



Chaos and commitment in the early childhood education classroom: Direct and indirect associations through teaching efficacy

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H I G H L I G H T S

- This study explored early childhood teachers' work environment and commitment.
- Teachers experiencing greater classroom chaos reported decreased commitment.
- Classroom chaos was associated with teachers' self-efficacy beliefs.
- Teachers' greater self-efficacy was associated with better professional commitment.

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Early childhood teachers demonstrate lower professional commitment and higher attrition, compared to kindergarten, and other elementary and secondary level teachers (Whitebook, Phillips, & Howes, 2014). The National Association for the Education of Young Children (National Association for the Education of Young Children, 2004) estimated that 30% of early childhood teachers leave their position every year, compared to 17% of elementary and secondary teachers and 11% in other occupations (Ingersoll, Merrill, & Stuckey, 2014). Teacher attrition, particularly at such high levels, leads to inexperienced staff and adversely affects the quality of child care provided for young children (Whitebook & Sakai, 2004). High teacher turnover interferes with the development of young children who require stable caregivers and caregiving environments at school (Hamre & Pianta, 2005) in order to develop secure attachment and relationships (Morrissey, 2009). Turnover also destabilizes the operation of child-care centers, demanding expenditures for recruitment and retraining, and overburdening the teachers who remain (Totenhagen et al., 2016; Whitebook & Sakai, 2004).

To understand factors that might impact teacher turnover, the current study explored predictors of early childhood teachers' professional commitment, which we define as a teacher's psychological bond to their profession and work as a teacher, including their job satisfaction and intentions to stay (Mowday, Steers, & Porter, 1979; Somech & Bogler, 2002). Lower professional commitment has been shown to predict actual turnover (Henke, Zahn, & Carroll, 2001; Manlove & Guzelli, 1997). Additionally, reduced teaching commitment, even when it does not lead to attrition, still negatively affects a teacher's performance at work, such as their effort and instructional quality, which adversely impacts the educational experience of their students (Day, Sammons, Gu, Kington, & Stobart, 2009; Kushman, 1992; Rosenholtz, 1989; Somech & Bogler, 2002).

Occupational factors specific to early care and education, including low pay and workplace instability, contribute to the high rates of turnover that exist among early childhood teachers (Wells, 2015; Whitebook & Sakai, 2004). Other aspects of the work environment, such as the organization of the work environment, also relate to diminished teachers' satisfaction and professional commitment (Johnson & Birkeland, 2003; Klassen & Chiu, 2011; Wells, 2015). In the current study, we examined an association between one aspect of teachers' work environment – teacher-perceived classroom chaos – and teachers' professional commitment in early care and education settings. In addition, we examined teachers' efficacy as a mediator of the association between teacher-perceived classroom chaos and professional commitment because teaching, as a more altruistically motivated profession (Watt & Richardson, 2007), is likely to be dependent upon these efficacy beliefs. Teachers may be unlikely to stay if they feel ineffective at accomplishing their altruistic goals of having a positive impact on their students. For example, Coladarci (1992) found that

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elementary teachers with diminished efficacy beliefs reported lower professional commitment.

Features of the school and classroom physical environment have been found to affect teachers' professional commitment and retention (e.g., Johnson, 2006; Ladd, 2011; Wells, 2015). Yet, there has been few investigations into the specific environmental condition of teacher-perceived classroom chaos. Additionally, few studies have examined the mechanisms or pathways linking these variables. An investigation of this pathway and its intervening mechanisms will enable the development of future interventions to intervene and promote teacher resilience against the harmful effects of environmental chaos.

1. Literature review

1.1. Teachers' professional commitment: Theoretical framework

A teacher's decision to stay in the classroom and their behavior within the classroom are strongly associated with their commitment to their job and the profession (Chesnut & Burley, 2015; Collie, Shapka, & Perry, 2011; Ladd, 2011). As described by Mowday et al. (1979), committed teachers identify with the values and goals of their organization, involve themselves in their work with extended effort, and express their loyalty to remain at the organization. Previous studies have shown that professional commitment, a psychological bond to the organization, is reflected in teachers' observable satisfaction and job and career retention (Canrinus, Helms-Lorenz, Beijgaard, Buitink, & Hofman, 2012; Porter, Steers, Mowday, & Boulian, 1974). In the current study, we define *professional commitment* as levels of teachers' job satisfaction and intentions to stay in their job and/or career. Job satisfaction is defined as the judgements, positive or negative, that teachers make when evaluating their work (Skaalvik & Skaalvik, 2011), which reflect teachers' assessments of the intrinsic and extrinsic rewards in concert with contextual factors. Job and career intentions reflect teachers' actual planned actions to remain at (or leave) their jobs and the teaching profession. Satisfaction and intentions have been shown to relate with teachers' actual turnover (Henke et al., 2001), but also relate with teachers' motivations to devote their time and energy to their current position (Watt & Richardson, 2008).

Teachers' experience and evaluation of workplace conditions contribute to teachers' bond with the organization and profession (Firestone & Pennell, 1993; Glisson, 2002). When teachers work in learning contexts that support their efforts and enable a feeling of success, they experience the psychic rewards of their work; these positive experiences strengthen their bond to their organization and towards the profession (Johnson & Birkeland, 2003; Rosenholtz, 1989). Among teachers, organizational factors have been found to be particularly salient (Johnson, Kraft, & Papay, 2012), although it is unclear whether this trend exists among early education teachers (Totenhagen et al., 2016; Yesil Dagli, 2012).

1.2. The role of teacher-perceived classroom chaos in professional commitment

A variety of factors contribute to teachers' professional commitment: teacher demographics, teacher qualifications, school organizational characteristics, school resources, and school student body characteristics (Borman & Dowling, 2008). Research has continually shown the importance of teacher-perceived contextual factors, particularly those related to their environmental climate, to teachers' career beliefs and professional decisions (Hanushek, Kain, & Rivkin, 2004; Johnson, 2006; Ladd, 2011; Loeb, Darling-Hammond, & Luczak, 2005; Mor Barak, Nissly, & Levin, 2001). For example, Mor Barak and colleagues, in a meta-analysis, reported

that teacher-perceived organizational climate (and less role overload) reduced early childhood teachers' turnover. In a more recent study of early childhood educators, Grant, Jeon, and Buettner (2018) also found that teacher-perceived working conditions predicted greater intentions to move to another job or leave the field of teaching and lower professional commitment. In a statewide survey of K-12 teachers in North Carolina, Ladd (2011) demonstrated that teacher-perceived working conditions, such as administration and facilities, accounted for most of the variation in turnover among teachers, and Borg and Riding (1991) identified teachers' perceptions of pupil misbehavior as the foremost predictor of stress, job commitment and job satisfaction using a sample of Maltese elementary teachers.

Teachers' perceptions of environmental factors, such as features of the classroom environment (where teachers spend most of their workday), can also influence their beliefs and experiences (Jeon, Buettner, & Grant, 2018). One such factor is *teacher-perceived classroom chaos*: a feature of environments "characterized by high levels of noise, crowding, and instability, as well as a lack of temporal and physical structuring (few regularities, routine, or rituals; nothing has its time or place)" (Wachs & Evans, 2010, p. 5). Studies of environmental chaos in the home environment have found that parent-perceived household chaos negatively affects parental wellbeing and children's development (Deater-Deckard, Chen, Wang, & Bell, 2012; Garrett-Peters, Mokrova, Vernon-Feagans, Willoughby, & Pan, 2016; Matheny, Wachs, Ludwig, & Phillips, 1995). Wachs, Gurkas, and Kontos (2004) adapted this construct of chaos and revised it to measure teacher-perceived environmental chaos in early childhood classrooms. The adapted scale, CHAOS-D, measures the student to teacher ratio, and teachers' perceptions of noise, space usage, crowding, traffic, and their control and organization (Wachs et al., 2004). We used this teacher perspective measure in the current study because an individual's perception of an event is often more predictive of its effect on their actions and physiological effect than the events themselves (Chang, 2013; Cohen, Kamarck, & Mermelstein, 1983). Cohen et al. (1983) found that a person's perceived amount of stress and their appraisal of actual experiences are more predictive of negative health outcomes than the experiences themselves. Similarly, measurement of teacher's perceptions of their environment could provide a clearer picture of their experience in their classroom.

Previous research found that teacher-perceived chaos in early care and education settings was associated with less compliant behavior from children (Wachs et al., 2004) and more negative responsiveness from teachers in early childhood classrooms (through impeding their effective coping strategies, Jeon, Hur, & Buettner, 2016). In the first grade classroom, decreased teacher-perceived classroom chaos, as reported by teachers, resulted in greater reading and math gains, particularly among boys (Ponitz, Rimm-Kaufman, & Brock, 2009). Although teacher-perceived chaos was found to be associated with student outcomes in early childhood education settings (Mashburn et al., 2008; Ponitz et al., 2009; Wachs et al., 2004), there is a lack of studies examining the relationship between teacher-perceived chaos and early childhood teacher outcomes, such as teachers' professional commitment.

Montgomery and Rupp (2005) underscored that "understanding and uncovering negative emotions related to external stressors is the first step towards a better performance, a higher degree of professional satisfaction, and, consequently, a higher level of teacher retention" (p.483). We identified classroom chaos as one of these teacher-perceived external stressors that would be significantly associated with teachers' professional commitment. Furthermore, our study was designed to explore the potential mediators on the associations between teacher-perceived classroom chaos and teachers' commitment to find ways to help

teachers deal with stress from chaotic environments and reduce turnover in early childhood teachers. We hypothesize that teacher-perceived classroom chaos will be indirectly associated with teachers' commitment through a decline in their job-related efficacy beliefs.

1.3. Teacher efficacy beliefs

Bandura (1977) defined *self-efficacy* beliefs as a person's situation-specific sense of self that a) enables their actions and b) affects their behavior. Bandura specified four experiential sources of self-efficacy expectations: mastery, vicarious, social, and physiological. Mastery experiences are the cumulative results of performance evaluated as successes or failures. For instance, a teacher who attempts to establish (and thus expects) order in their classroom but encounters chaos will experience this as a failure; when compounded over time, these experiences of failure eventually diminish their beliefs about their mastery of important teaching skills. Closely tied to these mastery experiences are the physiological sources of self-efficacy, describing a person's emotional arousal; a person's psychological and emotional state will affect their self-efficacy expectations beyond the effect of actual events and outcomes (Bandura, 1977). Excitement leads to increased self-efficacy beliefs, but anxiety and stress inhibit performance and are evidence of a lack of belief in one's ability to produce a desired outcome (Devos, Dupriez, & Paquay, 2012).

Teachers have efficacy beliefs restricted to their teaching outcomes, called *teacher efficacy beliefs*. For example, Gibson and Dembo (1984), in their dual-factor measure of teacher efficacy, recognize the difference between teachers' beliefs about their own teaching abilities, *personal teacher efficacy* (PTE), and their beliefs about their environment and the teacher profession as a whole, *general teacher efficacy* (GTE) construct. Researchers have also explored more context or situation-dependent self-efficacy beliefs, such as beliefs about particular subjects or the instructional versus management roles of teachers (Bandura, 1997; Tschannen-Moran & Hoy, 2001). Bandura (1997) described seven different sets of efficacy beliefs related to teachers' practice, including *disciplinary efficacy*: beliefs about their ability to establish classroom rules and procedures to manage children's challenging behaviors. This domain is most relatable across different classroom contexts and for early childhood teachers.

1.4. Chaos and teacher efficacy

We explored teachers' self-efficacy as a mediator of the association between classroom teacher-perceived classroom chaos and teachers' professional commitment because experiences characteristic of chaos, involving crowding, noise, and lack of structure, in teachers' environment may be associated with their professional commitment by first influencing early childhood teachers' self-beliefs. There is evidence in the parenting literature that parents experience higher levels of anxiety and stress when they are in more chaotic environments (Deater-Deckard et al., 2012). Additionally, there is evidence that students in chaotic environments experience lower self-efficacy and lower control over their emotions and behavior (Berger et al., 2017; Maxwell, 2010).

Likewise, teachers who perceive their classroom to be more chaotic may experience more negative moods, anxiety, and stress that may in turn relate to their self-efficacy beliefs about their job as a teacher. For example, Jeon et al. (2016) found that teacher-perceived classroom chaos in early childhood settings was significantly related with teachers' well-being: in particular, their ability to regulate their emotions and to cope with stressors. Teachers' well-being is closely tied to their self-efficacy beliefs (Kim & Kim,

2010) and helps to construct self-efficacy beliefs through the cognitive process of translating transitory events into symbols and memories that affect a person's behavior (Bandura, 1977). We, therefore, hypothesize that a chaotic, disordered, uncontrollable environment would likely be associated with decreased levels of teachers' GTE, PTE, and disciplinary efficacy. Although no studies have yet examined the relationship between classroom chaos and early childhood teachers' efficacy beliefs, Kim and Kim (2010) shows that early childhood teachers' perceived work environments strongly predicted their efficacy beliefs. In addition, among a sample of Norwegian teachers in the K-12 sphere, Skaalvik and Skaalvik (2010) found a relationship between teacher-perceived time pressure, one component of chaos, and teachers' self-efficacy beliefs, which in turn related to teachers' satisfaction and burnout. Potentially, when chaotic environments overburden the senses (Corapci & Wachs, 2002), teachers' appraisal of their own self-efficacy may be diminished.

Much of the research regarding teacher efficacy beliefs has focused on showing their positive relationship with student outcomes – teachers who believe in their abilities to teach and the ability of their students to learn inspire similar beliefs in their students, which leads to improved academic success (Caprara, Barbaranelli, Steca, & Malone, 2006). Studies of teachers' self-efficacy have yet to answer the question: how do teachers' efficacy beliefs relate to their attachment to their job early childhood education? Specifically, to what extent is a teacher's work environment associated with their beliefs about themselves and their teaching abilities, which in turn, is associated with their professional commitment?

Although there is a lack of studies that investigate the associations between chaos in the early childhood classroom and teaching efficacy, the parenting literature has investigated the pathway from parental perceptions of household chaos to parenting behavior for young children, looking at parental efficacy as a potential mediator (e.g., Corapci & Wachs, 2002). Parents' sense of diminished control in a chaotic environment, which makes them feel like the environment and events are beyond their control, may lead to their feelings of incompetence as parents. Corapci and Wachs (2002) found that increased perceived chaos, specifically noise, in the home was associated with parents reporting a lower sense of parenting efficacy.

Environmental chaos may be associated with individuals' beliefs and attitudes across various settings, but chaos might manifest differently in school settings. Chaos in school settings may additionally reflect teachers' training background or skills on how to manage and organize classrooms. When teachers perceive their classroom to be more chaotic, it might be due to the nature of the environment that teachers cannot modify (e.g., noise, space constraints, classroom set-up, group size, etc.), but it might also be due to teachers' classroom management skills. Regardless, it can lower their efficacy beliefs because early childhood teachers, who care for young children and experience environmental chaos, may experience psychological responses similar to parents and similarly form self-beliefs reflecting their perceived lack of control.

1.5. Teacher efficacy beliefs and their role in professional commitment

As a person's environment and experience are associated with their efficacy beliefs, these beliefs may in turn be associated with their well-being, actions, and behavior. Previous investigations of teacher behavior in the classroom has focused on how their teacher efficacy impacts their instructional choices, which directly influence student behavioral and academic outcomes (Bandura, 1997; Dicke et al., 2014; Pajares, 1992; Poulou, 2007; Tschannen-Moran,

Hoy, & Hoy, 1998; Woolfolk & Hoy, 1990). Teachers' self-efficacy beliefs also affect their own psychological and physical health. Lower self-efficacy beliefs in teachers have been shown to predict a wide range of health and behavioral outcomes, including worse physical and mental health (Wang, Hall, & Rahimi, 2015), burnout (Schwarzer & Hallum, 2008; Skaalvik & Skaalvik, 2007; Wudy & Jerusalem, 2011), and strain via stress (Betoret, 2009; Schwarzer & Hallum, 2008).

Teacher beliefs also directly affect their larger decision-making behavior about their jobs and careers (Coladarci, 1992). Teachers with lower efficacy beliefs believe themselves less capable of producing desired outcomes in the classroom and therefore feel less inclined to continue their work and report reduced commitment to stay in the classroom (Klassen & Chiu, 2011; Wang et al., 2015). Studies around the globe have documented, across grade levels, the association between teachers' diminishing beliefs in their ability to succeed and their reduced professional commitment (e.g., Riehl & Sipple, 1996, and Ware & Kitsantas, 2007 in the United States; Klassen et al., 2013 in Canada; Bogler & Somech, 2004 in Israel; and Chan, Lau, Nie, Lim, & Hogan, 2008 in Singapore). However, Klassen and Chiu (2011) called for further examination to clarify how the relationship between job stress, teacher efficacy, and professional commitment varies across grade levels. Their most intriguing results concerned kindergarten teachers (including the fact that they were least likely to quit) and suggested the promise of further inquiry into teachers of younger children. Previous studies on early childhood teachers' professional commitment (e.g., Whitebook & Sakai, 2004) did not investigate the role of teachers' self-efficacy beliefs in relation to their professional commitment or other environmental factors that are predictive of commitment.

1.6. The current study

Researchers have provided evidence for the relationship between environmental chaos and unhealthy child development (Berger et al., 2017; Evans & Wachs, 2010), teachers' responsiveness (Jeon et al., 2016), teachers' psychological well-being (Jeon et al., 2018) and less effective parenting (Dumas et al., 2005). No studies have yet explored how environmental chaos relates with early childhood teachers' turnover intentions. The construct and measure of environmental chaos has yet to be extensively employed to examine the order (or disorder) in the classroom setting, which could further explain the relationships between early childhood teachers' working environments and high attrition. Teacher-perceived occupational environments have been linked to many psychological effects in teachers, including efficacy beliefs (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Dicke et al., 2014). However, many researchers (Klassen & Chiu, 2011; Skaalvik & Skaalvik, 2007; Wang et al., 2015) have suggested further exploration is needed of the role teacher efficacy beliefs play in teachers' commitment. If teacher efficacy beliefs mediate the relationship between classroom environments and early childhood teachers' perceptions of their jobs and career decisions, then interventions to develop and retain teachers may target their malleable self-efficacy beliefs.

The aims of the current study are to explore the associations between teacher-perceived classroom chaos and professional commitment, and to explore the potential mediating role of self-efficacy on these associations. First, we hypothesized that greater teacher-perceived classroom chaos would be directly associated with lower levels of teachers' professional commitment. Next, we explored the indirect associations between teacher-perceived classroom chaos and teachers' professional commitment via teachers' teaching efficacy beliefs. We hypothesized that a higher degree of teacher-perceived classroom chaos would be associated

with lower beliefs in their abilities, their job, and the profession, which in turn would be associated with lower commitment to their job and career in early childhood education.

2. Methods

2.1. Participants

This study examined a sample of 1129 pre-school teachers, working in child-care centers or public pre-K programs across the United States. Table 1 shows the descriptive statistics of the sample – nearly all teachers were female (97.21%), in the lead teacher role (93.01%), and identified as White, non-Hispanic (84.86%). The average years of experience was over 15 but the median teacher had been working as an ECE teacher for 8 years. Over half (66.73%) of the sample attained at least a bachelor's degree. Of the programs where teachers worked, a third (31.1%) were non-profit and 10.3% were Head Start centers. Our sample statistics largely confirm those of the National Survey of Early Care and Education (NAEYC), 2013, although our sample had higher median experience (14 instead of 10 years) and higher education (80% college-educated instead of 53%).

2.2. Procedures

We used the data from the Survey of Early Childhood Educators: US project (Buettner, Jeon, Hur, & Garcia, 2016) that was collected in 2014, after obtaining university Institutional Review Board approval. Early care and education programs were selected for participation from a pool including all 50 states and the District of Columbia, using the mailing list service Market Data Retrieval (MDR). The MDR was used due to the lack of national and state level data available regarding child-care centers and early childhood education programs. The MDR has also been used by previous studies for similar national sampling (e.g., Pianta, Cox, Taylor, & Early, 1999; Rous, Hallam, McCormick, & Cox, 2010) and is updated annually. We requested a stratified random sampling according

Table 1
Sample descriptive statistics.

Variables	n	Mean/%	SD
Child Behavior (<i>out of 4</i>)	1119	1.35	0.71
<i>Teacher demographics</i>			
Age (<i>years</i>)	1052	44.6	12.44
Gender (<i>1 = female</i>)	1110	97.21%	–
Race/Ethnicity	1083		
White, non-Hispanic		84.86%	–
Black, non-Hispanic		7.76%	–
Hispanic		1.94%	–
Other race		5.45%	–
Marital status (<i>1 = single</i>)	1101	25.34%	–
<i>Teacher –Job Status & Training</i>			
Salary (<i>thousand \$</i>)	1085	27.5*	12.7
Lead Teacher (<i>1 = lead</i>)	1102	93.01%	–
ECE Experience (<i>years</i>)	1114	15.56	9.62
PD Participation	1071	91.41%	–
Licensed	1071	49.58%	–
<i>Educational attainment</i>			
Less than an Associate degree		20.02%	–
Having at least an Associate degree		13.26%	–
Having at least a Bachelor's degree		66.73%	–
<i>Program characteristic</i>			
Accredited	1004	31.1%	–
Non-Profit	1077	31.1%	–
Head Start status	1101	10.3%	–

Note. SD = Standard Deviation; ECE = Early childhood education; PD = Professional Development; figures with an asterisk are the median figure (of a categorical variable).

to child-care type (day care center and public pre-K program) and geographic region (nine regions of the USA as defined by the US Census Bureau: New England, Middle Atlantic, East North Central, West North Central, South Atlantic, East South Central, West South Central, Mountain, and Pacific), which produced 18 strata in total. Sampling was done to match the proportion of child-care type in each region (i.e. 70% from day care centers and 30% from public pre-K programs). After the list of child-care programs by the 18 strata was provided, we confirmed that the sample randomly selected by the MDR proportionally matched our suggested proportions for each stratum.

A survey packet was mailed to the director at each of the 7500 child-care programs identified in the stratified random sample. This packet included a letter to the director regarding the research project and a sealed teacher packet. To ensure random sampling of teachers at the centers, directors were asked to give the teacher packet to the teacher (serving pre-school aged children, i.e. three-to five-year olds) whose birthday was closest to the receipt date. The teacher packet consisted of a stamped and addressed return envelope, \$1 bill incentive and the questionnaire. The questionnaire asked teachers about various aspects of their workplace and their own social emotional health. Three weeks after the sending of the original packets, reminder postcards were also sent to directors.

The final sample consisted of 1129 teachers (a 16% response rate) each from a unique child-care center. A total of 455 packets (6% of those mailed out) were returned either as undeliverable or because that center had no pre-school aged classrooms. There was no statistically significant difference in any strata between the proportion of packets mailed and those received by the research team, comprising the final sample.

2.3. Measures

2.3.1. Teacher-perceived classroom chaos

To measure teachers' perceptions of environmental chaos within a child-care classroom, we used the child-care classroom version of the Confusion, Hubbub, and Order Scale (CHAOS-D, Wachs et al., 2004). This is an adaptation of Matheny et al.'s (1995) original CHAOS scale, which was designed to measure the home environment and has been widely used in child and parenting studies (Coldwell, Pike, & Dunn, 2006; Evans, Gonnella, Marcynyszyn, Gentile, & Salpekar, 2005). The CHAOS-D consists of 16 items asking teachers about their perceptions of the various chaotic elements in their classroom (crowding, noise, high traffic, and the degree of control and organization of space and time; e.g., "There are too many children in our classroom given the amount of space we have."). We adapted the binary true-false format into a 5-point scale (ranging from 1 = *Definitely untrue*, 5 = *Definitely true*), which has been validated in the parenting literature (e.g., Coldwell et al., 2006). For our analysis, we calculated the mean of 16 items; in the current sample, reliability (Cronbach's alpha) was 0.81. According to Wachs et al. (2004), the test-retest reliability of the CHAOS-D scale was 0.87; this scale has also significantly predicted observed global child-care quality.

2.3.2. Teacher Self-efficacy

We utilized three teacher efficacy subscales to capture various aspects of teachers' self-efficacy beliefs in regards to their role as a teacher: general teaching efficacy (GTE), personal teaching efficacy (PTE), and disciplinary teaching efficacy. First, we asked teachers to respond to 9 items that were adapted for early childhood teachers from the Gibson and Dembo's (1984) Teacher Efficacy Scale. These questions ask teachers about their beliefs regarding GTE (5 items measuring teachers' ability to affect student outcomes; e.g., "The amount a child can learn is primarily related to family

background.") and their own PTE (4 items measuring their own ability to affect student outcomes, e.g., "If I try hard, I can get through to even the most difficult or unmotivated children.") using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). The reliability in the current sample was .75 for the GTE subscale and 0.72 for the PTE subscale. This scale has been widely used to predict student and teacher outcomes (e.g. Hoy & Spero, 2005; Nir & Kranot, 2006; Somech & Drach-Zahavy, 2000).

Second, teachers responded on three items measuring disciplinary self-efficacy from the Teacher Self-efficacy Scale (Bandura, 1997) using a 5-point scale (1 = *not at all like me*; 5 = *a lot like me*). Bandura's (1997) scale measures several domains of teaching (differentiating between types of activities or subject matter) based on the principle that self-efficacy is context and task-specific. We used only the disciplinary self-efficacy subscale as it was most applicable to the early childhood education setting. The sample item includes "I can get children to follow classroom rules," and the reliability was 0.84.

2.3.3. Professional commitment

Teachers' professional commitment was measured by six items that focused on their commitment to their job (or program) and career, incorporating their career intentions and job and career satisfaction. The first part of this measure uses four items that were adapted from the Schools and Staffing Survey (SASS, National Center for Educational Statistics, 2005). These items ask teachers to rate their commitment, including their intention to stay in their current career, work place and position (e.g. would they choose to become an early-childhood teacher if they could choose again). Teachers responded on a 5-point scale (1 = *Strongly disagree* to 5 = *Strongly agree*). The second part of the measure asks teachers to rate, on a 7-point scale (1 = *Strongly disagree* to 7 = *Strongly agree*), their job satisfaction with their careers as an early childhood teacher and also with their current position. From an exploratory factor analysis and a confirmatory factor analysis using the random split-half samples, Buettner et al. (2016) confirmed that the six observed items loaded on a single factor, labeled as professional commitment ($\alpha = 0.82$ in the full sample). We included this latent variable representing teachers' professional commitment in our hypothesized model as a dependent variable.

2.3.4. Covariates

We included a set of covariates in the model that have been found to influence teachers' commitment: child behaviors, teachers' demographics, teachers' job status and training, and program characteristics (Chan et al., 2008; Collie et al., 2011; Totenhagen et al., 2016). *Child behaviors* was measured by teachers' report of how many children in their class exhibited seven different problem behaviors (from Rimm-Kaufman, Pianta, & Cox, 2000; e.g., "Difficulty working as part of a group"). Teachers reported on a 5-point scale (0 = *none*, 4 = *more than 1/2 of the class*). We used the mean of the eight items ($\alpha = 0.89$). We also controlled for the number of children who have or could qualify for an Individualized Education Program (IEP) or an Individualized Family Service Plan (IFSP) in the classroom. Teachers' *demographics* included their age in years, gender (dummy coded, 1 = *female*), race and ethnicity (dummy coded 'White, non-Hispanic' as a reference category, 'Black, non-Hispanic,' 'Hispanic,' and 'Other race'), and marital status (dummy coded, 1 = *single*). Teachers' *job status and training* was measured by their salary using 11 categories (1 = *\$5000 or less*, 11 = *\$75,001 or more*), status as lead teacher (dummy coded, 1 = *lead*), participation in professional development (PD) in the previous school year (dummy coded, 1 = *participated*), possession of an early childhood education license (dummy coded, 1 = *licensed*), and educational attainment (dummy coded 'less than an associate degree' as a

reference category, 'having an associate degree,' and 'having a bachelor's degree') and teaching experience years in an early childhood education field. Additionally, we controlled for *program characteristics*, including accreditation, non-profit status and Head Start status (all dummy coded as 1=yes); and program size (1=1–30 children enrolled in the program; 4=more than 94 children enrolled in the program).

2.4. Data analyses plan

We simultaneously tested the direct and indirect associations between teacher-perceived chaos and teachers' professional commitment through three teaching efficacy mediators using structural equation modeling in STATA 14.0 (*sem* command). Specifically, we estimated the following coefficients: (a) a direct association between teacher-perceived classroom chaos and a latent variable representing teachers' professional commitment after controlling for covariates; (b) associations between teacher-perceived classroom chaos and teaching efficacy variables; (c) associations between teaching efficacy variables and teachers' professional commitment; and (d) indirect associations between teacher-perceived classroom chaos and professional commitment through teaching efficacy variables. Following Hayes (2009) and MacKinnon's (2008) procedure, the indirect coefficients were generated by (b) path \times (c) path using 5000 bootstrap samples. Missing data was handled by full information maximum likelihood (FIML) estimation in order to preserve all available data (Arbuckle, 1996). We utilized multiple goodness of fit indices: (1) chi-square statistics (χ^2); (2) a comparative fit index (CFI) of 0.90 or higher (Hu & Bentler, 1999); and (3) the root-mean-square error of approximation (RMSEA) less than 0.06 indicating adequate fit or less than 0.05 indicating close fit (Browne & Cudeck, 1993).

3. Results

3.1. Descriptive statistics and correlations

Table 2 provides descriptive statistics and bivariate correlations between key variables: teacher-perceived classroom chaos, three teacher efficacy mediators, and each of the observed variables that consist of a professional commitment latent variable. There were negative correlations between teacher-perceived classroom chaos and the efficacy and commitment variables (correlation coefficients ranged from -0.39 to -0.28 for efficacy variables and from -0.28 to -0.15 for commitment variables), the strongest relationship being with disciplinary efficacy ($r = -0.39, p < .001$). The largest positive correlation was between personal efficacy and disciplinary efficacy ($r = 0.45, p < .001$).

Table 2
Descriptive statistics and bivariate correlations between key variables.

	1	2	3	4	5
1. Classroom Chaos ^a	1				
2. Personal Efficacy ^a	-.34***	1			
3. General Efficacy ^a	-.09**	.29***	1		
4. Disciplinary Efficacy ^a	-.39***	.45***	.16***	1	
5. Professional Commitment ^a	-.22***	.15***	.07*	.13***	1
<i>n</i>	1120	1119	1119	1120	1119
Mean	2.23	4.35	3.69	4.26	4.41
Standard Deviation	0.47	0.53	0.78	0.62	0.94
Theoretical Range	1–5	1–5	1–5	1–5	1–5
Range	1.2–4.1	1–5	1–5	2–5	1–5

Note. ECE = Early Childhood Education. ^aThe mean of items was used to examine bivariate correlations and descriptive statistics. * $p < .05$; ** $p < .01$; *** $p < .001$.

3.2. Structural equation modeling

The hypothesized model was estimated using structural equation modeling. We first estimated a measurement model that consists of a latent variable representing professional commitment. The single factor structure with the six observed items fit the data well, $\chi^2(3) = 1.47, p = .69, RMSEA = 0.00$ (90% CI [0.00, 0.05]), CFI = 1.00 (See Buettner et al. (2016) for more details on split-half exploratory and confirmatory factor analyses), therefore, we included a latent variable in our hypothesized structural model as an outcome. In the following structural equation modeling, we simultaneously examined the direct and indirect associations between teacher's perception of classroom chaos and teachers' professional commitment via teaching efficacy beliefs after controlling for a wide range of covariates. The overall model fit was adequate, $\chi^2(220, n = 1129) = 366.485, p < .01, RMSEA = 0.024$ (90% CI [0.020, 0.029]), CFI = 0.961. Without the key variables, covariates explained 6.5% of the variance in professional commitment. When key variables were added, the model explained 19.6% of the variance in professional commitment; 14.2% of the variance in personal teaching efficacy; 11.5% of the variance in general teaching efficacy; and 19.2% of the variance in disciplinary efficacy. The results are shown in Fig. 1.

3.2.1. Direct associations

We first found that teacher-perceived classroom chaos was negatively and significantly associated with professional commitment after controlling for teaching efficacy beliefs and other covariates ($\beta = -0.23, SE = 0.03, p < .001, 95\% CI = [-0.31, -0.17]$), indicating teachers who perceived classroom climate as more chaotic had lower levels of professional commitment. Among covariates, female teachers had better professional commitment than male teachers ($\beta = 0.10, SE = 0.03, p < .01, 95\% CI = [0.04, 0.17]$) and black, non-Hispanic teachers had lower levels of professional commitment than white, non-Hispanic teachers ($\beta = -0.08, SE = 0.03, p < .05, 95\% CI = [-0.15, -0.02]$). In addition, teachers' annual salary was positively associated with their professional commitment ($\beta = 0.16, SE = 0.03, p < .001, 95\% CI = [0.09, 0.23]$). When teachers had participated in professional development during the previous school year, they reported greater professional commitment ($\beta = 0.08, SE = 0.03, p < .05, 95\% CI = [0.02, 0.14]$); however, when teachers had completed any child development or early childhood education courses beyond high school, they had lower professional commitment ($\beta = -0.07, SE = 0.03, p < .05, 95\% CI = [-0.13, -0.01]$).

3.2.2. Indirect associations

First, teachers' perceptions of classroom chaos were negatively and significantly associated with personal teaching efficacy ($\beta = -0.32, SE = 0.03, p < .001, 95\% CI = [-0.37, -0.27]$), general teaching efficacy ($\beta = -0.27, SE = 0.03, p < .001, 95\% CI = [-0.33, -0.21]$), and disciplinary efficacy ($\beta = -0.39, SE = 0.03, p < .001, 95\% CI = [-0.44, -0.34]$) after controlling for covariates, indicating that teachers who perceived their classroom as more chaotic reported lower levels of teaching efficacy beliefs. In turn, teachers' personal efficacy and general efficacy were positively and significantly associated with teachers' professional commitment after controlling for teacher-perceived classroom chaos and other covariates (personal efficacy $\beta = 0.11, SE = 0.04, p < .01, 95\% CI = [0.03, 0.18]$; general efficacy $\beta = 0.11, SE = 0.03, p < .01, 95\% CI = [0.04, 0.17]$); however, disciplinary efficacy was not significantly associated with professional commitment ($\beta = 0.05, SE = 0.04, p < .22, 95\% CI = [-0.02, 0.12]$). From the Sobel test estimating the indirect effects, we found that general and personal teaching efficacy mediated the associations between classroom

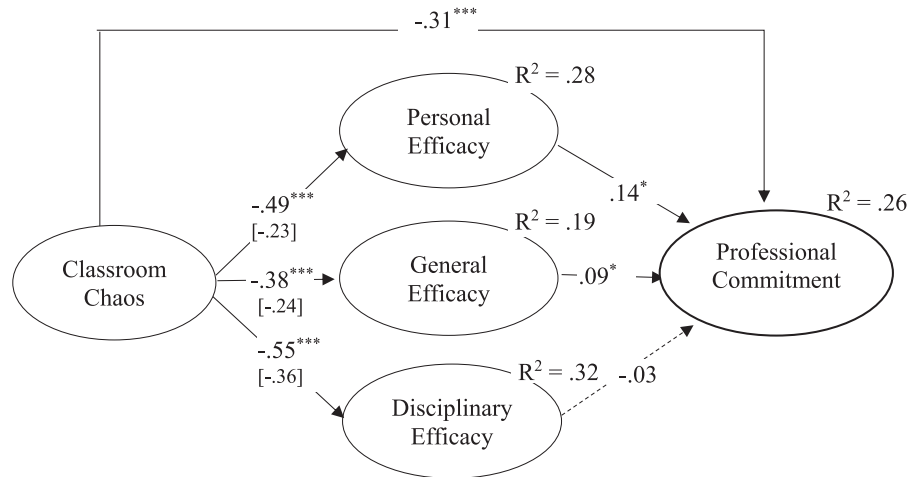


Fig. 1. Path analysis for the prediction of teachers' professional commitment. Standardized regression coefficients are reported. Dashed line represents non-significant paths. Observed variables, error terms, and covariances between the error terms are omitted. Omitted covariates include child behaviors, the number of children who have or could qualify for an Individualized Education Program (IEP) or an Individualized Family Service Plan (IFSP) in the classroom, teacher demographics (age, gender, race/ethnicity, and marital status), teacher type (lead or assistant), educational attainment, participation in professional development, possession of an early childhood education license, teaching experience, salary, and program characteristics (accreditation, non-profit status and Head Start status, and program size). Coefficients in the brackets represent coefficients from alternative reverse path associations. ** $p < .01$; *** $p < .001$.

chaos and professional commitment (general efficacy indirect $\beta = -0.03$, $SE = 0.01$, 95% $CI = [-0.04, -0.01]$; personal efficacy indirect $\beta = -0.03$, $SE = 0.01$, 95% $CI = [-0.05, -0.01]$). This indicates that a higher degree of teacher-perceived classroom chaos was associated with lower levels of teachers' professional commitment through diminishing teachers' general and personal teacher efficacy.

3.2.3. Sensitivity analysis

We additionally tested the sequential ignorability assumption in our mediation model because our data were cross-sectional (Imai, Keele, & Yamamoto, 2010). We tested reverse associations between teacher-perceived classroom chaos and teaching efficacy variables to examine an alternative path model. Although the coefficients of the associations between efficacy variables and classroom chaos were significant, the model did not fit well, $RMSEA = 0.050$ (90% $CI = [0.048, 0.052]$) and $CFI = 0.806$, and the magnitudes of the coefficients were smaller than the coefficients in the hypothesized path model (Fig. 1 shows the reversed pathway coefficients in brackets). We, therefore, concluded that the hypothesized model fits better than the alternative model with reversed paths.

4. Discussion

Shortages of quality teachers, high rates of teacher turnover and teachers' reduced job satisfaction and commitment to their jobs are increasing areas of concern in the search for providing quality education to every child (Ingersoll, 2002; Darling-Hammond, 2015). In the early childhood classroom, these issues are even more pressing (Wells, 2015; Whitebook & Sakai, 2003). Researchers seeking to curtail turnover trends have begun not only to examine organizational factors that reflect the occupational environment teachers work in and its effects on professional commitment but also mediating factors such as emotions and attitudes (Manlove & Guzella, 1997; Torquati, Raikes, & Huddleston-Casas, 2007).

We examined the direct and indirect associations between teacher-perceived classroom chaos, a feature of the workplace environment, and early childhood teachers' professional commitment through teaching efficacy. First, we found a significant

negative association between teacher-perceived classroom chaos and teachers' professional commitment, as hypothesized. Increased perceptions of chaos in their classrooms was associated with teachers' decreased job satisfaction and commitment and increased desire to potentially leave their job. While workplace climate has been tied to early childhood teachers' turnover (Whitebook & Sakai, 2004), examination of specific aspects of workplace climate, such as classroom chaos, is relatively new. Although disruptive student behavior is often examined in the K-12 classroom as an indicator of classroom climate (Dicke et al., 2014) and is shown to contribute to teachers' decreased professional commitment (Borg & Riding, 1991), the examination of how chaotic classroom environments relate to early childhood teachers is another new perspective that provides new information for future interventions. The measure of classroom chaos presents a concrete way to assess a teacher-perceived aspect of classroom climate that we found to be associated with teachers' professional commitment.

Second, we found a significant negative association between teacher-perceived classroom chaos and teachers' self-efficacy beliefs. These findings reflect Bandura's (1977) conception of self-efficacy beliefs: beyond experiences themselves, people's interpretations and internalization of complex and ambiguous experiences produce meaning and value to a person. Our findings of the associations between self-efficacy and professional commitment using teachers' perceptions of their chaotic environments similarly capture the strong tie between teachers' perceptions and beliefs, which also likely reflect their future behavior. In sum, our findings show that early childhood teachers who perceive chaos in their classroom environments would experience reduced teacher efficacy beliefs, which in turn would disengage them from the job and the profession as a whole.

In our study, we found that three aspects of teachers' self-efficacy beliefs, general teaching, personal teacher and disciplinary beliefs, were related with teachers' perceptions of classroom chaos. However, we found that only two types of efficacy beliefs (personal and general) were significantly related with teachers' professional commitment. Surprisingly, there was no significant relationship with teachers' disciplinary efficacy although this efficacy belief had the strongest (negative) correlation with teacher-perceived classroom chaos. This aspect of efficacy

may not be as strongly associated with professional commitment because teachers are able to compartmentalize this subset of their efficacy beliefs, not letting it relate to their beliefs about and attachment to their job and future work. General and personal efficacy beliefs, on the other hand, capture a majority of teachers' beliefs about themselves and their work, and are therefore more likely to be associated with their thoughts about their job and career (Coladarci, 1992). Additionally, since disciplinary efficacy measures teachers' beliefs about their control over their current students (Bandura, 1997), teachers may separate their current student behavior from their long-term career beliefs.

Our results were consistent with previous findings that higher self-efficacy beliefs could improve teacher's commitment to their classroom in the midst of obstacles in their environment. Dicke et al. (2014) illustrated that teachers' positive self-efficacy beliefs in their teaching sustain them through disturbances in the classroom, enabling them to overcome the usual accompanying negative effects like stress and emotional exhaustion. Teachers with high teacher efficacy beliefs are confident in their agency: the ability to combine their skills, motivation, and psychology accomplish their goal (Bandura, 1982). Our results also show how teacher-perceived environmental challenges in the classroom (e.g., chaos) may be associated with their efficacy beliefs, such as difficulties in believing in their agency and losing motivation to persist in their current situation, which may be reflected in their lower commitment with and commitment to their current job. In this way, teachers' efficacy is a potential predictor of teachers' commitment, beyond their amount of experience or actual qualifications (Chesnut & Burley, 2015; Hoy & Woolfolk, 1990). Self-doubt can undermine the benefits of qualifications and experience if teachers do not believe in this accrued knowledge (Bandura, 1986). Thus, teacher efficacy beliefs may be a useful measure to predict teachers' job and career decisions, in addition to the typical examination of working conditions, preparation, and training or other personal contributing factors.

Finally, we investigated the pathway from teacher's perceptions of environmental chaos to professional commitment. Our findings revealed that personal and general efficacy mediated the association between teacher-perceived classroom chaos and teachers' professional commitment. When teachers perceived their classroom as more chaotic, they reported lower levels of personal and general efficacy, which in turn, associated with decreased professional commitment. Corapci and Wachs (2002) found similar results in looking at the effects of chaos on parenting behaviors – parents reported lower parenting efficacy when operating in more chaotic environments, feeling a loss of control.

4.1. Implications

The results from this study add to the body of literature investigating teachers' perceptions of their work environments and their association with teachers' efficacy and professional commitment. Similar to the effects of the classroom environment on children's development (e.g., Ponitz et al., 2009), the environment may influence teachers' psychological health and decisions they make about whether or not to stay in the classroom. Based on our results, administrators looking for ways to keep their teachers satisfied and committed to their centers and schools may consider the features of their organizations that add to the chaos perceived and experienced by teachers (e.g., teacher-child ratios, classroom allocations, scheduling and interruptions).

Our results indicate that interventions aimed at increasing professional commitment might target improving early childhood teachers' perceptions of their abilities to deal with perceived chaos in their classroom. Strategies could include helping teachers

identify chaotic elements in their classrooms and reduce it via more structure and organization of the classroom environment (e.g., eliminating extraneous noise). Interventions could also help teachers feel more comfortable with elements in the classroom that they may perceive as chaotic or staying aware and mindful through unpredictable events during the day (e.g., *Cultivating Awareness and Resilience in Education* for teachers, from Jennings et al., 2017). Our results suggest that employing strategies to reduce perceived classroom chaos may help improve teachers' professional commitment.

This study also reiterated the importance of self-efficacy beliefs. As an alterable characteristic, self-efficacy beliefs provide an opportunity for administrators, policymakers, and teachers themselves to intervene in preventing harmful effects from the working environment. Bandura (1977) explains several methods of therapy and induction for behavior change which help people to examine and alter their interpretation processes. An intervention could guide a teacher through their experiences of chaos in the classroom, identifying their reactions to this environment and how it affects their beliefs about their teaching skills and their emotions, as well as their attachment to their work. In addition, interventions may help teachers realize that certain chaos is unavoidable and prevent negative beliefs from translating into negative behaviors, such as leaving their job. Many professional development efforts are aimed at increasing teachers' skills and knowledge (Garet, Porter, Desimone, Birman, & Yoon, 2001), however, our results add to the voices signaling for the importance of increasing teachers' beliefs about these skills as an aspect of changing their attitudes and practices (Aloe, Amo, & Shanahan, 2014; Clarke & Hollingsworth, 2002; Coladarci, 1992; Kleinsasser, 2014). Bolstering teachers' self-efficacy could help them withstand certain amounts of perceived classroom chaos and be more resilient, which could enable them to maintain a stronger investment in their current job.

4.2. Future research

Further examination of the pathway investigated in this study could examine the potential moderating role of self-efficacy explaining how teachers respond to classroom chaos differently. Additionally, other mediators of negative environmental impacts on teachers' beliefs and behaviors could inform ways to improve teachers' experience in the classroom and prevent high turnover. In-depth qualitative or mixed methods studies could further explore these mechanisms (e.g., Wells, 2017).

Although our study shows the relationship between teacher-perceived chaos and teachers' perceptions of themselves and their jobs, incorporating other triangulating data, such as child assessments and teacher quality, is needed to examine the influence of observed chaos in the classroom. A more objective measure of chaos from an observer, which could be incorporated into observational and evaluation procedures, could provide additional data on one aspect of classroom and school climate. In addition, collecting longitudinal data would help identify the directions of the pathways that were investigated in the current correlational study.

There has been little investigation of how chaos operates, and its pathways, with older students in K-12 classrooms. Literature on the uncertainty, confusion, crowding, and instability in K-12 classrooms (Kraft et al., 2015; Maxwell, 2010; Welsh, Green, & Jenkins, 1999) suggests that chaos operates within the school environment and spurs a demand for further research on the best way to measure chaos in order to discover its implications for students, teachers, and schools. Adaptation of the CHAOS-D tool (Wachs et al., 2004) for the K-12 classroom could provide a more

objective tool to measure these disruptions and discipline issues than the current figures such as the number of office discipline referrals, which are more open to biases.

4.3. Limitations

Due to the cross-sectional nature of our data and correlational analysis, a limitation in our inferences is that the findings cannot be interpreted as causal. The nature of the relationships examined in this study could potentially be produced by unmeasured confounding factors (e.g., teachers' classroom management skills which are only adjusted for via proxy variables of experience, licensure, and educational attainment) or operate in reverse order (i.e., teachers with lower professional commitment produce more chaotic classroom through lack of agency and effort). One advantage of the cross-sectional nature of our data collection, however, was that due to its less intrusive nature, we were able to gather the exploratory data from more teachers and the rates of missing data were small. Although this study was correlational, it was the first study to explore the associations between early childhood teacher-perceived classroom chaos, teaching efficacy, and professional commitment, providing initial evidence for future studies to investigate further. Although we explained a significant proportion of the variation in teachers' commitment, future research can incorporate other factors, such as teachers' skills or competence to explain more of teachers' commitment. Future studies are also needed to examine the associations longitudinally to determine if the links between these variables is causal. The low response rate to the survey, 16%, was another limitation; this low response rate, however, is not unusual for a national, random sampling of mailed surveys.

The survey data from teachers' self-report could be potentially biased due to a lack of other confirmatory evidence from objective sources. Self-report data also creates increased shared variance within responses – the variation between different teachers' perceptions can create a bias in response when comparing their reports. One method to eliminate this weakness would be direct observation of teachers or surveying of other personnel working with these teachers. However, this exploratory study utilized teachers' self-report to fully understand the nature of teachers' perceptions of their work environment, which might relate to their efficacy beliefs and professional commitment. Many studies regarding teachers' working conditions employ measures of teachers' perceptions because teacher's evaluations of their working conditions influence the psychological climate they experience (Glisson, 2002). Individual teachers evaluate their working conditions differently, and this evaluation often has a stronger connection with their beliefs and behaviors than the observed environment (Johnson et al., 2012). Future studies may want to add more objective and observable measures to expand the current findings.

5. Conclusion

This study explored the associations between teacher-perceived classroom chaos, teachers' efficacy, and teachers' professional commitment: an indication of their beliefs about their job and predictive of their future behavior (i.e. intention to leave their current workplace). Our findings add to the body of literature that shows how teacher-perceived work environments relate to teachers' beliefs about and commitment to their job and their own abilities. Based on our results, more research on the mediating role of efficacy and the mechanisms of chaos in the classroom could help lead to increased retention of teachers in the early childhood education classroom, and increased access to high quality care for children.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.tate.2019.02.010>.

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