

# Predictors of First-Grade Teachers’ Teaching-Related Time During COVID-19

Anna D. Johnson   
Owen N. Schochet 

Georgetown University

Sherri Castle  
Diane Horm

University of Oklahoma–Tulsa

Deborah A. Phillips

Georgetown University

*Exposure to teachers and teaching-related activities is vital for young children’s learning. When COVID-19 closed schools, teachers responded with a mix of live- and prerecorded lessons and one-on-one communication with students, which necessitated shifts in planning time. The current study identifies pre-COVID predictors of time teachers devoted to each of these teaching-related activities to illuminate actionable levers for supporting educators during widespread educational disruption. Teachers with higher prepandemic job commitment devoted more overall time to pandemic-induced remote teaching. Teachers’ prepandemic executive functioning and observed classroom instructional and organizational quality—features of successful teachers during normal times—predicted more during-pandemic time remote teaching, while teacher older age and having more high-needs students was associated with less remote teaching time. These results contribute to an emerging literature that spotlights potential promising avenues for supporting teachers via professional development during normal times as well as in future widespread educational disruptions.*

Keywords: COVID-19, remote teaching, instructional time, low-income, teachers, elementary school

WHEN COVID-19 struck the United States in spring 2020, most school districts rapidly terminated face-to-face (F2F) instruction and moved all teaching online in what scholars are referring to as “emergency remote teaching” (Beattie et al., 2021). There is virtually no evidence on effective practices for online teaching in preschool through early elementary school (Darling-Hammond et al., 2020). With little guidance and no preparation time before initiating emergency remote teaching, most elementary teachers were given tremendous autonomy in how much time to spend on teaching and teaching-related activities, and in what format: for instance, live “synchronous” versus prerecorded instruction. A sudden pivot to emergency remote teaching likely required increased planning time to sustain effective instruction in this new context (Branch & Dousay, 2015). Simultaneously, many school districts and scholars urged teachers to prioritize maintaining connections with their students—especially for low-income and otherwise vulnerable populations of students, like English language learners (ELLs) and students with special learning needs (SNs) who may be particularly

challenging to engage remotely (Kraft et al., 2020; Kuhfeld et al., 2020; National P-3 Center, 2020). With such public calls for teachers to prioritize frequent and meaningful connection with students and families (Schwartz, 2020), an additional dimension of emergency remote teaching thus became regular communication with students and parents.

The overarching goal of the current study is to identify predictors of the time teachers devoted to these key teaching and teaching-related activities during the sudden pivot to remote instruction during the spring of 2020. It is critically important to build this body of literature with emerging data from the current pandemic because while COVID-19 is considered the most widespread educational disruption in recent memory (Collie, 2021), it is unlikely to be the last such event. To our knowledge, there exist no prepandemic empirical studies of the predictors or consequences of elementary school teachers’ remote teaching as online instructional models are limited for the youngest learners, highlighting the need for new research to examine teachers’ experiences during COVID-19. In addition, given the potential for



subsequent waves of COVID-19 over the next few months and years—and different disruptions in the future—it is important to identify factors that associate with teachers' capacities to devote time to teaching and teaching-related activities under emergency remote teaching conditions. Such information may also prove useful under nondisaster conditions, for instance, by providing insight into teachers' most natural adaptations and uptake of new modes of practice, which may inform future efforts to support teachers' increased blending of technology into the classroom and other less-traditional teaching approaches.

### *The Importance of Time Spent on Teaching and Teaching-Related Activities for Young Students*

Research suggests, especially for young learners in early elementary school, that the time teachers devote to teaching and related activities—like planning and communicating with students and families—is vital for student learning and well-being (e.g., Barnard, 2004; Clements & Sarama, 2008; Hamre & Pianta, 2005; Harn et al., 2008; Hoover-Dempsey et al., 2002). The importance of exposure to instruction, instructional time, and access to teachers is underscored by the large literature linking chronic student absenteeism to worse student outcomes; the negative effects of absenteeism on outcomes has been found to extend to the youngest students and is independent of family-level factors that predict attendance (e.g., Arbour et al., 2016). Lack of contact with teachers, who, second to parents are among the most consequential actors in young children's ecosystems, likely explains much of this negative effect.

During normal times, that is, in F2F school for early elementary students, teachers spend the greatest proportion of their work day delivering instruction on academic-related subjects (Roth et al., 2003), which drives student learning (see above). Effective teachers also devote substantial time to planning, which allows them to develop, test, and revise strategies; planning time has been positively linked to teacher efficacy and better student outcomes (Brobst et al., 2017). Additionally, the time teachers spend communicating with individual students and families is an important ingredient for student success; parent engagement, which relies on teachers (Hoover-Dempsey et al., 2002), has been associated with better student outcomes among young elementary school students (Barnard, 2004; Cheung & Pomerantz, 2011; El-Nokali et al., 2010).

The time teachers spend remote teaching is not a proxy for effectiveness. It is, however, an essential precondition for effectiveness and, as discussed above, matters for children's learning outcomes and affords opportunities for student-teacher interactions. These are *critical* in the COVID context, where educators and researchers have raised alarms about the potential negative impacts of sustained learning loss and social isolation on student well-being and future

academic success (Kuhfeld et al., 2020; Saladino et al., 2020). Understanding predictors of the time teachers devote to teaching and teaching-related activities during COVID-related school closures, both overall and according to activity—live (synchronous) and prerecorded lessons, the planning time required to produce those lessons, and contact with individual families and children—is an important first step in documenting how educators support students during this unprecedented time and may identify actionable items that can bolster positive child and educator outcomes in future disruptions.

### *Predictors of Time Teachers Spend on Teaching-Related Activities During COVID-19*

The design of the current study permits exploration of factors collected immediately before the COVID-induced move to emergency remote teaching—"pre-COVID factors"—that might predict teacher time allocation during emergency remote teaching. This design clarifies the directionality between predictors and teachers' time allocations, eliminating the possibility that COVID and related stressors influenced the predictors. We select a set of pre-COVID predictors that may associate with during-COVID teaching time because they capture (a) the teacher's available resources and demands that facilitate or interfere with time dedicated to teaching, which may generalize from F2F to a remote environment, and (b) observed classroom quality, which taps teachers' skills and effort, plausibly affecting time dedicated to remote teaching and teaching-related activities.

*Conceptual Foundations.* We conceptualize teachers' available resources and demands as expected to facilitate or exacerbate their ability to invest time in remote teaching and teaching-related activities, following the oft-cited job demands-resources (JD-R) model (Bakker & Demerouti, 2007). Recent applications of the JD-R model emphasize its relevance for predicting employee behavior and productivity (Bakker & Demerouti, 2018). We consider more time devoted to teaching and teaching-related activities during emergency remote teaching to be a positive work outcome for teachers during the pandemic. Thus, the resources and demands we consider are theoretically or empirically linked to teachers' capacities to devote more time to pandemic-induced emergency remote teaching and teaching-related activities.

A second set of predictors taps teacher effectiveness via measures of observed classroom quality. Given no existing empirical research defining effective full-time teaching of young elementary students via widespread remote platforms instead of F2F, we draw on a large body of evidence identifying effective teaching practices during normal F2F classroom-based learning (see Pianta & Hamre, 2009; M. Pressley

et al., 2003, for a detailed discussion of effective teaching practices). Insofar as assessments of teacher effectiveness reflect both commitment and skill, it is plausible—albeit untested—that such assessments of teachers' observed classroom quality during normal F2F teaching would correlate with the time teachers dedicate to teaching and related activities during emergency remote teaching. If confirmed, such a correlation could provide suggestive guidance to the field as to the most effective time allocations of teachers during remote teaching. Moreover, if observed teaching quality during normal times correlates with how teachers allocate time during remote emergency teaching, the positive impacts of efforts to improve teacher effectiveness during normal times might extend to teachers' behavior during disruptions that necessitate remote instruction.

*Teacher Resources and Demands.* Following JD-R theory (Bakker & Demerouti, 2007, 2018), the amount of time teachers can dedicate to teaching remotely is a function of the balance between their demands, or stressors, and their resources, or protective factors. Demands and resources can be physical, psychological, social, or organizational; this model has recently expanded to incorporate personal demands and resources (Yin et al., 2018).

*Demands.* The current study selects demands that the emerging literature suggests could influence elementary school teachers' time allocation during remote teaching. First, larger class size has been linked with worse classroom climate (Lee & Bierman, 2016) and poorer student academic and social outcomes (e.g., National Institute of Child Health and Human Development Early Child Care Research Network, 2004). ELL students and students with SNs typically require more one-on-one attention and support from their teachers (e.g., de Jong & Harper, 2005), and thus having a larger number would be more demanding of teacher time under normal circumstances, as well as during COVID (Kraft et al., 2020). We hypothesize that during emergency remote teaching, teachers with larger class sizes and those with more high-needs students would devote more time overall to remote teaching, driven by more time in live, synchronous instruction and communicating with individual students and families. We tentatively anticipate that teachers with more high-needs students would spend more time in live interaction with students via synchronous lessons and one-on-one communication because those are the modes that permit more targeted scaffolding and support.

*Resources.* Following prior literature, we highlight teachers' personal resources as well as social and organizational aspects of the job that could enable teachers to allocate more time to remote teaching and related tasks (Bakker & Demerouti, 2007).

With respect to personal resources, there is a growing body of research suggesting that personal resources such as self-efficacy and job-related self-esteem predict work engagement (Mauno et al., 2007; Xanthopoulou et al., 2009). Some limited research suggests that organizational-based self-esteem—an identified resource with implications for job performance—is strongly correlated with job satisfaction and commitment (Pierce & Gardner, 2004). Although we lack a direct measure of self-efficacy, our study did capture teachers' pre-COVID job commitment. In light of recent research linking personal resources at an earlier timepoint to later work engagement (Xanthopoulou et al., 2009), we conceptualize job commitment as a pre-COVID personal resource with implications for investing time in teaching and teaching-related activities during COVID-induced emergency remote teaching. Specifically, we hypothesize that teachers with higher pre-COVID job commitment will devote more overall time during COVID to teaching and teaching-related activities.

Prior research also points to teacher executive function (EF) as important for effective teaching (see Jennings & Greenberg, 2009). EF is a constellation of skills including an individual's ability to concentrate (concentration), pay attention (attention), and execute a particular task (task execution). These skills support essential duties of teaching such as planning, attention shifting, and decision making, and have been identified as key ingredients in both positive classroom climate and children's outcomes (Anderson et al., 2020; Friedman-Krauss et al., 2014). In the pandemic-induced pivot to online instruction, which came with little guidance and no time to prepare, we suspect that teachers with greater EF skills were better equipped to grapple with numerous new expectations in the absence of established routines and habits. We hypothesize that teachers with greater EF may have more intentionally and flexibly shifted their planned lessons online and thus that higher teacher EF will be associated with the allocation of teaching-related time to activities that require planning, such as the execution of live synchronous lessons, the design and prerecording of asynchronous (recorded) lessons, and time spent on planning for both.

We have more tentative hypotheses about the role of other personal resources such as teacher household income and age. Concerns about insufficient income and resources have been experimentally shown to inhibit cognitive functioning (Mani et al., 2013). It has been hypothesized that income poverty exerts a "cognitive load," taxing adults' mental abilities and interfering with well-being (e.g., Shah et al., 2012). Teachers with higher household incomes may have fewer worries and distractions as their basic needs are better met, allowing them to devote more time and attention to remote teaching. Older teachers may have more experience to draw on in the transition to remote instruction, recognizing the added planning and communication time

entailed, and thus may devote more time to online teaching. On the other hand, older teachers may be less familiar and comfortable with online teaching platforms and technology. For some, this may detract from the motivation entailed in adapting and dedicating time to online teaching; for others, it could motivate them to learn new skills. Therefore, while we hypothesize that teachers with higher incomes who have more “mental space” for planning ahead may devote more time to prerecording lessons and to planning, we do not offer a directional hypothesis regarding teacher age.

With respect to job-related social and organizational resources, research suggests that among young elementary school students, teacher perceptions of a positive school climate are modestly associated with growth in student learning (e.g., Banerjee et al., 2017) and in enhanced teacher job satisfaction (Dutta & Sahney, 2016). Thus, a positive school climate, in which teachers feel supported by the school administration and connected to colleagues, is conceptualized as a job resource (Domitrovich et al., 2019). We anticipate that teachers with more positive perceptions of school climate pre-COVID will devote more time to emergency remote teaching and teaching-related activities during COVID. Finally, we include a pre-COVID count of the number of teaching staff in the classroom in addition to the lead teacher as a job-related resource. Although it is unclear whether pre-COVID number of teaching staff and availability of specialist teachers translated into during-COVID supports, number of additional teaching staff pre-COVID may capture unobserved features of the classroom: for instance, especially strong teachers are often offered student teachers as interns and classes with students with special behavioral or learning needs are often provided specialists. Therefore, we include a count of the number of teaching staff in addition to the lead teacher as a pre-COVID job resource.

*Observed Classroom Quality.* A large extant literature identifies features of classrooms in the early elementary grades that promote learning and well-being for young students (e.g., Hamre & Pianta, 2005; Perry et al., 2007). These features surround the instructional, organizational, and emotional supports teachers provide for their students, and are operationalized as providing clear sequenced instruction using varied and appropriate language; supporting students’ development of concepts and problem-solving skills by scaffolding their thinking and engaging in questioning and feedback; setting norms and expectations for behavior; and engaging in sensitive and responsive interactions with students (Hamre & Pianta, 2005). Typically, these processes are measured using live observations of classroom teaching.

The most widely used observational measure of classroom teaching quality for children in the earliest grades is the Classroom Assessment Scoring System (CLASS), which has three subscales: instructional support (IS), emotional support (ES), and classroom organization (CO; Pianta et al.,

2008). The CLASS captures key dimensions of children’s classroom instruction and instructional-related experiences that are theoretically or (modestly) empirically linked to enhanced child learning and development (Burchinal, 2018; Pianta & Hamre, 2009; M. Pressley et al., 2003). As such, the CLASS is among the most—if not *the* most—commonly used observational assessment system for early education and elementary-grade classrooms both in research and by state and local government offices of early education (Bassok et al., 2021).

We hypothesize that high scores on the CLASS may signal especially strong and dedicated teachers; the same teachers who devote time and effort required to obtain high scores on the CLASS during F2F instruction (observed pre-COVID school closures) may also be those whose skill and commitment manifest in more time spent on remote teaching—particularly live, synchronous teaching which we assume to be the closest proxy for F2F teaching.

### *Current Study*

Given the unexpected nature of COVID-19—closing schools abruptly across the globe in what is being referred to as the most widespread disruption to education in living memory (Collie, 2021)—the goal of this study is to contribute to an emerging body of research on the pandemic’s impacts on students and teachers. Specifically, we seek to document previously unstudied pre-COVID predictors of teachers’ emergency remote teaching-related time allocations. This is important, given that COVID-19 and its variants continue to threaten a return to full in-person school and even when eradicated, this pandemic is unlikely to be the last disaster that unexpectedly disrupts education on a massive scale. Relying on well-developed conceptual and empirical foundations—namely, the job resources and demands model and an established observational measure of classroom quality, respectively—we pursue two research questions. First, we examine how pre-COVID job resources and demands and observed classroom quality predict the overall amount of time teachers spent engaged in teaching and teaching-related activities during COVID-induced emergency remote teaching. Second, we explore how the same pre-COVID job resources and demands and observed classroom quality variables predict distinct teaching and teaching-related activities during emergency remote teaching, controlling for total teaching time.

### **Method**

#### *Data Source, Participants, and Procedures*

Data come from the Tulsa SEED Study, which is an ongoing longitudinal study following a cohort of low-income children in the Tulsa, OK Public Schools (TPS) district from pre-K through fourth grade. Each year, grade-level TPS

teachers complete surveys about their experiences and well-being, and trained observers conduct live classroom observations to assess classroom quality. The present study uses data from the 2019 to 2020 academic year when study children were in first grade; thus, all focal teachers are first-grade teachers.

In January–March 2020, prior to the COVID outbreak, 129 first-grade teachers (out of 148 first-grade teachers in all of TPS, representing 87% of first-grade teachers in the district) completed annual surveys, 101 of whom were observed in their classrooms (teachers' written consent to participate was obtained at study enrollment). These surveys and classroom observations provide our “pre-COVID” measures of teachers' resources, demands, and observed classroom quality.

On March 16, 2020, TPS closed in-person instruction and all teachers transitioned to remote teaching. As in most school districts around the country forced to pivot overnight to emergency remote teaching, TPS' elementary school teachers were given wide flexibility in meeting the diverse needs of their students. TPS teachers were instructed to prioritize maintaining contact with families and students and to work to connect families with resources to meet various urgent needs experienced during the pandemic. Academically, teachers were directed to focus on sustaining the skills students had learned previously in the academic year and not to teach new material. Elementary school teachers were expected to provide 1 hour of academic content per day and were given flexibility in the mode of delivery. The district had not previously utilized a content management software for the elementary grade levels and was unable to provide much professional development to support implementation during the immediate aftermath of COVID onset. Instead, TPS allowed teachers to utilize a variety of approaches including Zoom calls, posting videos or other materials on Canvas, and emailing or otherwise contacting parents directly.

Between May and July 2020, 118 first-grade teachers completed surveys about their experiences during COVID; these surveys provide the “during COVID” measures of teachers' instructional time allocation during emergency remote teaching. Surveys (pre- and during-COVID) were administered via Qualtrics and teachers were offered a \$25 incentive to return a completed survey.

Of the 118 first-grade teachers who returned during-COVID surveys, 83 had both pre-COVID survey and classroom observation data; of these 83 teachers, 16 teachers were missing one or two pre-COVID survey items and five were missing three or more pre-COVID survey items. To retain maximum sample size, we imputed data for the 16 teachers missing only one or two pre-COVID survey variables but to be conservative in our imputation, we dropped the five teachers missing three or more variables. We imputed data using the *ice* (imputation by chained

equations) command in Stata 16 to impute 20 data sets (Azur et al., 2011; Graham et al., 2007) and the *mi estimate* command to combine estimates across imputed data sets, following Rubin's rules (Rubin, 1987). The final analytic sample thus includes 78 first-grade teachers located across 40 of TPS' 46 elementary schools; the majority of teachers were located in schools with only one or two classrooms represented; 90% of teachers were located in schools with one, two, or three classrooms represented. Only two schools had four teacher respondents. There were no statistically significant demographic differences between teachers included in the analytic sample and those for whom we had demographic data via the pre-COVID survey but who were missing pre-COVID classroom observation or during-COVID survey data and were thus dropped from analyses ( $N = 51$ ). All study protocols were approved by the University of Oklahoma Institutional Review Board.

### Measures

Descriptive statistics on all measures are displayed in Table 1.

*Teachers' Instructional Time Allocation During COVID.* Teachers reported total teaching time allocated each day to remote teaching across live synchronous instruction, prerecording instruction, planning for remote teaching, and responding to student and parent questions. Response options were: (1) “I did not do this activity”; (2) “at least once per week, but not daily”; (3) “0–0.5 hours”; (4) “0.5–1 hours”; (5) “1–2 hours”; (6) “2–4 hours”; and (7) “4–6 hours.” Categorical responses were transformed into continuous minutes by imputing a random value in the respondent's reported categorical range, a standard practice (see King, 2020). We examined the distribution of responses across categories; because the raw categories are not skewed, when we converted these categorical responses to continuous minutes, they retain their normality and have similar properties with most teachers reporting 1 to 2 hours of time spent across all teaching/teaching-related activities. Our measure of total teaching time reflects the sum of the total time spent on the four remote teaching activities.

*Pre-COVID Predictors of Teachers' Instructional Time Allocation.* All pre-COVID resources and demands were drawn from the annual pre-COVID teacher survey, administered in January to March 2020.

*Resources and demands.* Pre-COVID resources include teacher EF, captured using the six-item Webexec scale measuring concentration, attention, and task execution problems (Buchanan et al., 2010). Example items include “Do you find it difficult to keep your attention on a particular task?” and “Do you have difficulty seeing through something you

TABLE 1  
*Descriptive Statistics for Study Variables*

Variable	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max
During-COVID time allocations					
Daily time spent (min) . . .					
. . . on all teaching activities	78	421.40	195.69	125.27	964.01
. . . live remote teaching	78	76.27	66.90	0.00	299.81
. . . prerecording remote teaching	78	80.60	82.18	0.00	327.62
. . . planning for remote teaching	78	133.03	88.97	1.74	359.95
. . . responding to students/parents	78	132.57	93.76	2.06	358.61
Pre-COVID teacher resources					
Executive functioning	78	19.31	3.84	7.00	24.00
Job commitment	76	3.26	0.62	1.50	4.00
Positive school climate	77	18.45	3.74	9.00	24.00
Number of teaching staff	77	1.71	0.96	1.00	5.00
Monthly household income (\$)	71	5,475.17	2,460.71	2,300.00	12,500.00
Teacher age (years)	76	40.64	12.17	22.00	65.00
Pre-COVID teacher demands					
Number of students	78	21.10	2.90	15.00	30.00
% classroom ELL	76	0.37	0.25	0.00	1.00
% classroom with learning disabilities	77	0.07	0.07	0.00	0.29
Pre-COVID observed classroom quality					
CLASS instructional support	78	2.41	0.63	1.25	4.50
CLASS emotional support	78	5.62	0.67	3.81	6.94
CLASS classroom organization	78	5.59	0.75	3.58	6.92

*Note.* Cell entries are unimputed values. ELL = English language learner; CLASS = Classroom Assessment Scoring System.

have started?” Items were rated on a 4-point scale from *no problems* (1) to *many problems* (4), reverse-coded, and summed ( $\alpha = .89$ ) so that higher scores indicated greater EF. Pre-COVID job commitment was captured with two items (“I look forward to coming to work most days” and “I plan to return to TPS as a teacher next year”), rated on a 4-point scale from *strongly disagree* (1) to *strongly agree* (4), then averaged. Teacher perception of pre-COVID school climate was assessed with six items validated by Domitrovich et al. (2019) capturing the supportiveness of the principal, cooperation among staff members, and help with enforcing rules and teaching children with SNs (Domitrovich et al., 2019); sample items include “There is a great deal of cooperative effort among staff” and “Principal enforces school rules for conduct and backs me up when needed.” Teachers endorsed each item on a 4-point scale ranging from (1) *strongly disagree* to (4) *strongly agree*; items were summed ( $\alpha = .90$ ) with higher scores indicating a more positive school climate. Additional indicators of resources included the pre-COVID total number of teaching staff in the classroom, teachers’ monthly pretax household income, and teacher age in years.

Pre-COVID demands include teachers’ reports of the total number of students in their F2F classroom, the total number of ELLs, and the total number of students with SNs.

*Observed classroom quality.* Pre-COVID classroom quality was measured using the widely used and well-validated CLASS for K–third grade (Pianta et al., 2008). All CLASS observers for the current study were certified through a 2-day training with a certified trainer affiliated with the CLASS’ publisher, TeachStone, using TeachStone’s video training process which includes self-study of materials, discussion, and practice scoring. Observers became certified after coding five training videos and achieving scores within 1 point of the master codes, 80% of the time across all dimensions. Each classroom was observed once, live, over the course of 9 weeks between January and March 2020 (right before COVID-19 induced school closures on March 16, 2020).

Classroom observers assessed teacher–child interactions across four 15-minute cycles of observations. Three domains of teacher–child interaction quality were assessed on a 7-point rating scale (1 = *low* to 7 = *high*): IS, ES, and CO. Following standard practice, we constructed one score for each domain by averaging its component items. The IS subscale averages 14 items that comprise three dimensions: concept development, quality of feedback, and language modeling ( $\alpha = .90$ ). The ES subscale averages 16 items that comprise four dimensions: positive and negative emotional climates, teacher sensitivity, and teacher regard for student

perspectives ( $\alpha = .80$ ). The CO subscale averages 12 items that comprise three dimensions: behavior management, productivity, and instructional learning formats ( $\alpha = .78$ ).

### *Analytic Strategy*

All analyses were conducted using Stata version 16. To address nesting of teachers within schools, we used cluster robust standard errors, which is an acceptable approach to addressing multilevel data (see Huang, 2018). Given the relatively low number of clusters ( $<50$ ; Cameron & Miller, 2015), we implemented the *clubSandwich* package in Stata which provides both adjusted standard errors via the more appropriate CR2 estimator (Bell & McCaffrey, 2002; Imbens & Kolesar, 2013) as well as corrected (empirical) degrees of freedom (Tyszler et al., 2017).

Two sets of regression models were run, corresponding to the two research questions. The first regression model predicted total teaching and teaching-related activity time during COVID from the full set of pre-COVID resources, demands, and classroom quality variables. A second set of regression models predicted teachers' specific time allocations across teaching and teaching-related activities from the same full set of pre-COVID resources, demands, and classroom quality variables. Separate regression models were run for each specific teaching-related activity (live synchronous instruction, prerecording lessons, planning time, and communicating with children and families), controlling for total time. For ease of interpretation, all predictors were standardized but the outcomes—time spent in minutes—were not because they are intrinsically meaningful; these partially standardized coefficients can be interpreted as a one unit change in the predictor associating with change in time spent in minutes on the outcome. Given the small sample size and exploratory nature of the study, we report exact  $p$  values, and interpret findings that are significant at  $p < .10$ .

### **Results**

Bivariate associations among study variables are displayed in Table 2. There was little to no multicollinearity in the variables subsequently included in regression models, and none of the pre-COVID predictors were significantly associated with during-COVID measures of teacher time allocation. Rather, dimensions of teacher time allocation associated with each other only: time spent planning was positively and significantly associated with time spent on synchronous and prerecording lessons, and time spent prerecording lessons was positively and significantly associated with time spent synchronous remote teaching. Likewise, pre-COVID predictors only associated with each other: the three subscales of the CLASS observed classroom quality measure were all positively and significantly related. Teacher age was positively and significantly associated with teacher EF and

household income; teacher perceived positive school climate was positively and significantly associated with teacher job commitment and teacher job commitment was negatively and significantly associated with observed CLASS IS. Finally, having more students with SNs in the classrooms was significantly associated with lower teacher-reported positive school climate and lower household income.

Table 3 presents results of the first ordinary least squares regression model, which aimed to assess how the pre-COVID resources, demands, and observed classroom quality variables displayed in Tables 1 and 2 associated with during-COVID overall time spent on teaching and teaching-related activities. As Table 3 demonstrates, pre-COVID job commitment was the only significant predictor of the total time teachers devoted to remote teaching during COVID: specifically, 1  $SD$  more in job commitment associated with nearly an hour (58.98 minutes) more in total daily teaching time during COVID.

Table 4 presents results from the second set of ordinary least squares regression models which aimed to investigate how pre-COVID resources, demands, and observed classroom quality variables displayed associated with specific during-COVID remote teaching and teaching-related activities, net of total teaching time. The same set of pre-COVID predictors presented in Table 3 were used in models presented in Table 4. With respect to teachers' pre-COVID resources, teachers with higher EF spent more time prerecording lessons: 1  $SD$  more in teacher EF was linked with nearly 20 minutes more time spent prerecording lessons. A 1  $SD$  reduction in number of teacher staff predicted nearly 14 minutes less time spent planning for remote teaching. Having more ELL students and more students with SNs in the pre-COVID classrooms predicted approximately 18 and 16 fewer minutes spent on planning, respectively, while larger pre-COVID class size and more ELL students pre-COVID was associated with 17 and 18 minutes more time spent per day responding to students and parents, respectively. Finally, older teachers tended to spend more time communicating with students and parents than younger teachers but less time prerecording lessons: a 1  $SD$  increase in teacher age was linked with approximately 18 minutes more spent time communicating with students and parents, and 19 minutes less time spent prerecording lessons.

Turning to teachers' pre-COVID observed classroom quality, a 1  $SD$  higher pre-COVID CLASS IS score predicted nearly 22 minutes more time spent on synchronous (live) teaching. A 1  $SD$  higher pre-COVID CLASS CO score predicted 22 minutes more spent responding to students and parents.

### **Discussion**

The time teachers devote to teaching and the activities that support it, matter for children's learning. When COVID

TABLE 2  
*Bivariate Relationships Between Study Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
During-COVID teacher time allocations															
Daily time spent (min) . . .	—														
(1) . . . live remote teaching	0.33*	—													
(2) . . . prerecording remote teaching	0.31*	0.31*	—												
(3) . . . planning for remote teaching	-0.10	-0.25	0.11	—											
(4) . . . responding to students/parents															
Pre-COVID teacher resources															
(5) Executive functioning	-0.21	0.15	-0.11	-0.18	—										
(6) Job commitment	-0.08	0.21	0.21	-0.01	0.19	—									
(7) Positive school climate	-0.10	-0.07	0.05	-0.07	0.07	0.51**	—								
(8) Number of teaching staff	-0.08	0.08	-0.04	0.22	0.04	-0.01	0.10	—							
(9) Monthly household income	-0.16	-0.16	-0.14	-0.23	0.24	0.00	0.23	0.13	—						
(10) Teacher age	-0.16	-0.22	-0.02	-0.03	0.30*	0.13	0.18	0.02	0.35**	—					
Pre-COVID teacher demands															
(11) Number of students	-0.21	-0.09	-0.02	0.09	0.05	0.00	-0.10	0.20	-0.05	-0.23	—				
(12) % classroom ELL	0.01	-0.19	-0.21	0.24	0.14	0.10	0.04	0.14	0.09	0.01	0.12	—			
(13) % classroom with learning disabilities	0.07	0.21	-0.10	0.15	0.02	-0.12	-0.31*	0.06	-0.28*	0.01	-0.05	-0.07	—		
Pre-COVID observed classroom quality															
(14) CLASS instructional support	0.23	-0.01	-0.04	-0.22	0.08	-0.29*	-0.02	-0.11	0.15	0.16	-0.12	-0.06	-0.13	—	
(15) CLASS emotional support	-0.05	-0.10	-0.16	-0.09	0.12	-0.21	-0.16	-0.09	-0.03	-0.01	-0.05	0.06	-0.01	0.56**	—
(16) CLASS classroom organization	-0.04	-0.13	-0.07	0.03	0.13	-0.20	-0.08	-0.08	0.01	0.05	-0.08	0.13	-0.15	0.63**	0.78**

Note. Sample includes 78 classroom teachers. Cell entries are unimputed values. ELL = English language learner; CLASS = Classroom Assessment Scoring System.  
 \* $p < .05$ . \*\* $p < .01$ .



TABLE 3

*OLS Regression Predicting Teachers' Total Daily Teaching Time From Pre-COVID Resources, Demands, and Classroom Quality*

Variable	Daily time spent on all teaching activities		
	<i>b</i>	<i>SE</i>	<i>p</i>
Pre-COVID teacher resources			
Executive functioning	-39.83	25.97	.13
Job commitment	58.98	29.72	.05
Positive school climate	-15.62	31.78	.62
Number of teaching staff	15.37	26.47	.56
Monthly household income	-12.48	28.36	.66
Teacher age	-25.41	21.87	.25
Pre-COVID teacher demands			
Number of students	-11.34	17.97	.53
% classroom ELL	-4.41	27.98	.88
% classroom with learning disabilities	20.24	29.34	.49
Pre-COVID observed classroom quality			
CLASS instructional support	28.56	35.87	.43
CLASS emotional support	-39.91	37.82	.29
CLASS classroom organization	18.21	44.345	.68
Constant	421.84	22.40	.00
<i>N</i>	78		

*Note.* Daily time spent on all teaching activities is unstandardized and is in minutes. All model predictors are standardized to have a mean of 0 and a standard deviation of 1. Models estimated with CRSEs. Standard errors adjusted using CR2 estimator and empirical degrees of freedom. Multiple regression analyses conducted with imputed data. OLS = ordinary least squares; ELL = English language learner; CRSEs = cluster robust standard errors; CLASS = Classroom Assessment Scoring System.

abruptly closed most U.S. public schools in spring 2020, elementary school teachers—most of whom do not typically teach online—were forced to switch from F2F to remote instruction which dramatically altered burdens on teachers' teaching and related time. We sought to identify predictors of how teachers spent their teaching and teaching-related time during remote emergency instruction, in an effort to highlight features that correlate with a known good for young students: exposure to teachers and teaching-related activities. While our findings are exploratory, based on a small sample, and specific to Tulsa, they offer insights into predictors of teachers' capacities to devote time to teaching in a remote context which is useful for teacher preparation for future emergency remote teaching as well as for supporting teachers' increased blending of technology into the classroom under nondisaster conditions. Some of these predictors, like observed instructional quality which includes language modeling and concept development, and class size, are malleable and amenable to professional development or educational policy intervention. Others, like teacher age, are suggestive of specific targets for professional development support around enhancing technology literacy.

Teaching requires time, not just for instruction but also for planning and communicating with students and parents. Providing this time requires high levels of job commitment under normal circumstances, but even more so during a

pandemic which strained teachers' mental health and well-being (Collie, 2021; T. Pressley, 2021; Tulsa SEED Study Team, 2020). Our findings support this notion: teachers' self-reported job commitment predicted more overall time spent on remote teaching and teaching-related activities.

Once disaggregated by specific teaching-related activity, we found that the drivers of teachers' specific time allocations differed by their pre-COVID resources, demands, and observed teaching quality. The only significant predictor of more time spent on live synchronous teaching, which we assume to be the closest online approximation of F2F teaching of young students, was higher pre-COVID observed IS scores. In our data, a 1 standard deviation increase in IS yielded almost a quarter-hour more time spent on live remote teaching; for young children, who have limited attention spans, this is likely a meaningful amount of time. In general, teachers who score higher on IS are more skilled teachers who ask open-ended questions and are responsive to and expand on children's interests (Pianta et al., 2008); these teachers may be drawn to synchronous instruction where they can continue back-and-forth interactions with their students. If higher IS pre-COVID predicts more time spent on the closest proxy for F2F learning during emergency remote instruction, enhancing teachers' IS could be a promising target for preparing teachers for future remote teaching.

TABLE 4  
*OLS Regressions Predicting Teachers' Daily Teaching Time Allocations From Pre-COVID Resources, Demands, and Classroom Quality*

Variable	Daily time spent live remote teaching			Daily time spent prerecording remote teaching			Daily time spent for remote teaching			Daily time spent responding to students/parents		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Pre-COVID teacher resources												
Executive functioning	-5.80	4.92	.24	19.90	9.97	.05	0.29	7.21	.97	-10.57	10.03	.29
Job commitment	-3.27	9.41	.73	9.00	7.31	.22	5.95	11.06	.59	-12.95	13.51	.34
Positive school climate	0.27	7.50	.97	-7.71	11.26	.49	3.88	9.04	.67	7.23	11.90	.54
Number of teaching staff	-0.11	6.44	.99	4.34	8.04	.59	-13.93	7.05	.05	7.35	11.68	.53
Monthly household income	-0.30	7.17	.97	3.85	9.50	.69	2.99	7.89	.70	-9.23	9.84	.35
Teacher age	-9.16	6.07	.13	-19.00	9.76	.05	8.84	7.39	.23	18.23	10.66	.09
Pre-COVID teacher demands												
Number of students	-8.38	6.82	.22	-11.13	7.96	.16	0.64	6.24	.92	16.88	9.96	.09
% classroom ELL	8.37	7.79	.28	-5.73	9.36	.54	-17.95	6.50	.01	18.38	10.77	.09
% classroom with learning disabilities	2.59	8.23	.75	4.47	10.73	.68	-15.87	7.35	.03	8.48	11.07	.44
Pre-COVID observed classroom quality												
CLASS instructional support	21.79	8.53	.01	9.05	9.22	.33	-12.35	7.91	.12	-16.80	12.10	.17
CLASS emotional support	8.74	8.40	.30	6.88	11.65	.55	-9.70	13.49	.47	-3.67	18.00	.84
CLASS classroom organization	-15.15	10.30	.14	-20.42	15.64	.19	15.80	12.04	.19	22.16	11.67	.06
Daily time spent on all teaching activities	0.20	0.04	.00	0.24	0.04	.00	0.34	0.04	.00	0.23	0.05	.00
Constant	-7.92	14.67	.59	-19.47	16.70	.24	-11.87	16.61	.48	35.22	21.52	.10
<i>N</i>	78											

*Note.* Daily time spent on all teaching activities is unstandardized and is in minutes. All model predictors are standardized to have a mean of 0 and a standard deviation of 1. Models estimated with CRSEs. Standard errors adjusted using CR2 estimator and empirical degrees of freedom. Multiple regression analyses conducted with imputed data. OLS = ordinary least squares; ELL = English language learner; CRSEs = cluster robust standard errors; CLASS = Classroom Assessment Scoring System.

In our data, teachers who scored higher on observed CO, which reflects a focus on behavior management, student engagement in learning, and positive work habits, spent more time communicating with students and parents. This could reflect teachers' abilities to pivot and respond to the unique needs of students in their class who may be struggling with behavior and engagement challenges in an online learning environment. If teachers who are "tuned in" to student behavior and engagement during F2F learning maintain that emphasis and connection during remote teaching by attempting to communicate with and support families directly, shoring up teachers' classroom management and organization skills during normal times could be another way to prepare them for success during the next educational disruption that necessitates online learning.

Our results also suggest that there may be a tradeoff between time devoted to planning versus communicating with families. There are only so many hours in the day, perhaps especially during the pandemic when many teachers likely had their own caregiving responsibilities to juggle with teaching. In our data, teachers with more high-needs students—ELLs and students with SNs—spent less time planning but (in the case of ELLs) more time responding to student and parent questions. Perhaps more time communicating with families—a goal emphasized by the TPS district during COVID—reduced time available for planning. Another interpretation is simply that teachers increased the time they would typically spend in communication with families because they were leaning into the challenges of remote teaching by responding to the specific needs of their students. It is also possible that having more high-needs students reduced planning time because, in the absence of specialists working directly with students with special language and learning needs (TPS did not regularly provide specialist teachers during COVID-induced emergency remote learning), teachers simply weren't used to or equipped to plan activities for ELLs and students with SNs. Future research should ask teachers specifically about the role of specialists in supporting high-needs students during periods of emergency remote teaching.

Finally, teachers with better EF devoted more time to prerecording lessons. EF capacities enable adults to juggle multiple demands, plan, and respond flexibly (Barkley & Murphy, 2010). Prerecording videos likely requires each of these capacities. Given that adult EF is amenable to training (Mitchell et al., 2017), a promising pathway to supporting teacher EF and teachers' capacity to devote time to prerecording lessons—potentially useful both during in-school learning (e.g., with substitute teachers) and school closures—could be embedding teacher EF training into professional development. Alongside teachers with higher EF skills, younger teachers also invested more time in prerecording lessons, which may suggest more comfort with the technology needed to record and upload videos and other media. This too can be remedied with professional

development, and perhaps by pairing older with younger teachers for a "tech mentoring" relationship. Of course, all of this assumes that prerecorded instruction is effective for young learners. In light of the paucity of research on remote instruction for young children, this remains simply an assumption. It is entirely possible that prerecorded lessons require attentional capacities beyond what typical young children can marshal, especially without a live teacher on the other side of the screen. Live synchronous lessons may be favorable to prerecorded lessons if, for example, the former affords teachers with needed opportunities to monitor and increase student engagement, and to scaffold and support learning. This is especially important for children with SNs, behavior challenges, or who are simply too young to interact with asynchronous media without adult supervision. On the other hand, it could be that for young children, directed, uninterrupted content delivered in a prerecorded video may be a good substitute or supplement for live instruction, particularly for low-income students who may lack the dependable internet or device access needed to consistently attend synchronous instruction. Prerecorded lessons could also be especially supportive for children who are absent for long periods of time due to illness or other circumstances beyond their control, and as supplementary material for substitute teachers. Until there is more research on the effectiveness of prerecorded versus live synchronous versus F2F instruction for young students, these remain unanswered empirical questions worthy of future study.

### *Limitations*

While the current study contributes to a fast-emerging body of literature, it is important to emphasize the descriptive nature of the findings. Despite our inclusion of pre-COVID predictors of during-COVID experiences, which increases our confidence in the directionality of the findings, the results are nonetheless based on two cross-sections of data. Therefore, causality cannot be inferred. We are also limited by the measures available: as noted throughout, teacher time spent during emergency remote teaching on teaching-related activities is not analogous to teacher effectiveness or quality. While we and others reason that more time spent on teaching and teaching-related activities is likely promotive and protective for child learning during a pandemic where social and educational isolation is a major risk, there are no existing data on what constitutes effective or high-quality teaching in an emergency remote context for young children. Future studies should seek to capture more varied and nuanced features of teaching and teaching-related activities that are consequential for child learning, as well as the multitude of added stressors that likely constrained teachers' capacities to devote time to remote teaching. For instance, in this and other emerging data, scholars have documented high levels of during-pandemic teacher personal

and economic stress and depression (Collie, 2021; T. Pressley, 2021; Tulsa SEED Study Team, 2020) and many teachers were juggling multiple demands on their time during the pandemic; in our data, 46% of teachers reported that they were managing the distance learning of their own child or children at home while teaching. Future research should investigate the role of additional personal demands and resources in efforts to understand constraints on teachers' time to devote to during-pandemic remote teaching.

An additional limitation concerns our measure of teacher time allocation, which relies on teacher self-report and thus could be biased or inaccurate (although it is not clear in which direction). However, we note that the distribution of minutes spent across teaching activities is normally distributed in our sample. Finally, we recognize that our results are generalizable only to one school district; it will be important to continue gathering data through this and future educational disruptions in a wide and varied set of school districts across the country to better account for the full range of experiences and outcomes.

### Conclusion

Our findings suggest that observed classroom instructional and organizational quality and teacher EF—features of successful teachers during normal times—facilitates time spent on remote teaching, while teacher older age, larger class size, and having more high-needs students might be barriers that interfere with teachers' capacities to devote more time to remote teaching under emergency circumstances. During this unprecedented time of pandemic-induced remote teaching, our results suggest that teachers can be supported through professional development focused on teacher EF and enhanced instructional and organizational strategies, peer-to-peer mentoring focused on technology, and help from specialists and aides for large classes and classes with high proportions of ELLs and students with SNs.

In sum, strong teachers are strong teachers: teachers who are committed, strong on instructional quality, and who are organized are more likely to provide their students with more teaching and teaching-related experiences in an emergency remote teaching context. Efforts to build and support these attitudes and skills within the teaching profession will pay off during good times and bad times. The goal now is to ensure strong learning for children, whether in a classroom or via remote instruction, by identifying, supporting, and rewarding these teachers.


### Acknowledgments

This study was supported by grants from the Heising-Simons Foundation (Grant #s 2016-107 and 2017-329), the Foundation for Child Development (Grant #GU-03-2017), the Spencer Foundation (Grant #201800034), and the NIH/NICHD (Grant #1R01HD092324-01A1). Data collection was also supported by the George Kaiser

Family Foundation and the University Strategic Organization Initiative at the University of Oklahoma. All errors are the responsibility of the authors. We are deeply grateful to the Tulsa Public School district and teachers who participated in our study; it takes tremendous effort to do what they do in normal times and these data were collected during the COVID-19 pandemic. We salute them.

### ORCID iDs

Anna D. Johnson  <https://orcid.org/0000-0002-9832-6724>

Owen N. Schochet  <https://orcid.org/0000-0001-6712-2705>

### Open Practices

The data access and analysis files for this article can be found at <https://doi.org/10.3886/E155842V1>

### References

- Anderson, K. L., Weimer, M., & Fuhs, M. W. (2020). Teacher fidelity to conscious discipline and children's executive functioning skills. *Early Childhood Research Quarterly, 51*(2), 14–25. <https://doi.org/10.1016/j.ecresq.2019.08.003>
- Arbour, M., Yoshikawa, H., Willett, J., Weiland, C., Snow, C., Mendive, S., Barata, M. C., & Trevino, E. (2016). Experimental impacts of a preschool intervention in Chile on children's language outcomes: Moderation by student absenteeism. *Journal of Research on Educational Effectiveness, 9*(1), 117–149. <https://doi.org/10.1080/19345747.2015.1109013>
- Azur, M. J., Stuart, E. A., Frangakis, C., & Leaf, P. J. (2011). Multiple imputation by chained equations: What is it and how does it work. *International Journal of Methods in Psychiatric Research, 20*(1), 40–49. <https://doi.org/10.1002/mpr.329>
- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of Management Psychology, 22*(3), 309–328. <https://doi.org/10.1108/02683940710733115>
- Bakker, A. B., & Demerouti, E. (2018). Multiple levels in job demands-resources theory: Implications for employee well-being and performance. In E. Diener, S. Oishi, & L. Tay (Eds.), *Handbook of well-being*. DEF Publishers. <https://nobascholar.com/chapters/36/download.pdf>
- Banerjee, N., Stearns, E., Moller, S., & Mickelson, R. A. (2017). Teacher job satisfaction and student achievement: The roles of teacher professional community and teacher collaboration in schools. *American Journal of Education, 123*(2), 203–241. <https://doi.org/10.1086/689932>
- Barkley, R. A., & Murphy, K. R. (2010). Impairment in occupational functioning and adult ADHD: The predictive utility of executive functioning (EF) ratings versus EF tests. *Archives of Clinical Neuropsychology, 25*(3), 157–173. <https://doi.org/10.1093/arclin/acq014>
- Barnard, W. M. (2004). Parent involvement in elementary school and educational attainment. *Children and Youth Services Review, 26*(1), 39–62. <https://doi.org/10.1016/j.childyouth.2003.11.002>
- Bassok, D., Magouirk, P., & Markowitz, A. J. (2021). Systemwide quality improvement in early childhood education: Evidence from Louisiana. *AERA Open, 7*. <https://doi.org/10.1177/23328584211011610>
- Beattie, M., Wilson, C., & Hendry, G. (2021). Learning from lockdown: Examining Scottish primary teachers' experiences

- of emergency remote teaching. *British Journal of Educational Studies*. Advance online publication. <https://doi.org/10.1080/00071005.2021.1915958>
- Bell, R., & McCaffrey, D. (2002). Bias reduction in standard errors for linear regression with multi stage samples. *Survey Methodology*, 28(2), 169–182. <https://www150.statcan.gc.ca/n1/en/catalogue/12-001-X20020029058>
- Branch, R. M., & Dousay, T. A. (2015). *Survey of instructional design models*. Association for Educational Communications and Technology. <https://aect.org/docs/SurveyofInstructionalDesignModels.pdf?pdf=SurveyofInstructionalDesignModels>
- Brobst, J., Markworth, K., Tasker, T., & Ohana, C. (2017). Comparing the preparedness, content knowledge, and instructional quality of elementary science specialists and self-contained teachers. *Journal of Research in Science Teaching*, 54(10), 1302–1321. <https://doi.org/10.1002/tea.21406>
- Buchanan, T., Heffernan, T. M., Parrott, A. C., Ling, J., Rodgers, J., & Scholey, A. B. (2010). A short self-report measure of problems with executive function suitable for administration via the Internet. *Behavioral Research Methods*, 42(3), 709–714. [doi.org/10.3758/BRM.42.3.709](https://doi.org/10.3758/BRM.42.3.709)[doi.org/10.3758/BRM.42.3.709](https://doi.org/10.3758/BRM.42.3.709)
- Burchinal, M. (2018). Measuring early care and education quality. *Child Development Perspectives*, 12(1), 3–9. <https://doi.org/10.1111/cdep.12260>
- Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, 50(2), 317–372. <https://doi.org/10.3368/jhr.50.2.317>
- Cheung, C. S., & Pomerantz, E. M. (2011). Parents' involvement in children's learning in the United States and China: Implications for children's academic and emotional adjustment. *Child Development*, 82(3), 932–950. <https://doi.org/10.1111/j.1467-8624.2011.01582.x>
- Clements, D. H., & Sarama, J. (2008). Experimental evaluation of the effects of a research-based preschool mathematics curriculum. *American Educational Research Journal*, 45(2), 443–494. <https://doi.org/10.3102/0002831207312908>
- Collie, R. J. (2021). COVID-19 and teachers' somatic burden, stress, and emotional exhaustion: Examining the role of principal leadership and workplace buoyancy. *AERA Open*, 7. <https://doi.org/10.1177/2332858420986187>
- Darling-Hammond, L., Edgerton, A. K., Truong, N., & Cookson, P. W. (2020). *Restarting and reinventing school: Learning in the time of COVID and beyond*. Learning Policy Institute. [https://learningpolicyinstitute.org/sites/default/files/product-files/Restart\\_Reinvent\\_Schools\\_COVID\\_Priority2\\_Distance\\_Learning.pdf](https://learningpolicyinstitute.org/sites/default/files/product-files/Restart_Reinvent_Schools_COVID_Priority2_Distance_Learning.pdf)
- de Jong, E., & Harper, C. (2005). Preparing mainstream teachers for English-language learners: Is being a good teacher good enough? *Teacher Education Quarterly*, 32(2), 101–124. <http://www.jstor.org/stable/23478724>
- Domitrovich, C. E., Li, Y., Mathis, E. T., & Greenberg, M. T. (2019). Individual and organizational factors associated with teacher self-reported implementation of the PATHS curriculum. *Journal of School Psychology*, 76(October), 168–185. <https://doi.org/10.1016/j.jsp.2019.07.015>
- Dutta, V., & Sahney, S. (2016). School leadership and its impact on student achievement: The mediating role of school climate and teacher job satisfaction. *International Journal of Educational Management*, 30(6), 941–958. <https://doi.org/10.1108/IJEM-12-2014-0170>
- El-Nokali, N., Bachman, H. J., & Votruba-Drzal, E. (2010). Parent involvement and children's academic and social development in elementary school. *Child Development*, 81(3), 988–1005. <https://doi.org/10.1111/j.1467-8624.2010.01447.x>
- Friedman-Krauss, A. H., Raver, C. C., Neuspiel, J. M., & Kinsel, J. (2014). Child behavior problems, teacher executive functions, and teacher stress in Head Start classrooms. *Early Education and Development*, 25(5), 681–702. <https://doi.org/10.1080/10409289.2013.825190>
- Graham, J. W., Olchowski, A. E., & Gilreath, T. D. (2007). How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*, 8(3), 206–213. <https://doi.org/10.1007/s11121-007-0070-9>
- Hamre, B. K., & Pianta, R. C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development*, 76(5), 949–967. <https://doi.org/10.1111/j.1467-8624.2005.00889.x>
- Harn, B. A., Linan-Thompson, S., & Roberts, G. (2008). Intensifying instruction: Does additional instructional time make a difference for the most at-risk first graders? *Journal of Learning Disabilities*, 41(2), 115–125. <https://doi.org/10.1177/0022219407313586>
- Hoover-Dempsey, K. V., Walker, J. M., Jones, K. P., & Reed, R. P. (2002). Teachers Involving Parents (TIP): An in-service teacher education program for enhancing parental involvement. *Teaching and Teacher Education*, 18(7), 843–867. [https://doi.org/10.1016/S0742-051X\(02\)00047-1](https://doi.org/10.1016/S0742-051X(02)00047-1)
- Huang, F. (2018). Multilevel modeling myths. *School Psychology Quarterly*, 33(3), 492–499. <https://doi.org/10.1037/spq0000272>
- Imbens, G. W., & Kolesar, M. (2013). *Robust standard errors in small samples: Some practical advice*. National Bureau of Economic Research. <https://www.nber.org/papers/w18478>
- Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research*, 79(1), 491–525. <https://doi.org/10.3102/0034654308325693>
- King, M. M. (2020, September 3). *REDI for binned data: A random empirical distribution imputation method for estimating continuous incomes*. SocArXiv. <https://doi.org/10.31235/osf.io/eswm8>
- Kraft, M. A., Simon, N. S., & Lyon, M. A. (2020). *Sustaining a sense of success: The Protective role of teacher working conditions during the COVID-19 pandemic* (EdWorkingPaper: 20-279). Annenberg Institute at Brown University. <https://doi.org/10.26300/35nj-v890>
- Kuhfeld, M., Tarasawa, B., Johnson, A., Ruzek, E., & Lewis, K. (2020). *Learning during COVID-19: Initial findings on students' reading and math achievement and growth*. NWEA. <https://www.nwea.org/research/publication/learning-during-covid-19-initial-findings-on-students-reading-and-math-achievement-and-growth-2/>
- Lee, P., & Bierman, K. (2016). Profiles of kindergarten classroom and elementary school contexts: Associations with the first-grade outcomes of children transitioning from Head Start. *Elementary School Journal*, 117(1), 119–142. <https://doi.org/10.1086/687813>
- Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science*, 341(6149), 976–980. <https://doi.org/10.1126/science.1238041>

- Mauno, S., Kinnunen, U., & Ruokolainen, M. (2007). Job demands and resources as antecedents of work engagement: A longitudinal study. *Journal of Vocational Behavior, 70*(1), 149–171. <https://doi.org/10.1016/j.jvb.2006.09.002>
- Mitchell, J. T., McIntyre, E. M., English, J. S., Dennis, M. F., Beckham, J. C., & Kollins, S. H. (2017). A pilot trial of mindfulness meditation training for ADHD in adulthood: Impact on core symptoms, executive functioning, and emotion dysregulation. *Journal of Attention Disorders, 21*(13), 1105–1120. <https://doi.org/10.1177/1087054713513328>
- National Institute of Child Health and Human Development Early Child Care Research Network. (2004). Does class size in first grade relate to children's academic and social performance or observed classroom processes? *Developmental Psychology, 40*(5), 651–664. <https://doi.org/10.1037/0012-1649.40.5.651>
- National P-3 Center. (2020). "At-home" teaching and learning in PreK-3rd grade. Author. [https://nationalp-3center.org/wp-content/uploads/2020/03/PreK-3rd-At-Home\\_24Mar2020\\_FINAL.pdf](https://nationalp-3center.org/wp-content/uploads/2020/03/PreK-3rd-At-Home_24Mar2020_FINAL.pdf)
- Perry, K. E., Donohue, K. M., & Weinstein, R. S. (2007). Teaching practices and the promotion of achievement and adjustment in first grade. *Journal of School Psychology, 45*(3), 269–292. <https://doi.org/10.1016/j.jsp.2007.02.005>
- Pianta, R. C., & Hamre, B. K. (2009). Conceptualization, measurement, and improvement of classroom processes: Standardized observation can leverage capacity. *Educational Researcher, 38*(2), 109–119. <https://doi.org/10.3102/0013189X09332374>
- Pianta, R. C., LaParo, K. M., & Hamre, B. K. (2008). *Classroom assessment scoring system TM: Manual K-3*. Brookes.
- Pierce, J. L., & Gardner, D. G. (2004). Self-esteem within the work and organizational context: A review of the organization-based self-esteem literature. *Journal of Management, 30*(5), 591–622. <https://doi.org/10.1016/j.jm.2003.10.001>
- Pressley, M., Roehrig, A. D., Raphael, L. M., Dolezal, S. E., Bohn, C., Mohan, L., Reynolds, W. M., & Miller, G. E. (2003). Teaching processes in elementary and secondary education. In I. B. Weiner (Ed.), *Handbook of psychology: Vol. 7. Educational psychology*. Wiley. <https://doi.org/10.1002/0471264385.wei0708>
- Pressley, T. (2021). Factors contributing to teacher burnout during COVID-19. *Educational Researcher, 50*(5), 325–327. <https://doi.org/10.3102/0013189X211004138>
- Roth, J. L., Brooks-Gunn, J., Linver, M. R., & Hofferth, S. L. (2003). What happens during the school day? Time diaries from a national sample of elementary school teachers. *Teachers College Record, 105*(3), 317–343. <https://doi.org/10.1111/1467-9620.00242>
- Rubin, D. B. (1987). *Multiple imputation for non-response in surveys*. Wiley. <https://doi.org/10.1002/9780470316696>
- Saladino, V., Algeri, D., & Auriemma, V. (2020). The psychological and social impact of COVID-19: New perspectives of well-being. *Frontiers of Psychology, 11*, 577684. <https://doi.org/10.3389/fpsyg.2020.577684>
- Schwartz, S. (2020, August 5). Classroom routines must change: Here's what teaching looks like under COVID-19. *Education Week*. <https://www.edweek.org/teaching-learning/classroom-routines-must-change-heres-what-teaching-looks-like-under-covid-19/2020/08>
- Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science, 338*(6107), 682–685. <https://doi.org/10.1126/science.1222426>
- Tulsa SEED Study Team. (2020). *Parents, teachers, and distance learning during the COVID-19 pandemic: A snapshot from Tulsa, OK*. <https://medium.com/@TulsaSEED/parents-teachers-and-distance-learning-during-the-covid-19-pandemic-a-snapshot-from-tulsa-ok-5b5fdb54ea18>
- Tyszler, M., Pustejovsky, J. E., & Tipton, E. (2017). *REG\_SANDWICH: Stata module to computer cluster-robust (sandwich) variance estimators with small-sample corrections for linear regression* (Statistical Software Components S458352). Boston College Department of Economics. <https://ideas.repec.org/c/boc/bocode/s458352.html>
- Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior, 74*(3), 235–244. <https://doi.org/10.1016/j.jvb.2008.11.003>
- Yin, H., Huang, S., & Lv, L. (2018). A multilevel analysis of job characteristics, emotion regulation, and teacher well-being: A job demands-resources model. *Frontiers in Psychology, 9*, 2395. <https://doi.org/10.3389/fpsyg.2018.02395>

## Authors

ANNA D. JOHNSON is a Provost's Distinguished Associate Professor in the Department of Psychology at Georgetown University. Her research examines associations between public early education and intervention programs, and low-income children's academic, social, self-regulatory, and health outcomes from preschool into middle childhood. She leads the Tulsa SEED Study.

OWEN N. SCHOCHET received a PhD from the Department of Psychology at Georgetown University. He is a Human Services Researcher at Mathematica Policy Research where he studies the effects of early education policies and programs on the development of low-income children and the well-being of their parents and families.

SHERRI CASTLE is the assistant director of research at the Early Childhood Education Institute, University of Oklahoma, Tulsa. Her research evaluates impacts of public early education and intervention programs, including public pre-K and Head Start on low-income children's early learning, with a special focus on inputs to children's social-emotional and self-regulatory development.

DIANE HORM is the director of the Early Childhood Education Institute at the University of Oklahoma, Tulsa. She has decades of applied program evaluation research experience, focused on examining the efficacy of various early childhood programs or initiatives from child care to pre-K to Head Start.

DEBORAH A. PHILLIPS is a professor in the Department of Psychology at Georgetown University. She is one of the nation's leading child care policy researchers, with more than four decades of experience leading evaluations of early care and education program effects—including public preschool and early elementary school—on vulnerable children's learning and well-being.