Public Center	-0.096 (.069)	-1.401	.161	-0.095 (.086)	-1.100	.271
Head Start Center	0.008 (.082)	0.098	.922	0.015 (.088)	0.172	.863
Indirect						
Attributions → Proactive	---	---	---	0.00 (.00)	0.00	1.00

Attributions → Exclusionary	---	---	---	0.00 (.00)	0.00	1.00

Notes. Due to sample sizes, White teachers are the reference group for teacher race, Bachelor's degree is the reference group for education, and private centers are the reference group for center type. Standardized beta coefficients are reported. The mean of the latent variables is constrained to 0, and the variance is constrained to 1.

$^{\dagger}p < .1$, * p < .05, ** p < .01, *** p < .001

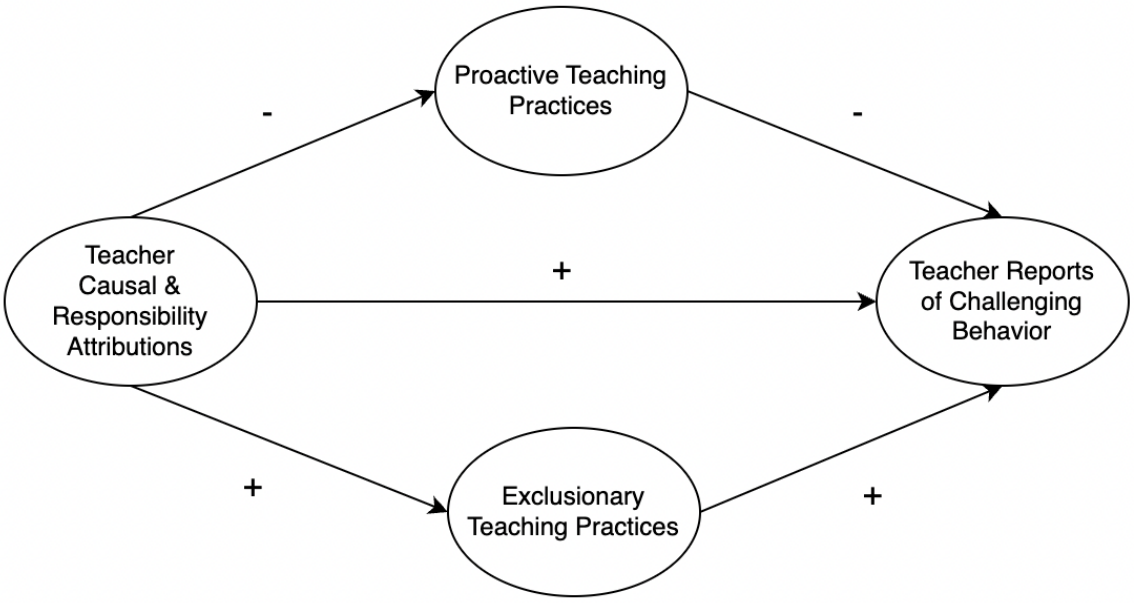

Figure 1. Research Question 3 Path Diagram and Hypothesized Associations

Appendix A: Preschool Teacher Attributions (PTA) Measure

Situation 1: Think about a time recently when a child in your classroom didn't do something you wanted done (such as picking up toys at the end of an activity, staying in line during hand washing, etc.), even after you asked several times.

Situation 2: Think about a time recently when a child in your classroom hit, pushed, yelled at, or otherwise behaved aggressively with another child.

Situation 3: Think about a time recently when a child in your classroom interrupted you and demanded your attention when you were busy with something else (talking on the phone, speaking with another child's parent, working on a project with other children, etc.).

Situation 4: Think of a time recently when a child in your classroom refused to go along with a daily routine (settling down to eat lunch, getting ready to go outside, lying quietly at rest time, etc.).

Situation 5: Think of a time recently when a child in your classroom was disrespectful of you (talked back to you, lashed out physically as if to hit or kick you, etc.).

For each situation, teachers rated the eight attribution items.

Example from Situation 1:

1. The child didn't do what I asked on purpose rather than unintentionally. [purposefulness]
2. The reason the child didn't do what I asked is something that comes up often with this child. [globality]
3. The reason the child didn't do what I asked is not likely to change. [stability]
4. The child didn't do what I asked because he or she is motivated by selfish rather than unselfish concerns. [motivation]
5. The child's behavior (in not doing what I asked) is due to something about him or her (for example, the mood he or she was in, his or her personality). [internal-external locus]
6. The child deserved to be disciplined for not doing what I asked. [blame]
7. The child didn't do what I asked mainly just to annoy me. [negative intent]
8. The child was able to control whether or not he or she did what I asked. [controllability]

Scale:
1 = disagree strongly
2 = disagree
3 = disagree somewhat
4 = agree somewhat
5 = agree
6 = agree strongly

Table A1. Preschool Teacher Attributions CFA Results

	Model 1	**Model 2**	**Model 3**
Items	One Factor	Two Factor	Higher-Order
Causal			
Globality	0.579	0.637	0.637
Stability	0.632	0.675	0.676
Internal-external locus	0.482	0.498	0.498
Responsibility			
Purposefulness	0.611	0.635	0.635
Motivation	0.734	0.760	0.760
Blame	0.498	0.476	0.476
Negative Intent	0.559	0.580	0.580
Attributions			
Causal	---	---	0.909 (n.s.)
Responsibility	---	---	0.937 (n.s.)
Model Fit			
RMSEA (< .08 = good fit)	0.074	0.066	0.073
SRMSR (< .08 = good fit)	0.046	0.044	0.044
CFI (≥.90 = good fit)	0.948	0.962	0.957

Notes. Standardized beta coefficients are reported. The mean of the latent variables is constrained to 0, and the variance is constrained to 1.

Appendix B: Teacher Strategies Questionnaire

Teachers rated how often they use the following techniques on a scale of rarely/never (1) to very often (5):

1. Comment on good behavior.
2. Describe or comment on bad behavior.
3. Reward good behavior.
4. Praise good behavior.
5. Use Time Out (Time Away) for destructive behavior.
6. Single out a child or a group of children for misbehavior.
7. Use physical restraint.
8. Use comments in a loud voice.
9. In-house suspension (send to principal's office for misbehavior).
10. Warn or threaten to send child out of classroom if s/he doesn't behave.
11. Send child home for misbehavior.
12. Call parents to report bad behavior.
13. Ignore misbehavior that is non disruptive to class.
14. Use verbal redirection for child who is disengaged.
15. Use problem-solving strategy.
16. Use anger management strategy.
17. Prepare children for transitions.
18. Use group incentives.
19. Use special privileges (e.g., special helper, extra computer time).
20. Set up individual incentive programs (e.g., stickers, prizes).
21. Give clear positive directions.
22. Warn of consequences for misbehavior (e.g., loss of privileges).
23. Use clear classroom discipline plan.
24. Label (describe) children's feelings (positive or negative).
25. Use nonverbal signals to redirect child who is disengaged.
26. Send home notes (or frowny faces) to report problem behavior to parent.

Table B1. TSQ Items in current study, grouped by original subscales

TSQ Subscale	Item Numbers	Items
Coaching, Praise, and Incentives*	1, 3, 4, 18, 19, 20	1. Comment on good behavior. 3. Reward good behavior. 4. Praise good behavior. 18. Use group incentives. 19. Use special privileges (e.g., special helper, extra computer time). 20. Set up individual incentive programs (e.g., stickers, prizes).
Proactive Strategies*	15, 16, 17, 21, 23, 24	15. Use problem-solving strategy. 16. Use anger management strategy. 17. Prepare children for transitions. 21. Give clear positive directions. 23. Use clear classroom discipline plan. 24. Label (describe) children's feelings (positive or negative).
Limit-Setting Strategies*	5, 13, 14, 22, 25	5. Use Time Out (Time Away) for destructive behavior. 13. Ignore misbehavior that is non disruptive to class. 14. Use verbal redirection for child who is disengaged. 22. Warn of consequences for misbehavior (e.g., loss of privileges). 25. Use nonverbal signals to redirect child who is disengaged.
Inappropriate Strategies	2, 6, 7, 8, 9, 10, 11, 12, 26	2. Describe or comment on bad behavior. 6. Single out a child or a group of children for misbehavior. 7. Use physical restraint. 8. Use comments in a loud voice. 9. In-house suspension (send to principal's office for misbehavior). 10. Warn or threaten to send child out of classroom if s/he doesn't behave. 11. Send child home for misbehavior. 12. Call parents to report bad behavior. 26. Send home notes (or frowny faces) to report problem behavior to parent.

Notes. *Coaching, praise, incentives; Proactive; and Limit-setting strategies (items 1, 3, 4, 5, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25) combine for a Positive Strategies overall score.

Table B2. TSQ Proposed Item Groupings from Dissertation Proposal

TSQ Subscale	**Items**
Positive Strategies	1. Comment on good behavior. (CPI) 3. Reward good behavior. (CPI) 4. Praise good behavior. (CPI) 13. Ignore misbehavior that is non disruptive to class. 14. Use verbal redirection for child who is disengaged. (LS) 15. Use problem-solving strategy. (PS) 16. Use anger management strategy. (PS) 17. Prepare children for transitions. (PS) 18. Use group incentives. (CPI) 19. Use special privileges (e.g., special helper, extra computer time). (CPI) 20. Set up individual incentive programs (e.g., stickers, prizes). (CPI) 21. Give clear positive directions. (PS) 23. Use clear classroom discipline plan. (PS) 24. Label (describe) children's feelings (positive or negative). (PS) 25. Use nonverbal signals to redirect child who is disengaged.
Inappropriate Strategies	2. Describe or comment on bad behavior. (IS) 5. Use Time Out (Time Away) for destructive behavior. (LS) 6. Single out a child or a group of children for misbehavior. (IS) 7. Use physical restraint. (IS) 8. Use comments in a loud voice. (IS) 9. In-house suspension (send to principal's office for misbehavior). (IS) 10. Warn or threaten to send child out of classroom if s/he doesn't behave. (IS) 11. Send child home for misbehavior. (IS) 12. Call parents to report bad behavior. (IS) 22. Warn of consequences for misbehavior (e.g., loss of privileges). (LS) 26. Send home notes (or frowny faces) to report problem behavior to parent. (IS)

Notes. Original subscale groupings are presented in parentheses: CPI = Coaching, Praise, Incentives. PS = Proactive Strategies. LS = Limit Setting. IS = Inappropriate Strategies.

Table B3. Teaching Strategies Revised CFA Model Fit for Positive Items

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Items	One Factor	One Factor, Revised Groupings	One Factor, Excludes Limit Setting Items	Two Factor, Coaching and Proactive Only	One Factor, Coaching Only	One Factor, Proactive Only
1. Comment on good behavior.	0.785***	0.792***	0.820***	0.873***	0.839***	---
3. Reward good behavior.	0.572***	0.575***	0.625***	0.678***	0.718***	---
4. Praise good behavior.	0.741***	0.746***	0.768***	0.780***	0.774***	---
5. Use Time Out (Time Away) for destructive behavior.	0.123	---	---	---	---	---
13. Ignore misbehavior that is non disruptive to class.	0.067	0.066	---	---	---	---
14. Use verbal redirection for child who is disengaged.	0.523***	0.525***	---	---	---	---
15. Use problem-solving strategy.	0.595***	0.606***	0.535***	0.686***	---	0.775***
16. Use anger management strategy.	0.533***	0.544***	0.486***	0.614***	---	0.641***
17. Prepare children for transitions.	0.569***	0.568***	0.538***	0.671***	---	0.623***
18. Use group incentives.	0.706***	0.710***	0.733***	0.764***	0.719***	---
19. Use special privileges (e.g., special helper, extra computer time).	0.643***	0.635***	0.663***	0.703***	0.710***	---
20. Set up individual incentive programs (e.g., stickers, prizes).	0.619***	0.608***	0.654***	0.717***	0.759***	---
21. Give clear positive directions.	0.584***	0.581***	0.577***	0.730***	---	0.696***
22. Warn of consequences for misbehavior (e.g., loss of privileges).	0.465***	---	---	---	---	---
23. Use clear classroom discipline plan.	0.630***	0.586***	0.588***	0.689***	---	0.553***
24. Label (describe) children's feelings (positive or negative).	0.494***	0.499***	0.362***	0.484***	---	0.543***
25. Use nonverbal signals to redirect child who is disengaged.	0.602***	0.610***	---	---	---	---
RMSEA (< .08 = good fit)	0.141	0.161	0.174	0.109	0.211	0.091
SRMSR (< .08 = good fit)	0.112	0.119	0.114	0.082	0.074	0.047
CFI (≥.90 = good fit)	0.723	0.721	0.767	0.910	0.917	0.967

Notes. Standardized beta coefficients are reported. The mean of the latent variables is constrained to 0, and the variance is constrained to 1.

Table B4. TSQ Item Sorting Activity Results

TSQ Inappropriate Subscale Items	# Voted Positive	# Voted Negative	# Voted Neutral	Included in model?
2. Describe or comment on bad behavior. (IS)	0	4	6	N
5. Use Time Out (Time Away) for destructive behavior. (LS)	1	2	7	N
6. Single out a child or a group of children for misbehavior. (IS)	**0**	**10**	**0**	**Y**
7. Use physical restraint. (IS)	**0**	**8**	**1**	**Y**
8. Use comments in a loud voice. (IS)	0	5	5	N
9. In-house suspension (send to principal's office for misbehavior). (IS)	**0**	**10**	**0**	**Y**
10. Warn or threaten to send child out of classroom if s/he doesn't behave. (IS)	**0**	**10**	**0**	**Y**
11. Send child home for misbehavior. (IS)	**0**	**10**	**0**	**Y**
12. Call parents to report bad behavior. (IS)	0	3	6	N
22. Warn of consequences for misbehavior (e.g., loss of privileges). (LS)	2	1	7	N
26. Send home notes (or frowny faces) to report problem behavior to parent. (IS)	0	5	4	N

Notes. After original and proposed groupings of inappropriate practices did not fit the data well in a series of confirmatory factor models, we sent a sorting exercise with the strategies to ten experts in the field, including three professors, a postdoctoral scholar, and six graduate students. The goal of this sorting exercise was to come to some consensus on item groupings and test a new model. For each item, the experts indicated whether they thought the strategy was positive ("This is a positive strategy - I would encourage preschool teachers to use this strategy"), negative ("This is NOT a positive strategy - I would discourage preschool teachers from using this strategy"), or neutral ("This strategy is in the middle - I'm not sure if I would recommend this strategy/it depends"). Bolded items were included in final CFA model and SEM analyses.

Table B5. Teaching Strategies Revised CFA Model Fit for Inappropriate Items

Items	**Model 1** One Factor, Original Items	**Model 2** One Factor, Revised Groupings	**Model 3** One Factor, Revised from Sorting Exercise
2. Describe or comment on bad behavior.	0.504***	0.512***	---
5. Use Time Out (Time Away) for destructive behavior.	---	0.629***	---
6. Single out a child or a group of children for misbehavior.	0.592***	0.659***	0.533***
7. Use physical restraint.	0.382**	0.371**	0.414**
8. Use comments in a loud voice.	0.516***	0.516***	---
9. In-house suspension (send to principal's office for misbehavior).	0.673***	0.604***	0.861***
10. Warn or threaten to send child out of classroom if s/he doesn't behave.	0.679***	0.692***	0.668***
11. Send child home for misbehavior.	0.584***	0.585***	0.519***
12. Call parents to report bad behavior.	0.375***	0.329***	---
22. Warn of consequences for misbehavior (e.g., loss of privileges).	---	0.391***	---
26. Send home notes (or frowny faces) to report problem behavior to parent.	0.486***	0.477***	---
Model Fit			
Root mean square error of approximation (< .08 = good fit)	0.136	0.110	0.085
Standardized root mean square residual (< .08 = good fit)	0.131	0.121	0.069
Comparative fit index (≥.90 = good fit)	0.691	0.759	0.940

Notes. Standardized beta coefficients are reported. The mean of the latent variables is constrained to 0, and the variance is constrained to 1. To strategically select items included in Model 3, we sent a sorting exercise with the strategies to ten experts in the field, including three professors, a postdoctoral scholar, and six graduate students. The goal of this sorting exercise was to come to some consensus on item groupings and test a new model. For each item, the experts indicated whether they thought the strategy was positive ("This is a positive strategy - I would encourage preschool teachers to use this strategy"), negative ("This is NOT a positive strategy - I would discourage preschool teachers from using this strategy"), or neutral ("This strategy is in the middle - I'm not sure if I would recommend this strategy/it depends").

Appendix C: Sutter-Eyberg Student Behavior Inventory- Revised (SESBI-R) Items

Teachers rated how often the following behaviors occurred with each selected student on a scale of never (1) to always (7):

1. Has temper tantrums
2. Pouts
3. Teases or provokes other students
4. Lies
5. Acts frustrated with difficult tasks
6. Does not obey school rules on his/her own
7. Demands teacher attention
8. Dawdles in obeying rules or instructions
9. Acts bossy with other students
10. Gets angry when doesn't get his/her own way
11. Interrupts teacher
12. Impulsive, acts before thinking
13. Refuses to obey until threatened with punishment
14. Has difficulty staying on task
15. Blames others for problem behaviors
16. Has difficulty entering groups
17. Is easily distracted
18. Has difficulty accepting criticism or correction
19. Fails to finish tasks or projects
20. Sasses teacher
21. Verbally fights with other students
22. Whines
23. Is overactive or restless
24. Physically fights with other students
25. Makes noises in class
26. Acts defiant when told to do something
27. Argues with teachers about rules or instructions
28. Interrupts other students
29. Is noisy
30. Has trouble awaiting turn
31. Talks excessively
32. Loses things needed for school activities
33. Fidgets or squirms in seat
34. Fails to listen to instructions
35. Is touchy or easily annoyed
36. Bothers others on purpose
37. Has trouble paying attention
38. Has difficulty staying seated