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Everyday Heroes: The Personal and Economic Stressors of Early Care and Education Teachers Serving Low-Income Children

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Abstract

Research findings: This study uses newly available data on low-income children and their teachers in a mixed-delivery, publicly funded early care and education (ECE) system to document the prevalence of personal and economic stressors that ECE teachers experience. We go on to explore whether these stressors are associated with child academic, self-regulatory, and social outcomes. Results indicate that ECE teachers in our sample report a high degree of personal and economic stressors – for instance, rates of depression and food insecurity are relatively high. Yet, these stressors' associations with child outcomes are often weak and inconsistent.

Practice and policy: ECE teachers in publicly funded settings face high expectations but are paid astonishingly low wages, which may contribute to high stress. More research is needed to understand why the many stressors teachers report did not consistently predict child outcomes in this study. What enables teachers to compartmentalize or absorb their personal and economic stressors such that their students are protected from its impacts? How can this information be applied to professional development focused on improving teacher wellbeing? Regardless of associations with child outcomes, reducing stressors reported by ECE teachers is a worthy practice priority because children deserve healthy and economically secure teachers and a worthy policy priority from a human rights perspective.

It is now widely accepted that high-quality early care and education (ECE) – especially public programs designed to prepare low-income children for school entry such as Head Start and public pre-kindergarten (pre-k) – can help close early income-based achievement gaps (Phillips et al., 2017; Yoshikawa et al., 2013). It is also widely accepted that the hallmark of high-quality ECE programs is the interactions between teachers and children (Hamre, 2014; Peisner-Feinberg et al., 2001): ECE teachers create classroom environments and experiences that can promote or compromise learning and growth (Diamond et al.,

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2013; Hamre, 2014; Institute of Medicine [IOM] and National Research Council [NRC], 2015; Johnson, 2017; Phillips et al., 2016; Shonkoff & Phillips, 2000). Due in part to this growing recognition of ECE teachers' critical role in shaping young children's early learning, expectations for ECE teachers are high (Center on the Developing Child, 2007).

Yet ECE teachers are among the lowest-paid professionals in the U.S. (Phillips et al., 2016; Whitebook et al., 2014). With low pay and high expectations, it is no surprise that ECE teachers, especially those serving low-income children in public programs, report relatively high rates of stress. Most of the research examining stressors and experiences of stress among ECE teachers has focused on emotional distress and job-related stress, alone and as they relate to depression (De Schipper et al., 2009; Groeneveld et al., 2012; Hamre & Pianta, 2004; Hindman & Bustamante, 2019; Jeon et al., 2019, 2014; Li-Grining et al., 2010; Whitaker et al., 2013). A smaller set of study points to other kinds of stressors among ECE teachers – economic stressors. Economic stressors among ECE teachers include not just low pay, but also household food insecurity and dependence on public, means-tested benefits (Whitaker et al., 2015; Whitebook et al., 2014). In the current paper, we use the term "stressors" to refer to hardships that may contribute to – but are distinct from – stress. We consider both external factors that may contribute to short-term reactive stress, such as food insecurity or stressful work conditions, as well as internal, self-reported indicators of emotional distress, such as elevated depressive symptoms.

Just as research has identified negative associations between parental stressors and children's developmental outcomes (see Goodman et al., 2011; Hughes et al., 2013), an emerging body of research has identified similar associations between ECE teachers' stressors and children's outcomes (Buettner et al., 2016; Hindman & Bustamante, 2019; Jeon et al., 2019, 2014; Whitaker et al., 2015). These studies have focused nearly exclusively on children's social and emotional outcomes. Few studies have examined children's self-regulatory skills, and, to our knowledge, none have explored academic outcomes. Additionally, with few exceptions, most studies linking ECE teacher stressors to child outcomes rely on teacher-reported measures for both sets of variables. This is problematic, as teachers who report more stressors may perceive higher levels of problem behavior among the children they teach (Hindman & Bustamante, 2019; Raver et al., 2009).

We build and improve on the nascent literature linking ECE teacher stressors to child development in four ways. First, we examine a wider set of ECE teacher stressors – both personal and economic stressors – than has been explored to date. Stressors are hardships that contribute to stress and include both personal (e.g., emotional distress, as captured by elevated depressive symptoms; physical health) as well as economic (e.g., food insecurity; low salary) hardships. We document the prevalence of these stressors and then test for their associations with child outcomes. Second, our outcome measures capture not just children's social-emotional wellbeing, but also include children's academic and self-regulatory skills. Third, most of our outcomes are measured via direct assessment as opposed to teacher report, thereby removing shared method variance between measures of teacher stressors and child development. Finally, our sample is drawn from the two major public ECE programs designed to boost school readiness for low-income children – Head Start and public pre-k – where the stressors on and expectations of ECE teachers are especially high. Past research

on stressors among teachers in public ECE settings serving low-income children has focused exclusively on Head Start teachers (Roberts et al., 2016; Whitaker et al., 2013, 2015; Zinsser et al., 2013).

Stressors among ECE Teachers

Expectations for what ECE teachers can do – especially for vulnerable young children – have increased as scientific consensus has emerged suggesting that interactions between teachers and young children are the key active ingredients in high-quality ECE (Phillips et al., 2017). Child development and neuroscience research from the last two decades have underscored the importance of children's first 5 years as the foundation for future academic and life success (Black et al., 2017; Shonkoff et al., 2012; Shonkoff & Phillips, 2000). This research implies that stressful early environments, including those associated with poverty, interfere with aspects of children's early biological and brain development that underlie learning, emotional, and self-regulatory skills (Bagby et al., 2019; Miller et al., 2011; Nusslock & Miller, 2016). Encouragingly, supportive early environments characterized by predictable norms and expectations (Raver et al., 2009) and directed by a calm and nurturing parental or non-parental caregiver (Magnuson & Schindler, 2019; McCoy, 2016; Phillips, 2016) can ameliorate that stress. The hope is thus that ECE teachers can buffer low-income children from the negative effects of impoverished early environments while simultaneously enhancing children's skills across multiple domains of development (Center on the Developing Child, 2007).

Simultaneously, ECE teachers, particularly those serving low-income children in public programs like Head Start and school-based pre-k, are increasingly required to meet escalating and high-stakes accountability standards. For instance, in many states, school-based public pre-k programs are held to the same quality and improvement regulations as elementary grades under the Every Student Succeeds Act (ESSA; Center on Enhancing Early Learning Outcomes [CEELO] & the Council of Chief State School Officers [CCSSO], 2017). Head Start Program Performance Standards and regular program monitoring require Head Start programs to demonstrate that they meet comprehensive quality criteria or risk being de-funded (Office of Head Start [OHS], 2016). In effect, ECE teachers are expected to be "everyday heroes" – delivering positive benefits for disadvantaged children coupled with extremely low compensation.

Given this mix of high expectations, public scrutiny, and low wages (Whitebook et al., 2018), it is perhaps not surprising that ECE teachers report experiencing multiple stressors. Much of the existing research on ECE teachers' personal distress as it may relate to overall stress and wellbeing has focused on depression. Estimates suggest that close to one-quarter of ECE teachers report depression, with the highest rates among teachers in public ECE settings designed for low-income children, like Head Start (Corr et al., 2014; Whitaker et al., 2013, 2015). ECE teachers also report high levels of workplace stress (Li-Grining et al., 2010).

Economic stressors are also endemic among ECE teachers, in large part because they are paid astonishingly low wages (Whitebook et al., 2018). U.S. Department of Labor data

reveals that ECE teacher salaries fall in the 19th percentile of all U.S. wages (Phillips et al., 2016). ECE teachers also earn, on average, two-thirds of what comparably educated kindergarten teachers earn (Whitebook et al., 2014). It is no surprise then that nearly half of all ECE teachers rely on some form of government assistance (Whitebook et al., 2018), and many struggle to pay for health care utilities, and food (Whitaker et al., 2015).

Less attention has been paid to other potential stressors for ECE teachers. For instance, poor physical health and high degrees of household chaos are additional stressors prevalent among ECE teachers (Whitaker et al., 2013) and, based on parent–child evidence, known to be adversely related to adult-child interactions (Coldwell et al., 2006). Although empirical studies have not yet examined whether poor ECE teacher health relates to children's experiences and outcomes in ECE, theoretically poor physical health would be expected to impair teachers' physical agility and distract them from focusing on their essential instructional, emotional, and management responsibilities. Poor health may also cause frequent missed workdays, which likely interferes with the development of close teacher–child relationships and predictable classroom routines. ECE teachers who have high degrees of household chaos may likewise be distracted from their essential duties in the classroom. Again, while this has not yet been empirically tested, evidence from research on household chaos among parents suggests higher chaos is linked with lower warmth and harsher discipline (Coldwell et al., 2006). Chaos in the home environment is thought to increase distraction and add to overall "cognitive load" (Deater-Deckard et al., 2012). It is thus plausible that teachers experiencing a chaotic household may have depleted emotional resources to manage challenging classroom situations and poorer executive functioning required to plan and deliver high-quality curricula.

Links between ECE Teacher Stressors and Teacher Practices

The expectation that ECE teacher stressors should impact child development is rooted in Bronfenbrenner's ecological systems model (Bronfenbrenner & Morris, 2006). This model suggests that caregiver–child interactions in the child's "microsystem" are the most proximate influence on children's development. Just as parents' stress arising from personal and economic difficulties affects their sensitivity, responsiveness, and harshness with their children (Goodman et al., 2011; Johnson & Markowitz, 2018a, 2018b; Lee et al., 2009; Li et al., 2011; Wachs et al., 2009), ECE teachers' stress influences the quality of their interactions with their young students (Buettner et al., 2016; Jeon et al., 2014; Li-Grining et al., 2010; Roberts et al., 2016; Whitaker et al., 2015; Zinsser et al., 2013).

The model of the prosocial classroom (Jennings & Greenberg, 2009) offers a specific theoretical framework to help explain how teacher stress may influence classrooms and thus children. It argues that teachers' wellbeing and social-emotional competence impact their abilities to develop and sustain healthy relationships with children, to effectively manage the classroom, and to model and support social-emotional learning. Instead of appraising a challenging situation (e.g., disruptive children, negative peer interactions, chaotic interactions during instructional time) and managing the event using adaptive cognitive and behavioral strategies (e.g., Aldwin, 2007), teachers under stress may instead experience and display negative emotions toward students and co-teachers, withdraw

from and thus lose control of the classroom, and have less patience and sensitivity to manage children's emotions and support children's behavioral and cognitive self-regulation. Teachers who are emotionally exhausted, depressed, or distracted by economic worries may also struggle to plan and deliver high-quality cognitively stimulating content and scaffold learning opportunities (Magnuson & Schindler, 2019; Mani et al., 2013; Raver et al., 2012, 2009).

The ecological and prosocial classroom theoretical models help explain the findings of recent studies linking ECE teacher stressors to teacher practices and classroom processes. For instance, in a sample of ECE teachers drawn from child care centers across the country, teachers' psychological load (including depression, stress, and emotional exhaustion) was associated with more negative responses to children's negative emotions (Buettner et al., 2016; Jeon et al., 2014). Similarly, ECE teachers in private preschools who reported more job-related stressors demonstrated lower and more inconsistent emotional support of children in their classrooms (Zinsser et al., 2013). In a statewide sample of Head Start teachers in Pennsylvania, both teacher depression and teacher workplace stressors predicted more teacher-child conflict; interestingly, there was no association between teacher financial hardship and teacher-reported teacher–child relationship quality (Whitaker et al., 2015). Additionally, a study of Head Start teachers found that high rates of workplace stressors predicted poor teacher–child interaction quality (Li-Grining et al., 2010). To date, no studies have examined how stress due to economic hardship per se (apart from workplace stress more generally), poor physical health, or chaotic home environments influence teachers' performance in the classroom.

ECE Teacher Stressors and Child Social-Emotional Development

The preponderance of empirical studies exploring associations between ECE teacher stressors and children's development has focused on social-emotional outcomes. Indeed, Jennings and Greenberg's (2009) model of the prosocial classroom has the most direct implications for links from teacher stressors to disruptions in child social-emotional skills. ECE teacher depression, perceived stress, and emotional exhaustion have been linked with unsupportive and insensitive (i.e., punitive, minimizing, intrusive) responses to children's negative emotions (Buettner et al., 2016). This may explain why teacher depression predicted increased problem behavior over the course of a Head Start year (Roberts et al., 2016). The same study found that teacher depression also predicted teacher-reported declines in children's social skills. In another sample of Head Start teachers, higher levels of workplace stressors and depression predicted more conflicts with children (Whitaker et al., 2015). In a sample of preschool teachers in North Carolina, there were positive associations between teacher financial wellbeing (wages; ability to meet basic economic needs) and children's positive mood, affect, and classroom engagement (King et al., 2016). In yet another study, more teacher stressors and greater variability in emotional support predicted poorer emotion regulation and prosocial behaviors among the children in their care, but only in private preschool classrooms; no such associations were found in Head Start (Zinsser et al., 2013).

ECE Teacher Stressors and Child Self-Regulatory Skill Development

Children's pre-k self-regulatory skills predict subsequent academic achievement and school success (Blair & Razza, 2007; McClelland et al., 2006). As such, the constellation of abilities that constitute good self-regulation is critical for preschool children to develop. These self-regulatory skills include the ability to resist distractions and impulses and to selectively attend to relevant stimuli (Diamond, 2013). To the extent that ECE teachers' own self-regulatory skills are depleted by stress (Magnuson & Schindler, 2019; Raver et al., 2012), children's developing self-regulatory skills may feel the impact. It is likely, for example, that ECE teachers who struggle to provide consistent rules, predictable routines, and organized transitions as a result of compromised self-regulation capacities will undermine children's own ability to develop inhibitory control, planning, and attention skills that depend on consistent and orderly environments. Yet only one study has tested this possibility: Neuenschwander et al. (2017) examined associations between kindergarten teacher job-related stressors and children's self-regulatory skills, including inhibitory control and attention shifting. Significant associations were only detected between teacher stressors and self-regulatory skills for children in low-poverty schools; among children in high-poverty schools, teacher stressors were not related to child self-regulation perhaps because children in high-poverty schools face numerous other, potentially more damaging stressors (e.g., neighborhood violence, housing instability, food insecurity).

ECE Teacher Stressors and Child Academic Skill Development

Although no studies have tested whether ECE teacher stressors relate to children's academic outcomes in early childhood (ages 0–5), there are reasons to suspect it might. For instance, one study found that ECE providers who report stress are less likely to actively engage children during periods of free play (Ota et al., 2012). This lack of engagement may result in lower cognitive stimulation. Further, because stress interferes with adults' executive functioning (Mani et al., 2013), stressed teachers may be challenged to plan and deliver cognitively stimulating, challenging, and individualized instructional content and to scaffold complex tasks for children. This could explain why Jeon et al. (2016) found that high teacher stress predicted lower levels of classroom instructional support, which captures teachers' abilities to sustain back-and-forth interactions with children and help model appropriate use of language, develop concepts, and provide quality feedback. Albeit focused on older school-age children, one recent study examining stress and child academic outcomes found that children in classrooms with teachers who were stressed but reported high levels of coping performed better on a math assessment than children in classrooms whose teachers reported low levels of coping (Herman et al., 2018). However, there were no significant differences in reading, nor any significant differences in children's academic outcomes for teachers who reported low vs. high levels of stress (Herman et al., 2018). Similarly, another study on school-aged children found that teachers' depressive symptoms were associated with lower math achievement for children with low math skills at the start of the school year (McLean & Connor, 2015). However, as with Herman et al. (2018) study, there was no significant relationship for reading (McLean & Connor, 2015). To our knowledge, no studies have explored these questions in samples of preschool-aged children.

On the other hand, teacher stressors may not be associated with children's academic skills development. First, the study that found teacher stress influenced instructional quality (Jeon et al., 2016) used a measure of instructional quality that is only weakly and inconsistently related to child outcomes (Burchinal, 2018). If teacher stress does not impinge on the classroom processes that are supportive of academic outcomes, then stress would not predict worse cognitive development. It is also plausible that – unlike our hypotheses about teachers' stress and their abilities to manage the classroom and offer emotional support – stress may have little association with teachers' instructional quality. One purely speculative theory about why this might revolve around the presence of a curriculum, which scaffolds instructional time. If instruction is shaped largely via a curriculum, teacher responsiveness and sensitivity – which is potentially shaped by teacher stressors – may play a smaller role, leaving less room for the teacher's own wellbeing to influence quality of instruction and thus, academic skills.

Current Study

The current study examines ECE teacher stressors identified in the ECE literature as pertinent to child outcomes, while expanding on this area of inquiry in three important ways. First, we consider a wider range of stressors than those explored in existing research that are theoretically likely to relate to children's outcomes via their associations with ECE teacher mental health and executive functioning, including household chaos and physical health problems. Second, we address prior studies' near-exclusive focus on child social-emotional outcomes by adding assessments of children's academic and self-regulatory skills. Third, in our suite of child outcomes, we include direct assessments of children's skills as well as teacher-reported outcomes. Prior studies finding associations between ECE teacher stressors – many of which conceptualize depression as a key stressor – and child outcomes have mostly relied on teacher-reported child outcomes. For instance, Hindman and Bustamante (2019) found that lower teacher depression was related to better child prosocial skills and fewer problem behaviors, but this was only true for teacher-reported social outcomes; when parent-reported outcomes were considered, there was no association between teacher depression and child outcomes. This suggests that perhaps more depressed teachers rate child outcomes as more problematic. Finally, much of the research on ECE teacher stressors in low-income samples has been restricted to teachers in Head Start (e.g., Roberts et al., 2016; Whitaker et al., 2013, 2015; Zinsser et al., 2013), leaving out the fastest-growing segment of center-based ECE for low-income children: school-based pre-k. Thus, our study, situated in a mixed-delivery system serving low-income 4-year-olds in Head Start and public pre-k settings, is generalizable beyond Head Start. We also focus on teachers serving an exclusively low-income population, which likely places added demands on ECE teachers. Accordingly, the prevalence and intensity of stressors among teachers serving low-income children who enter the preschool classroom with elevated risks and needs are expected to be higher than among the general population of ECE teachers (Johnson, 2017; Johnson et al., 2019).

With these innovations in mind, we address two research goals: first, we aim to document the extent of personal and economic stressors experienced by ECE teachers serving low-income preschoolers in the two major public ECE programs designed to prepare young,

low-income children for school. Next, we explore the possibility of associations between those stressors and children's academic, self-regulatory, and social-emotional outcomes, hypothesizing here that to the extent teachers report experiencing stressors those stressors will be negatively linked with children's development across all domains.

Method

Data for the current study were collected on ECE children and teachers in publicly funded ECE settings serving low-income 4-year-olds in Tulsa, Oklahoma. Across all settings, data on teacher stressors, supports, and demographics were collected using an online Qualtrics survey during the spring of 2018. Teachers were offered 20 USD for completing the 25-min online survey. In the early fall of 2017 and late spring of 2018, children's academic and self-regulatory outcomes were assessed. Teachers also reported on child social-emotional outcomes in the fall of 2017 and spring of 2018. In late winter through early spring of 2018, observations of ECE classroom quality occurred in each participating teacher's classroom. The Georgetown University Institutional Review Board reviewed and approved all study protocol.

Data Source and Sample

This study is part of a larger study of mixed delivery public pre-k for low-income children in Tulsa, Oklahoma. The study began with 633 low-income 3-year-old children attending publicly funded center-based ECE in Tulsa in 2016. When these children were 4 years old, in the fall of 2017, an additional 457 children were recruited, yielding a total sample of 1,149 children. All children attended one of four types of publicly funded center-based ECE serving low-income 4-year-olds in Tulsa (defined as a center in which a substantial proportion [~80%] of the student body qualified for free or reduced-price lunch): Tulsa Public Schools (TPS) school-based public pre-k, Tulsa charter school-based pre-k, Community Action Program of Tulsa (CAP-Tulsa) Head Start, and Tulsa Educare. There was a total of 142 classrooms located across 60 centers. Specifically, there were 48 TPS schools comprising 102 classrooms, four Tulsa charter schools with one classroom each, six CAP-Tulsa centers comprising 28 classrooms, and two Tulsa Educare schools comprising eight classrooms.

Lead teachers from each of the 142 classrooms were invited to participate in the online teacher survey in the spring of 2018. Of the 142 teachers recruited, 113 (approximately 80%) completed surveys (76 TPS school-based pre-k teachers, three charter school teachers, 24 CAP-Tulsa teachers, and six Educare teachers). There were no statistically significant differences in response rates across program types. We are unable to analyze differences between teachers who completed surveys and teachers who did not, given that we lacked even demographic data on nonparticipating teachers.

Measures

ECE Teacher Stressors: The key predictors of interest in the current study are variables that capture ECE teacher stressors. Teacher stressors include items that tap both personal

(e.g., depression, household chaos) and economic (e.g., salary, food insecurity) sources of stress.

Personal Stressors. Personal stressors were captured using validated measures of teacher depressive symptoms, household chaos, and physical health.

Depression. was assessed using the widely used and well-validated Center for Epidemiologic Studies Short Depression Scale (CES-D; Radloff, 1977). Teachers were asked to rate how often 10 items were true for them in the past week on a 4-point scale (0 = "Rarely or none of the time (less than 1 day)" to 3 = "All of the time (5–7 days)"). Items included depressive symptoms such as "I felt that everything I did was an effort" and "I felt fearful," as well as lack of depressive symptoms (e.g., "I felt happy") which were reverse-coded (α =.85). Items were summed to create a continuous depression scale (used in the multivariate models), where higher scores indicate more depressive symptoms. For descriptive purposes, we also constructed a binary indicator: teachers who scored 10 or higher on the continuous depression scale were coded as meeting a cutoff for elevated depressive symptoms (Andresen et al., 1994).

Household chaos. was assessed using the Confusion, Hubbub, and Order Scale (CHAOS; Matheny et al., 1995). The CHAOS includes 15 items describing the home environment, such as "There is very little commotion in our home," "It's a real zoo in our home," and "No matter what our family plans, it usually doesn't seem to work out." Responses are scored on a 4-point scale (1 = "Very much like your own home" to 4 = "Not at all like your own home"). The total CHAOS score is the sum across all items, with negative items reverse-coded. A higher score indicates more household chaos (α = .74).

Less than very good health. was assessed using a widely used single Likert-scaled item asking participants how they would rank their overall health (1 = "poor" to 5 = "excellent"). Following prior studies (e.g., Johnson & Markowitz, 2018b), a binary variable was created to classify participants as having less than very good health (scores of 1–3, or poor to good) versus very good (4) or excellent (5) health.

Economic Stressors. Economic stressors were captured through measures of salary, household food insecurity, teacher receipt of public benefits, and whether the teacher works another job.

ECE Salary. ECE salary was calculated as the ratio of salary to living wage, constructed as a function of the number of children and working adults in the home using the Massachusetts Institute of Technology (MIT) living wage calculator for Tulsa, Oklahoma (Nadeau, 2016). The living wage rate ranged from 18,865.60 USD per year for a household with two working adults and no children to 75,524.80 USD per year for a single parent with three children (Nadeau, 2016).

Household food insecurity was measured using the USDA Core Food Security Module (CFSM; Economic Research Service, 2012), the standard measure of food insecurity in survey research. For this study, we used the CFSM's 10-item household index (see Johnson

& Markowitz, 2018a). Items capture food insecurity in the last 12 months through questions such as “In the last 12 months, did you ever eat less than you felt you should because there wasn’t enough money for food?” and “How true is it for you that in the last 12 months: We couldn’t afford to eat balanced meals.” Respondents reported whether each item was never, sometimes, or often true. Each of the 10-items was dichotomized by combining “sometimes true” and “often true” (=1) before being summed such that higher numbers indicate more food insecurity (α = .82; per guidance from the Economic Research Service, 2012). For descriptive purposes, we also present categorical levels of food insecurity (see Table 1); however, the continuous scale was used in regression models.

Public Benefit Receipt. ECE teachers reported whether they received any of the following income-tested public benefits (these benefits are also referred to as means-tested, where eligibility for a benefit is determined by available means – in this case, income) in the last year: Earned Income Tax Credit (EITC), child care subsidy, Medicaid for themselves, Medicaid for their children, subsidized housing, TANF, WIC, or SNAP. A binary indicator was constructed to reflect if they received any public benefits.

Teacher Works Another Job. ECE teachers reported on whether they worked another job in addition to their job as a lead ECE teacher.

Child Outcomes: Child academic, self-regulatory, and social-emotional development was measured in the spring of 2018 using direct assessment, assessor report, and teacher report. Trained assessors administered direct assessments over two testing days in a separate room in the school that was relatively free of distraction. Tests were administered in a set order for consistency; assessors monitored children’s assent to participate throughout the assessment session and returned children to the classroom if they became upset.

Child Academic Outcomes. Child academic outcomes were directly assessed using the Woodcock-Johnson III Tests of Achievement (Woodcock et al., 2001). Children’s literacy skills were assessed using the Letter-Word Identification subtest, which measures children’s ability to identify progressively more difficult letters and words. Mathematical reasoning was assessed using the Applied Problems subtest where children are read a computational word problem and must solve it (e.g., “How many dogs are in this picture?”).

Child Self-regulatory Skill Outcomes. We assessed two elements of self-regulation: inhibitory control, or the cognitive capacity to resist distractions and inhibit a prepotent response (Diamond, 2013), and attention/impulse control, or the behavioral capacity to attend to rules and directions rather than giving in to an impulse (Smith-Donald et al., 2007).

Inhibitory control was measured directly using the tablet-based Executive Function (EF) Touch Silly Sounds Stroop Task (“Silly Sounds”, Willoughby et al., 2012). Based on the Day-Night task (Gerstadt et al., 1994), Silly Sounds asks children to point to a picture of a dog when they hear a “meow” sound and to point to a picture of a cat when they hear a “bark” sound. In this task, children have to resist the urge to match the picture of the animal with the canonical sound (bark = dog, meow = cat), which requires children to inhibit a prepotent response: correct responses demonstrate greater inhibitory control.

Attention/impulse control was measured using the Preschool Self-Regulation Assessment (PSRA) Attentive/Impulse Control subscale, long version (Smith-Donald et al., 2007). The PSRA is an observational tool to provide a global measure of children's social-emotional skills, including emotions, attention, and behavior throughout the interaction between the child and the assessor. In the Attentive/Impulse Control subscale (α = .94), the assessor scores the child on a 3-point scale (0 = "Never" and 3 = "Always) for how often they do each of the following positive behaviors: pays attention, is careful, sustains concentration, thinks, and plans before beginning each task, refrains from indiscriminately touching test materials, lets examiner finish before starting task, remains in seat appropriately during test, cooperates, and modulates, and regulates their own arousal level. The following negative behaviors are also assessed and reverse-coded when developing the final Attentive/Impulse Control score: struggles to wait between tasks, is defiant, is passively noncompliant, daydreams, is distracted by sights and sounds, shows intense, angry, irritable feelings and/or behavior, shows frequent feelings of anger or irritation, and is careless or destructive with test materials.

Child Social-emotional Outcomes. Child social-emotional outcomes were collected via teacher report in the spring of 2018 using the Teacher Observation of Classroom Adaptation Checklist (TOCA-C) Disruptive Behavior and Prosocial Behavior subscales (Koth et al., 2009). Teachers rated children's behaviors on a 6-point scale from "Almost never" to "Almost always." The Disruptive Behavior subscale includes nine items that capture children's disruptive or antisocial behaviors, including breaking rules, not getting along with others, harming others, getting angry when provoked, yelling at others, fighting, lying, harming property, and teasing classmates (α = .94). The Prosocial Behavior subscale consists of six items that capture children's adaptive social behaviors, including friendliness, obeying class rules, likability by classmates, showing empathy and compassion for others' feelings, and being rejected by classmates (reverse-coded; α = .88).

Covariates: Covariates were included to account for potential confounding of the relationship between teacher stressors and child outcomes. Such potential confounding variables include child-level variables, as well as teacher demographics and classroom variables.

Child Covariates. Child covariates included child age in months as of 9/15/2017, an indicator for the child's sex (1 = female), and indicators for whether the child is white (1 = white), black (1 = black), Hispanic (1 = Hispanic), with children who are another race in the omitted category. We also included lagged versions of each of the academic, self-regulatory, and social-emotional outcomes described above, so that the coefficients of interest represent spring skills net of where children started in the fall of the ECE year. All lagged child outcomes were drawn from the fall of 2017.

Teacher Covariates. Teacher demographic covariates included dummy variables for race/ethnicity and years of teaching experience. Due to small cell sizes within race categories, teacher race/ethnicity was collapsed into a single indicator of whether the teacher was white or nonwhite.

Classroom Covariates. We included measures of the percentage of children in the teacher's classroom who were dual-language learners (measured by whether their household primarily spoke a language other than English) and the percentage of children in the classroom with special needs. We also controlled for program type; because of the small number of charter schools and Educare centers, we combined the charter schools with TPS (as both are school-based) and the Educare classrooms with Head Start (as both Educare and Head Start are non-school based, center-based early interventions that serve low-income children only). Thus, our indicator for program type captures whether the teacher taught in a TPS or charter school (=1) versus a Head Start or Educare school.

Analytic Strategy

We implemented both simple descriptive as well as multivariate regression methods to address our research aims. To document stressors in our sample of ECE teachers serving low-income preschoolers across the major public ECE programs, we first computed descriptive statistics (Table 1). To assess associations between ECE teacher stressors and children's outcomes, we estimated multilevel regression models in which we predicted children's outcome scores from all teacher personal and economic stressors, controlling for child, teacher, and classroom covariates (Table 2). Alternative models, in which variables were added individually or as blocks of variables (just personal or economic stressors), did not produce substantively different results (results available upon request). Table 2 thus presents results from regression models in which all of the above predictors and covariates were included together. Coefficients in regression models were standardized to ease interpretation across outcomes and provide effect sizes.

All analyses were conducted using Stata version 16 (StataCorp, 2019). Little's missing completely at random (MCAR) test and covariate-dependent missingness (CDM) extension were conducted using the "mcartest" command (Li, 2013). Child-level data were determined to be missing completely at random. However, the MCAR test revealed patterns of missingness in the teacher level data. Post-hoc t-tests revealed that white teachers were more likely than nonwhite teachers to be missing data on the living wage ratio, and teachers in TPS or charter schools were more likely to be missing item-level data on depression, household chaos, living wage ratio, and food insecurity than Head Start or Educare teachers. One possible explanation for this is that Head Start and Educare centers had already been participating in the study for a year and thus, may have been more committed to responding. To address item-level nonresponse, data were multiply imputed. Multiple imputations in Stata 16 relied on the "ice" command to create 25 imputed data sets, and the "mim" command to combine estimates across imputed data sets.

Results

Sample Description

Table 1 displays descriptive statistics for all study variables, including means, standard deviations, and ranges for continuous items and percentages for categorical indicators. In the fall of their preschool year – that is, the fall of 2017 – children were on average 54 months (4.5 years) old. The sample of children was evenly divided by gender (51% female)

and racially diverse – 32% white, 26% black or African-American, 22% Hispanic/Latino, and 19% other race. Seventy-three percent of classrooms were in a TPS or charter schools and 27% were in CAP Head Start or Educare. In the average classroom, 34% of children were dual-language learners and 8% of children had learning disabilities. All of the lead teachers in our sample were female, and 82% of surveyed teachers were white. Teachers had an average of 13.7 years of teaching experience, and 76% had a BA or higher in ECE (all lead teachers had a BA degree).

Prevalence of Teacher Stressors

Teachers in our sample expressed high levels of personal stress. Specifically, 37% of teachers reported depression, as indicated by the CES-D screener. This figure is at the upper end of the range documented in prior studies, which have found between 25% and 50% of teachers to be depressed (De Schipper et al., 2009; Groeneveld et al., 2012; Hamre & Pianta, 2004; Jeon et al., 2014; Li-Grining et al., 2010; Whitaker et al., 2013). Further, 58% of the teachers in our sample reported having less than very good health, which is notably higher than the regional and national rates (31% and 32%, respectively; National Center for Health Statistics [NCHS], 2018). Teachers in our sample reported a low average level of household chaos (24 on a 15–60 point scale). Because we are the first to measure chaos and physical health among ECE teachers, no other data are available for comparison.

With regard to economic stressors, although the average ECE salary of the teachers in our sample was 1.5 times the living wage for Tulsa, Oklahoma and ranged from 27,000 USD to 57,000, USD 27% of teachers had a salary that was below the living wage. Indeed, many teachers experienced economic stress: 32% received at least one means-tested public benefit (that is, a public benefit whereby eligibility is determined based on low-income or poverty status), 26% worked another job in addition to their job as a lead ECE teacher, and 25% lived in households that reported at least some food insecurity (although just 3% were severely food insecure, which is the same percentage as reported among Head Start teachers in another study; Whitaker et al., 2015). To put this in context, national surveys of ECE providers (not limited to center-based preschool teachers) suggest that nearly 50% receive at least one means-tested public benefit (Whitebook et al., 2018), and one study of Head Start teachers in Pennsylvania found that approximately 10% reported receiving food stamps (Whitaker et al., 2015).

Associations between Teacher Stressors and Child Outcomes

Table 2 presents results from multilevel regression models predicting child academic, self-regulatory, and social-emotional outcomes from ECE teachers' personal and economic stressors.

With respect to personal stressors, coefficients were typically small and not always in expected directions. Unexpectedly, teachers who were depressed taught children who scored.01 SD higher on mathematical reasoning, although the magnitude of the association was near zero and statistical significance approached marginal levels ($SE = .01$, $p = .045$). Teacher depression was not associated with literacy, self-regulatory, or social-emotional outcomes. Children whose teachers reported more household chaos scored lower −on

mathematical reasoning, but again the magnitude of the association was quite small (β = −.01, *SE* = .005, *p* = .01). Household chaos was not associated with children's literacy, self-regulatory, or social-emotional outcomes. Teacher physical health was not predictive of any of our measures of academic, self-regulatory, or social-emotional outcomes.

Turning to teachers' economic stressors, teacher salary to living wage ratio was associated with a.15 SD increase in children's literacy scores (*SE* = .06, *p* = .02), holding all else constant. Additionally, teacher salary was associated with better attention/impulse control (β = .13, *SE* = .06, *p* = .045), with statistical significance approaching marginal levels. Salary did not predict mathematical reasoning, inhibitory control, or social-emotional skills. Although teacher household food insecurity was positively associated with children's disruptive behavior (β = .04, *SE* = .02, *p* = .01), it was unexpectedly also predictive of a.04 SD increase in children's literacy scores (*SE* = .01, *p* = .01). Household food insecurity did not predict children's mathematical reasoning, self-regulation, or prosocial behavior outcomes. Finally, teacher receipt of public benefits was associated with a.15 SD increase in attention/impulse control scores (*SE* = .07, *p* = .04), but did not predict any academic or social-emotional outcomes at conventional levels of statistical significance. Whether the teacher worked another job did not predict any child's academic, self-regulatory, or social-emotional outcomes.

Discussion

This study is the first to document a range of both personal and economic stressors likely to affect teachers' social and emotional wellbeing and to explore whether those stressors are associated with a comprehensive set of child outcomes. We do so in a sample of ECE teachers serving low-income children in a mixed-delivery system that includes the two major public ECE programs in the U.S.: Head Start and public pre-k.

The ECE teachers in our sample reported relatively high levels of stress. The fact that more than one-third of our sample reported depression is notable, and in line with prior studies of ECE teachers in high-poverty schools or Head Start programs (reported depression ranging from 25% to 50%; De Schipper et al., 2009; Groeneveld et al., 2012; Hamre & Pianta, 2004; Jeon et al., 2014; Li-Grining et al., 2010; Whitaker et al., 2013). Thus, the teachers in our sample fall in the mid-upper range of prior reports. This makes sense, given that all the teachers in our sample serve low-income children in high-poverty (Title I) schools or in early intervention programs targeted to low-income families.

Although the average teacher in our sample earned a salary that was 1.5 times the living wage in Tulsa, approximately one-third of sampled teachers received income-tested public benefits. This figure is lower than the 50% reported in a national sample of ECE providers (Whitebook et al., 2018). Additionally, in our sample, approximately one-quarter of ECE teachers reported being food insecure, and less than half reported being in very good or excellent health. Given the paucity of research using these additional measures of ECE teacher personal stressors, we do not have a comparison using other data; however, we note that such rates of food insecurity and poor quality health among full time, lead teachers are striking and worthy of attention, from a human rights perspective.

Despite the high prevalence of stressors in our sample, stressors were inconsistently related to child outcomes and the magnitude of the association – when there was one – was typically small. Specifically, teacher physical health and whether the teacher worked a second job were never associated with child outcomes. ECE teacher depression, household chaos, salary, household food insecurity, and public benefit receipt were related to child outcomes, yet effect sizes were mostly small (<.20) and associations sometimes ran in unexpected directions. Stressors that demonstrated associations in hypothesized directions included household chaos, which was negligibly associated with poorer mathematical reasoning scores; higher salary to living wage ratio, which was associated with better literacy and attention/impulse control; and food insecurity, which was linked with more disruptive behavior.

These findings are in accord with prior research, including research from the parenting literature. For instance, among parents, household chaos has been associated with lower warmth and harsher discipline (Coldwell et al., 2006), as well as compromised parent wellbeing (Deater-Deckard et al., 2012). Among ECE teachers, chaos has been found to interfere with teachers' emotion regulation and coping abilities (Jeon et al., 2016), which impacts the classrooms environment and thus children's experiences and outcomes (Jennings & Greenberg, 2009), including perhaps their development of math skills. With regard to the economic stressors of salary and food insecurity, prior studies have reported that teachers with low wages and who indicated their pay did not allow them to meet their basic financial needs relied on more negative emotions and behavior in their interactions with children relative to teachers with higher wages and who could meet their basic needs (King et al., 2016). Thus, it is not surprising in our study that teachers with higher salaries taught children who demonstrated better outcomes while those who experienced food insecurity taught children with more disruptive behavior.

In contrast to these negative associations, which are in line with our hypotheses, teacher depression and food insecurity predicted small advantages in literacy skills, and public benefit receipt was associated with better attention/impulse control. This constellation of findings suggests an uneven and complex portrait of linkages between ECE teacher stressors and outcomes for the children in their classrooms. Teacher depression was most often not related to child outcomes but the one instance in which it was, it positively predicted an academic outcome. This is especially surprising given prior evidence linking teacher depression to children's social-emotional outcomes. Notably, most prior studies finding associations between ECE teacher depression and child social-emotional outcomes (Roberts et al., 2016; Whitaker et al., 2015) have suffered from shared reporter variance in which both depression and child outcomes were measured with teacher reports. Evidence that teachers' stressors, such as depression, contributes to more unfavorable views of student behavior (Hindman & Bustamante, 2019; Raver et al., 2009) highlights the seriousness of this problem. Indeed, when prior studies have relied on parent-reported measures of social-emotional outcomes, associations with teacher stressors disappear altogether (Hindman & Bustamante, 2019). Thus, it is possible that prior work overstates the association between teacher depression and child social-emotional outcomes. We, however, did not even find associations between teacher depression and teacher-reported social-emotional outcomes.

Even more puzzling were the positive associations found between teacher depression (and teacher food insecurity) and children's math test scores. While we theorized that teacher stressors might have the smallest – or even null – association with children's academic development relative to other domains, we did not expect it to exhibit benefits. Unfortunately, there is no prior evidence to guide our interpretation of these findings, as the extant literature on preschool-age children has not included academic outcomes in studies assessing the association between ECE teacher stressors and children's outcomes. One purely speculative hypothesis relies on the possibility that the most highly skilled teachers bear a "burden of competence", such that they are asked to do more administratively (e.g., to serve as "master teachers" or instructional leaders) and put the most effort into their teaching, which yields both higher math scores among children but also contributes to elevated depressive symptoms, for instance. More generally, it is also possible that ECE teachers of low-income children are particularly motivated. Some teachers may find meaning and satisfaction in teaching vulnerable students despite low compensation and are therefore able to overcome stressors like food insecurity and depressive symptoms that might impinge on their teaching. Perhaps the most stressed teachers are those who are most dedicated to the craft, and who are thus willing to accept low wages and other stressors in order to do a job they love and find meaningful (Jennings, 2019; Minkel, 2016). If so, these most committed and passionate teachers may provide academically stimulating content, which could promote child academic outcomes, even in the face of high stress. Additionally, if instructional quality and content that supports academic skill development is largely scaffolded by the presence of a curriculum, perhaps teachers' own emotional states and stressors have less of an opportunity to impact instruction of academic content. Of course, these hypotheses are entirely speculative and are deserving of future study.

Finally, why would teacher public benefit receipt – an indicator of financial disadvantage – be positively associated with children's self-regulatory skills? Again, given the paucity of existing research here we rely largely on hypotheses that are ripe for future research. One possibility is that the teachers who have the organizational capacity and motivation to enroll in public benefits – a process that typically involves completing paperwork and providing documentation of income and work status – bring those same organizational and executional skills to bear in the classroom by providing more regulated, organized, and less chaotic classroom environments. Indeed, there is some limited evidence that among low-income individuals, it is the more skilled who pursue benefits for which they are eligible (Johnson et al., 2011).

Together, these results suggest that ECE teachers in Tulsa, for whatever reasons, were by and large not only able to shield the children in their classrooms from their own reported stressors but were able to provide sufficiently high-quality classroom instructional and self-regulatory environments as to support the development of math and attention/impulse control skills. Further research is needed to uncover the reasons teachers in our sample are able to prevent stressors from affecting their work. One possibility is that ECE teachers are able to draw on their own reflective capacities or self-regulatory skills to monitor and manage their stress while in the classroom (Magnuson & Schindler, 2019). There is some emerging evidence that ECE teachers with greater mindfulness have better teaching practices. An evaluation of a mindfulness program aimed at improving ECE

teacher emotional wellbeing reduced teacher distress and improved emotional support for students (Jennings et al., 2017). The teachers in our sample may also identify as part of a community, within their school, community, or profession, that provides social support to its members. Social support is well documented as an effective buffer against stress (Kalil et al., 2001; Lee et al., 2009; Simons et al., 1993). Additionally, Herman et al. (2018) study found that elementary school teachers who were stressed but had better coping strategies taught students who performed better on assessments of concentration, disruptive behavior, prosocial behavior, and math than teachers who were stressed but had low levels of coping. Perhaps the teachers in our sample have effective coping strategies that mitigate any negative effects of stressors of child outcomes. Such coping strategies could arise from a kind of "stress inoculation" (Boyce & Ellis, 2005), born from the knowledge of or selection into working with a population of disadvantaged students. Future studies will be needed to test whether self-regulatory capacity, motivation, social support, and even other factors that may be salient and specific to teachers in Tulsa and other southern states (e.g., religiosity, values) or to those who choose to work with disadvantaged populations significantly minimize the deleterious effects of stressors on ECE teachers.

It is also possible that there are indeed more negative associations between ECE teacher stressors on child development but we were unable to detect them in this sample. Nearly all of the children in our sample are low-income, attending means-tested early intervention programs like Head Start and Educare, or public pre-k classrooms in high-poverty schools. Low-income children are disproportionately exposed to stressors such as food insufficiency, maternal stress and depression, housing instability, and exposure to violence (Casey et al., 2001; Foster et al., 2007; McDaniel & Lowenstein, 2013; Ziol-Guest & McKenna, 2014). Perhaps ECE teacher stressors are of little consequence to children already exposed to chronic stress. This possibility is consistent with prior literature finding no association between ECE teacher stressors and child outcomes when samples are limited to low-income populations in Head Start or high-poverty schools (Neuenschwander et al., 2017; Zinsser et al., 2013).

There may also have been insufficient variation in the levels of stressors among our population of teachers, all of whom serve low-income students in the city of Tulsa, OK. This would be consistent with a prior study of Head Start teachers in which economic indicators were not statistically significantly related to teacher–child relationship quality (Whitaker et al., 2015). Replication of our analyses in other samples will be needed to assess the degree to which our weak associations between teacher stressors and child outcomes are generalizable.

Limitations and Future Directions

This study has several limitations that should be acknowledged and addressed in future studies. First and importantly, these results are correlational and do not support causal conclusions. While the inclusion of children's baseline skills is a powerful control that reduces the potential for bias in associations between teacher stressors and child outcomes, it nonetheless does not generate causal estimates. Additionally, results may not be generalizable to ECE teachers outside of Tulsa. TPS and CAP-Tulsa Head Start programs

– which are the bulk of the programs in our sample – pay their pre-k teachers on the same salary and benefit scales as elementary education teachers, and all lead teachers have BA degrees (Phillips et al., 2009). Higher education levels and higher pay may mean the teachers in our sample have more human capital and resources than their peers in other locations, which could offset associations between stressors and child outcomes.

Second, teacher stressor data were self-reported. Despite being anonymous, these data could still be subject to social desirability bias which could lead to underreports of sensitive data on topics like food insecurity, which could suppress true associations with child outcomes. However, the high rates of self-reported depressive symptoms suggest bias due to underreporting, at least for that measure, is unlikely. We are also limited in our ability to analyze the size of potential non-response bias. As mentioned earlier, we lack data on teachers who did not complete surveys, which prevents us from comparing teacher respondents to non-respondents. Therefore, the present study may not be generalizable to all ECE teachers in public and charter schools and Head Start and Educare centers, in Tulsa and elsewhere.

Additionally, the current study did not include assessments of the classroom processes and practices that may be most likely to transmit teacher stressors to child outcomes. Future studies should include such measures and test for mediation of the association between ECE teacher stressors and child developmental outcomes, even when main effects are small or insignificant (MacKinnon & Fairchild, 2009; MacKinnon et al., 2007). Based on the theory and evidence reviewed earlier, the most promising measures that may explain the sparse yet significant associations detected in the present study, and associations between ECE teacher stressors and child outcomes found in other studies, would be assessments of how teachers support children's social and emotional development and peer interactions, respond to children's negative emotions, and set and maintain order and predictability in the classroom. Direct assessments of ECE teachers' self-regulatory and other skills that may buffer children from their experiences of stressors would also shed light on the pathways – and protective factors – between teacher stressors and child outcomes. Qualitative interviews with ECE teachers to unpack strategies they use to overcome stressors and why they stay in a field with so many personal and economic stressors would also be fruitful directions for next-stage studies. Additionally, inclusion of measures of supports available to teachers, which may offset the negative effects of stressors on child outcomes, should be a priority for future research.

Finally, future studies should seek to explore longitudinal and cumulative effects of teacher stressors on the full range of children's outcomes examined here. It is possible that our study, which predicted children's spring pre-k outcomes from teacher stressor data collected earlier in that pre-k year, failed to capture delayed associations between stressors and outcomes. Indeed, by controlling for fall skills we are limiting our examination to just one academic year of exposure to the ECE teacher and classroom environment. Perhaps there are delayed or cumulative effects of teacher stress, such that negative associations between ECE teacher stressors and child outcomes emerge more consistently when stressed ECE teachers are followed by stressed kindergarten teachers. These questions are ripe for future inquiry.

Conclusion and Implications

Pending replication, our findings tentatively suggest that ECE teachers shoulder significant stressors but manage to keep them from impairing the development of the children they teach and care for on a daily basis. This does not imply that we should, as a community of researchers or as a society, be unconcerned with ECE teacher stress. Certainly, chronic personal and economic stressors take a toll and are likely to eventually impact the supply of qualified teachers, teacher classroom practices, and children's outcomes. Thus, it is a policy and practice priority to find effective ways to support these teachers, reduce their stress, and elevate their quality of life – to retain a healthy workforce and because at the very least, it is a human rights issue.

Indeed, there may be steps the field can take to provide more support to ECE teachers. Identifying what the teachers who most effectively buffer children from stress do in the classrooms and then sharing that information via teacher training and support networks is one option. Simultaneously, administrators can address and attempt to reduce teacher stressors directly by ensuring teachers get breaks across the day and the school year by building that time into the schedule and by managing class sizes so that teachers are not overwhelmed. Program administrators should also facilitate access to resources designed to improve mental and physical health, such as on-site mental health counseling, referrals to off-site practitioners, and health insurance coverage.

The most promising evidence-based approach to reducing teacher stress appears to be mindfulness training, which impacts teacher wellbeing and classroom practice (Jennings, 2019; Jennings et al., 2017). If increasing teachers' self-reflective and emotion regulation capacities through enhanced mindfulness can support their stress management, expanding the availability of these programs would be a worthwhile investment. In the meantime, we conclude that ECE teachers can appropriately be considered "everyday heroes" who strive to implement developmentally-enhancing classroom practices despite the stressors they experience.

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Table 1.

Descriptive statistics.

	Mean/%	SD	Min	Max	Possible range	*N*
Teacher personal stressors						
Depression score (CES-D)	8.79	5.97	0	27	0–30	106
Teacher exhibits elevated depressive symptoms (%)	36.79	48.45	0	100	0–100	106
Household chaos score	23.69	6.06	15	43	15–60	112
Teacher is in less than very good physical health (%)	58.41	49.51	0	100	0–100	113
Teacher economic stressors						
ECE salary to living wage ratio	1.48	0.6	0	3	-	101
ECE salary	38,404.27	6,020.73	27,000.00	57,000.00	-	102
ECE salary is below the living wage (%)	26.73	44.48	0	100	0–100	101
Household food insecurity score (continuous)	1.68	2.69	0	10	0–10	112
Household experiences any food insecurity (%)	25	43.5	0	100	0–100	112
Household is severely food insecure (%)	2.68	16.22	0	100	0–100	112
Public benefit receipt (%)	31.91	46.86	0	100	0–100	94
Teacher works another job (%)	25.66	43.87	0	100	0–100	113
Child outcomes						
Literacy	98.31	10.91	59	157	0–200	887
Mathematical reasoning	97.65	11.44	56	133	0–200	887
Inhibitory control	0.68	0.25	0	1	0–1	767
Attention/impulse control	44.76	7.99	4	51	0–51	879
Disruptive behavior	8.22	8.06	0	41	0–45	826
Prosocial behavior	23.37	5.21	0	30	0–30	826
Teacher covariates						
Race (%)						
Asian	1.79	13.3	0	100	0–100	112
Black or African-America	8.04	27.31	0	100	0–100	112
Hispanic or Latina	2.68	16.22	0	100	0–100	112
Multi-racial	0.89	9.45	0	100	0–100	112
White	82.14	38.47	0	100	0–100	112
Other	4.46	20.74	0	100	0–100	112
Years of experience as a teacher	13.71	10.75	1	45	-	113
Teacher has a BA or higher in ECE (%)	75.68	43.1	0	100	0–100	111
Child covariates						
Age at fall assessment window (in months)	54.26	3.65	47	68	-	899
Female (%)	50.72	50.02	0	100	0–100	899
Race (%)						
White	32.21	46.75	0	100	0–100	857
Black	25.9	43.84	0	100	0–100	857
Hispanic or Latino	22.4	41.72	0	100	0–100	857
Other	19.49	39.63	0	100	0–100	857
Lagged outcomes (from fall 2017)						

	Mean/%	SD	Min	Max	Possible range	*N*
Literacy	94.6	11.9	63	161	0–200	854
Math	95.08	12.78	58	134	0–200	854
Inhibitory control	0.57	0.27	0	1	0–1	672
Attention/impulse control	43.53	8.63	9	51	0–51	847
Disruptive behavior	8.87	7.67	0	44	0–45	829
Prosocial behavior	21.35	5.16	5	30	0–30	829
Classroom/program covariates						
Percent of children who are DLLs	34.05	24.03	0	100	0–100	113
Percent of children with learning disabilities	7.83	8.87	0	44	0–100	112
TPS/Charter school (%)	72.57	44.82	0	100	0–100	113

TPS = Tulsa Public Schools; DLL = dual-language learner

Table 2.

Multilevel regression models predicting child outcomes from ECE teachers' personal and economic stressors.

	Academic outcomes						Self-Regulation Outcomes						Social-emotional outcomes					
	Literacy			Mathematical Reasoning			Inhibitory Control			Attention/Impulse Control			Disruptive behavior			Prosocial behavior		
	β	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*	*β*	*SE*	*p*
Teacher personal stressors																		
Depression	−0.01	0.01	0.40	0.01	0.01	0.05	0.00	0.01	0.43	0.00	0.01	0.62	0.00	0.01	0.72	0.01	0.01	0.25
Household chaos	0.00	0.01	0.86	−0.01	0.00	0.01	−0.01	0.01	0.12	0.00	0.01	0.70	0.00	0.01	0.72	−0.01	0.01	0.31
Less than very good physical health	−0.07	0.07	0.31	0.04	0.06	0.53	−0.03	0.07	0.66	0.01	0.07	0.87	0.00	0.08	0.98	0.09	0.09	0.29
Teacher economic stressors																		
ECE salary	0.15	0.06	0.02	−0.02	0.05	0.74	−0.02	0.07	0.80	0.13	0.06	0.05	0.08	0.07	0.29	−0.06	0.08	0.44
Household food insecurity	0.04	0.01	0.01	0.01	0.01	0.50	0.00	0.02	0.86	0.00	0.01	0.74	0.04	0.02	0.01	−0.03	0.02	0.16
Public benefit receipt	−0.13	0.07	0.07	−0.10	0.06	0.10	0.12	0.07	0.09	0.15	0.07	0.04	0.02	0.08	0.77	−0.06	0.09	0.51
Teacher works another job	0.04	0.08	0.57	−0.02	0.06	0.69	−0.06	0.08	0.45	0.00	0.08	0.98	0.01	0.08	0.94	−0.10	0.09	0.30
Covariates																		
Lagged outcome	*0.05*	*0.00*	*0.00*	*0.05*	*0.00*	*0.00*	*1.04*	*0.10*	*0.00*	*0.05*	*0.00*	*0.00*	*0.10*	*0.00*	*0.00*	*0.13*	*0.01*	*0.00*
Teacher is white	*−0.03*	*0.09*	*0.72*	*−0.09*	*0.08*	*0.26*	*0.01*	*0.09*	*0.90*	*0.11*	*0.09*	*0.22*	*0.06*	*0.10*	*0.58*	*−0.09*	*0.11*	*0.43*
Years of experience as a teacher	*0.00*	*0.00*	*0.48*	*0.00*	*0.00*	*0.46*	*0.00*	*0.00*	*0.28*	*0.00*	*0.00*	*0.44*	*0.00*	*0.00*	*0.51*	*0.01*	*0.00*	*0.21*
Child age (in months)	*−0.04*	*0.01*	*0.00*	*−0.02*	*0.01*	*0.00*	*0.04*	*0.01*	*0.00*	*0.02*	*0.01*	*0.03*	*0.00*	*0.01*	*0.48*	*0.00*	*0.01*	*0.78*
Child is female	*0.04*	*0.04*	*0.33*	*0.02*	*0.05*	*0.59*	*0.09*	*0.06*	*0.14*	*0.23*	*0.06*	*0.00*	*−0.13*	*0.05*	*0.01*	*0.13*	*0.05*	*0.01*
Child is white	*0.00*	*0.06*	*0.99*	*0.03*	*0.06*	*0.62*	*−0.08*	*0.09*	*0.35*	*0.04*	*0.09*	*0.66*	*−0.10*	*0.07*	*0.16*	*0.15*	*0.07*	*0.03*
Child is black	*−0.02*	*0.07*	*0.80*	*−0.09*	*0.07*	*0.17*	*−0.18*	*0.10*	*0.07*	*−0.15*	*0.09*	*0.08*	*−0.03*	*0.07*	*0.64*	*0.01*	*0.08*	*0.91*
Child is Hispanic	*−0.06*	*0.07*	*0.42*	*−0.15*	*0.07*	*0.04*	*−0.07*	*0.10*	*0.50*	*0.05*	*0.09*	*0.59*	*−0.16*	*0.08*	*0.03*	*0.12*	*0.08*	*0.12*
Percent of children who are DLLs	*0.00*	*0.00*	*0.59*	*0.00*	*0.00*	*0.68*	*0.00*	*0.00*	*0.84*	*0.00*	*0.00*	*0.05*	*0.00*	*0.00*	*0.94*	*0.00*	*0.00*	*0.70*
Percent of children with learning disabilities	*0.00*	*0.00*	*0.25*	*0.00*	*0.00*	*0.93*	*0.00*	*0.00*	*0.87*	*0.00*	*0.00*	*0.55*	*0.00*	*0.00*	*0.25*	*−0.01*	*0.00*	*0.10*
TPS/Charter	*0.19*	*0.08*	*0.02*	*0.23*	*0.07*	*0.00*	*0.04*	*0.09*	*0.67*	*0.03*	*0.09*	*0.71*	*−0.01*	*0.09*	*0.96*	*−0.23*	*0.10*	*0.02*
Constant	*−3.49*	*0.45*	*0.00*	*−3.41*	*0.43*	*0.00*	*−2.70*	*0.52*	*0.00*	*−3.69*	*0.51*	*0.00*	*−0.71*	*0.41*	*0.08*	*−2.50*	*0.45*	*0.00*
Observations		*894*			*894*			*890*			*892*			*889*			*889*	

All classroom quality outcomes are standardized to have a mean of 0 and a standard deviation of 1.

TPS = Tulsa Public Schools; DLL = dual-language learner.