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Classroom chaos and program quality in early child care and education programs: A study from Turkey☆

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ABSTRACT

This study aimed to better understand the construct of classroom chaos in relation to child care program quality and examine its association with child externalizing problems and social competence. Towards this end, two studies were conducted at child care programs in Turkey. Study 1 was qualitiative and relied on eight focus group interviews with 24 Turkish teachers to gain a deeper understanding of what is meant by quality and chaos. Study 2 included 49 teachers and 251 preschoolers as participants to investigate the concurrent relations of classroom chaos and quality with children's socioemotional functioning. Results of multilevel linear modeling analyses revealed that teachers' increased perception of classroom chaos was associated with higher levels of externalizing problems and lower levels of social competence in children, even after controlling for program quality, child age, gender, and temperamental effortful control. Teacher-rated classroom chaos was also associated with mother-reported externalizing problems. On average, program quality was rated as minimal and showed no significant relations with externalizing problems and social competence. The implications of these findings were discussed with respect to the intervention targets in early child care and education programs.

1. Classroom chaos and program quality in early child care and education programs: A study from Turkey

There is concern that early care and education (ECE) programs show a wide variation in environmental quality (Vermeer, IJzendoorn, Cárcamo, & Harrison, 2016). The concern that many ECE programs fail to provide developmentally appropriate care and learning opportunities also exists in many developing countries around the world (Betancur, Maldonado-Carreño, Votruba-Drzal, & Bernal, 2021; Burchinal, 2018). Research has documented modest associations between child care quality and children's developmental outcomes, both concurrently and longitudinally (Brunsek et al., 2017; Burchinal, 2018; Vandell, Burchinal, & Pierce, 2016; Vermeer et al., 2016). Thus, a comprehensive assessment of the ECE context, which includes not only measures of child care quality but also environmental chaos has gained increasing importance (Corapci, 2010; Wachs & Evans, 2010). Yet, compared to the plethora of research on child care quality and its correlates, we know relatively less about environmental chaos at early child care settings.

Household chaos refers to high levels of crowding as typically defined by high people-to-room ratio, ambient background noise as well as a lack of temporal and structural regularities such that there are few routines, little is scheduled, or nothing has its place (Matheny, Wachs, Ludwig, & Phillips, 1995). To date, substantial research has shown that household chaos is related to increased risk of child behavior problems (Bobbitt & Gershoff, 2016; Valiente, Lemery-Chalfant, & Reiser, 2007), poor language, academic achievement and executive function skills (Andrews, Atkinson, Harris, & Gonzalez, 2021; Garrett-Peters, Mokrova, Vernon-Feagans, Willoughby, & Pan, 2016) as well as stress reactivity (Brown, Anderson, Garnett, & Hill, 2019). Similar to chaos at home, chaos in child care classrooms is characterized by disorganization, commotion, disrupted routines, crowding (i.e., high child-caregiver ratio, large group size), and noise (Wachs, Gurkas, & Kontos, 2004). The present study addressed chaos within the context of ECE programs in Turkey and evaluated child care chaos in relation to teacher and classroom characteristics as well as children's socioemotional functioning.

1.1. Environmental chaos in ECE programs

The numbers of children attending ECE programs are on the rise as social, economic, and demographic changes take place worldwide, especially due to widespread maternal employment (Morrisey, 2017), together with growing public awareness about the key role of early stimulation on child development (Schonkoff & Phillips, 2000). On average,

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88% of 3- to 5-year-old children are enrolled in ECE programs among the Organization for Economic Co-operation and Development (OECD) countries (OECD, 2020). As a consequence, child care has become another central microsystem that provides not only physical care but also cognitive and social stimulation in addition to those provided at home (Vandell, 2004).

Everyday transactions of young children with the immediate physical as well as social environment of the ECE programs are among the primary drivers of child outcomes (Bronfenbrenner & Evans, 2000). As a result, identifying contextual characteristics that act to promote development has become the focus of early childhood research, practice, and policy (Burchinal, 2018). A current and commonly accepted model sees child care program quality as a multidimensional construct that consists of structural and process quality indices (Soliday Hong et al., 2019; Vandell, 2004). Affordance characteristics of the environment such as toys and play materials that promote specific uses, small group size, low child-caregiver ratio, qualified staff with training in early childhood and low staff turnover are the indicators of high structural quality (NICHD ECCRN, 2000). On the other hand, high process quality is evident when children have affectionate, responsive, and stimulating caregivers who engage them in age-appropriate learning and play activities as well as positive peer interactions (Soliday Hong et al., 2019; Vermeer et al., 2016).

Chaotic environmental contexts, on the other hand, have been characterized by "frenetic activity, lack of structure, unpredictability in everyday activities, and high levels of ambient stimulation" (Bronfenbrenner & Evans, 2000, p. 121). What follows from this definition is that chaotic settings, which are typically regarded as an aspect of the physical microsystem, not only include structural characteristics (e.g., clutter, messiness), but also disruptions to the daily routines and too much stimulation from inanimate as well as animate sources such as noise, crowding, commotion (Wachs & Evans, 2010). To accurately conceptualize chaos, Wachs (1992) draws attention to the affordanceless environmental features that involve non-specific background stimulation. For example, crowding (high child-to-teacher ratio), noise (chatter, fuss), frequent interruptions of the activities due to environmental traffic (adults coming and going) are examples of animate background stimulation, whereas noise from traffic or electronic devices are examples of inanimate nature. Thus, environmental chaos integrates both spatial as well as affordanceless dimensions of the physical environment and allows animate elements in the environment such as people to contribute to the conditions defined as chaos. One's felt experiences of out of control are also considered as critical factors of chaos at the representation level (Fiese & Winter, 2010).

Whether child care quality and chaos constitute two independent and complementary features of the child care environment has been a matter of discussion (Corapci, 2010; Wachs et al., 2004). Certain components of environmental chaos in ECE programs such as objective measures of crowding (i.e., large group size, high child-adult ratios) obviously show overlap with the indices of poor structural quality. Yet, there are other environmental chaos components that are typically not captured by either structural or process quality. These include high levels of ambient noise, a sense of upheaval in the classroom and environmental traffic defined as many adults coming and going in the classroom (Wachs, 2010).

To assess chaos in ECE programs from teachers' perspective, Kontos and Wachs (2000) have modified the items of the widely used home chaos (CHAOS) scale (Matheny et al., 1995) for child care settings. This led to the development of an adapted chaos scale, entitled the Life in Early Childhood Programs (LECP; Kontos & Wachs, 2000). This scale aims to measure the conditions under which teachers carry out their activities and implement their daily program. Towards this end, teachers are asked to report on their perception of crowding (too many children in the available space), ambient background noise, disruptions to daily routines and structural disorganization (clutter, messiness) in their classroom. One study to date has shown that global child care quality measured by the Early Childhood Environment Rating Scale-Revised (ECERS-R, Harms, Clifford, & Cryer, 1998) was negatively correlated with teacher ratings on the LECP (Wachs et al., 2004). Wachs and colleagues have also shown that committed compliance was predicted only by child care quality, whereas noncompliance (i.e., child ignores teacher requests) was predicted only by classroom chaos. The NICHD study of early child care has also found that the inclusion of a physical environment measure that assessed the extent of crowding, commotion, clutter and stimulation in the physical environment significantly improved the prediction of positive caregiving over and above other structural and process quality indicators (NICHD ECCRN, 2000).

Recently, there is an increasing use of the LECP in research when examining the role of classroom chaos on child functioning as well as teacher-child interactions and teachers' psychological well-being. This body of research provides evidence that children are less likely to enjoy activities in classrooms with higher levels of chaos, particularly when they have poor attentional regulation skills (Berger et al., 2017). Furthermore, higher levels of classroom chaos predict less gains in literacy for all children and less gains in mathematics for boys only, over the school year (Ponitz, Rimm-Kaufman, Brock, & Nathanson, 2009). Only one study to date examined classroom chaos prospectively in relation to children's socioemotional adjustment. Using data from the Head Start Family and Child Experiences Survey, Bobbitt and Gershoff (2016) created a cumulative index of classroom chaos that included child-teacher ratio, class size, lack of routines, and instability indicators (i.e., variability in the number of teachers and child care arrangements). This classroom chaos index predicted increases in teacher- and parent-reported behavior problems among Head Start preschoolers from fall to spring.

A basic premise of the bioecological theory is that highly chaotic settings, where adult-child interactions occur, play a role on child development as potentially mediated by less responsive and stimulating interactions, poorer caregiver psychological well-being, and impaired child executive functioning (Wachs & Evans, 2010). Indeed, there is evidence that teachers' increased perception of chaos in their classrooms was related to their higher levels of non-supportive responses to child emotions (Jeon, Hur, & Buettner, 2016) and higher levels of conflict with children (Berger et al., 2017; Jeon et al., 2016). Jeon and colleagues have also shown that, when dealing with stress, teachers in classrooms with higher levels of chaos were less likely to engage in proactive ways to solve problems and use cognitive reappraisal, both of which have been shown to effectively reduce negative emotions (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). Finally, as reported by over 1000 child care teachers across the U.S., classroom chaos was significantly related to teachers' diminished job competence and teaching efficacy as well as job commitment (Jeon, Buettner, & Grant, 2018), and teachers' decreased job commitment was explained by their diminished teaching efficacy (Grant, Jeon, & Buettner, 2019).

1.2. Early Childhood Education and Care Programs in Turkey

The present study examined chaos and quality in ECE programs in Turkey, where 0–6 year-olds consitute 11.5% of the country's population. Despite the recent expansion of child care and preschool services, child care availability is still significantly lower compared to the OECD average, and the majority of young Turkish children remain unserved (World Bank, 2015). Though the enrollment rates in early childhood education has been historically low in Turkey, the number of 3–5 year-olds attending early education and care has tripled between 2005 and 2017 as a result of national policy efforts and initiatives taken by governmental and non-governmental organizations (OECD, 2020). According to the Ministry of National Education (MoNE), 41% of 3–5 year-olds were enrolled in preschools during the school year of 2019–2020 (National Education Statistics, 2020). Early childhood education and care is offered by public and private sector in Turkey. About 84% of all child care and preschool services are public, offered within public primary schools or within independent preschools registered with the MoNE or local mu-

nicipalities. The MoNE promotes policies and regulations for quality in ECE programs for children aged 3 and over.

Research in Turkey has shown that early child care environments had on average minimal to good quality based on the assessments with the ECERS and ECERS-R (Canbeldek & Erdogan, 2016; Kalkan & Akman, 2009; Yaya-Bryson, Scott-Little, Akman, & Cassidy, 2020). There is also wide discrepancy in environmental quality between public and private providers. A World Bank report (2015) has shown that the quality index based on 38 indicators was significantly higher in private providers compared to public providers (76.4 versus 38.3 out of a 100-point scale). Higher quality of private programs resulted from better infrastructure (i.e., sufficient and well-maintained indoor and outdoor space, physical safety), availability of age-appropriate materials, and more opportunities for parental involvement. Human resources that included teacher experience and education did not differ significantly between public and private programs. Finally, a recent study found that compared to the programs in North Carolina, ECE programs in Turkey, with 70% of them run by public providers, were more crowded based on the number of children in the group, and subscales reflecting structural quality indices were signficantly lower. On the other hand, classrooms in both samples were rated similarly on the subscales reflecting process quality (Yaya-Bryson et al., 2020). Adequate process quality along with lower structural quality may be explained by the highly educated teachers in the Turkish sample, who work in programs with limited resources and insufficient public funding (OECD, 2020).

1.3. The present studies

As reviewed above, the LECP is one of the few available measures to assess teachers' perception of chaos. However, this scale has not been used outside of the U.S. where classroom chaos-related issues like crowding, disorganization have been noted as a crucial problem (OECD, 2020). Furthermore, research that explores the associations among classroom chaos, child care quality, and child functioning is scarce. To fill in this gap, two consecutive studies were conducted. Study 1 was qualitative and designed to better understand classroom chaos and child care quality from Turkish teachers' perspective. Study 2 was quantitative and designed to systematically examine the relations between classroom chaos and quality as well as explore their concurrent relations with children's socio-emotional functioning.

1.4. Study 1

By conducting focus group interviews, the goal of Study 1 was to examine how Turkish teachers' expressed and discussed environmental chaos and quality. These interviews also provided an opportunity to identify how well Turkish teachers' descriptions of chaos would map on the item content of the LECP and whether their open-ended reponses would reveal distinct components of environmental chaos.

2. Method

2.1. Participants

Participants were 24 Turkish female teachers from the most common types of ECE programs. Three teachers were from a university-affiliated center, six teachers were from two preschools operated by the private sector, and 15 teachers were from five preschools operated by the public sector. These ECE programs were located in socioeconomically different districts of Istanbul, the largest metropolitan in Turkey. Comparable to a nationally representative sample in Turkey (World Bank, 2015), most teachers (79%) had college or graduate degree in early childhood education and an average of 8.91 years of work experience (SD = 6.1). The mean group size in their classroom was 15.7 (SD = 3.64) children. The recruitment of these programs was based on convenient sampling, yet guided by the range of ECE programs in Turkey to ensure representativeness. The number of different types of programs in the sample was proportional to the public/private ratio of service providers in Turkey. Following the director's consent, those teachers who volunteered participated in the focus group interviews.

2.2. Procedure

Eight focus group interviews, each one consisting of 3 to 5 teachers, were conducted at the ECE program by the second author. Teachers were first asked to describe a high-quality program followed by their perception of chaotic classrooms. Open-ended questions were asked to allow teachers elaborate on their perception of quality and chaos. Interviews lasted on average 40 minutes and were audio-recorded for later verbatim transcription and coding.

2.3. Coding of Open-Ended Focus Group Interviews

Framework analysis was applied to examine, categorize and tabulate recurrent themes and descriptions in teachers' narratives (Green & Thorogood, 2004). First, all transcripts were read several times thoroughly by the first and second authors to immerse in the data and gain familiarity with the descriptions. Both authors independently tagged words, phrases and segments indicative of program quality and environmental chaos. Conceptually similar and recurrent descriptions of quality and chaos mentioned by different teachers within a group or by different groups were classified as a coding category. These coding categories were then compared to resolve disagreements, and consensus was reached in the definition of codes. A final coding scheme was established through pilot coding. To link teachers' narratives to coding categories in a systematic way, a qualitative data analysis program (MAXQDA) was employed.

Main categories that emerged for program quality included: (1) *Materials*: presence of developmentally appropriate learning materials and toys, (2) *Activities:* presence of a variety of developmentally appropriate learning practices and play activities, (3) *Physical environment*: indoor and outdoor space, safety, hygiene, furnishings, (4) C*urriculum*: developmentally approriate daily program of various activities, (5) *Group size*: number of children, child-teacher ratio (6) *Teacher-child relationship:* supportive interactions and effective communication with children, and age-appropriate discipline, (7) *Teacher qualifications* such as education, child-centered teaching philosophy.

In the case of environmental chaos, the following categories emerged: (1) *Commotion*: a sense of upheaval, high-activity, no rules, (2) *Temporal disorganization*: interruptions to daily activities and program schedule, (3) *Structural disorganization:* untidy classroom with materials scattered all around, (4) *Crowding:* large group size, low number of adults, low teacher/child ration, limited classroom space, (5) *Noise:* high levels of fuss and whining, (6) *Environmental traffic:* people coming and going into the classroom. Two authors have coded the transcripts using the MAXQDA. Cohen's kappa ranged from 0.77 to 1.00 for the coding categories, suggesting adequate to perfect consistency between coders.

3. Results and Discussion

When asked about the indicators of quality, age-appropriate play and learning materials that are varied, enough in number and of good quality were endorsed by all of the eight groups along with teacher qualification and positive teacher-child relationship. The next most frequently endorsed quality indicators voiced in four groups were availability and variability of activities (e.g., arts and crafts, dramatic play, outdoor games) and the physical environment features such as large enough space for indoors and outdoors, child care safety as well as the hygiene of child care facilities. Group size and low child/teacher ratio were brought up in three groups followed by age-appropriate program

Table 1
Main themes, quotations and corresponding ECERS-R subsacles for program quality.

Theme	Example Comments	# of Groups Endorsed (out of 8)	Corresponding ECERS-R Subscale(s)
Play and Learning Materials	*"The quality of the materials"* *"The materials should be educational and appropriate for the age and level of the children"*	8	Space and Furnishings
Teacher-child relationship	*"Of course, it is very important for the teacher to be friendly and social"* *"The quality of the teacher's contact and communication with the child is also very important"*	8	Interaction Language and Reasoning
Teacher qualifications	*"First of all, the education and experience of the teacher is very important"* *"What is the teacher's educational philosophy?"* *"Teachers who know classroom management should do this job"*	8	Language and Reasoning Interaction Parents and Staff
Activities	*"Sports branches that require children to use hand-eye coordination"* *"Having a garden at school and children being engaged in nature, garden and soil"*	4	Activities
Physical environment	*"Equipment of the classroom"* *"Toys are placed at the child's level"* *"Hygiene is also important"* *"It is important that safety precautions have been taken"*	4	Space and Furnishings
Group size	*"The number of children"* *"The teacher-child ratio" "Is the classroom environment suitable for children? Is it big enough?*	3	Space and Furnishings

schedule as endorsed by two groups. Only few teachers mentioned appropriate classroom temperature, enough lighting and the absence of ambient background noise as quality indicators. Overall, quality was defined with respect to the characteristics of the physical context known as structural quality as well as the characteristics of teacher-child interaction, known as process quality (see Table 1).

When asked about their perceptions of environmental chaos, there was unanimous consensus across and within all eight focus groups that a chaotic classroom involved high levels of commotion and upheaval. Teachers raised the issue of commotion in association with a sense of turmoil or lack of rules in the classroom. They referred to chaotic classrooms as hectic and at times out of control that challenged their authority over children. The hustle and bustle due to high-energy children, who run around and disrupt regular classroom routine was mentioned, which in return compromises teachers' interactions with children over time and results in growing chaos. Previously shown relations between classroom chaos and teacher-child conflict (Berger et al., 2017) make sense in light of these focus group findings.

Teachers in all groups also brought up crowding when defining chaos. While some teachers commented on the number of children (e.g., large group size, high child/teacher ratio), others talked about the small classroom space. Only a few teachers joined together these two dimensions of crowding. Next, temporal disorganization due to the interruptions of daily routines, as well as noise, and environmental traffic were brought up in six focus groups. Teachers have most commonly associated chaos with a lack of smooth transition between the activities, rushing through daily routines, difficulty using classroom time effectively, as well as too much and too loud sounds. Structural disorganization was also voiced by some groups, as they referred to messy, disorganized classrooms where materials are scattered all around (see Table 2).

Overall, these interviews revealed that teachers regarded the affordance characteristics of the physical environment (i.e., availability of age-appropriate play and learning materials, stimulating activities in classroom) as uniquely associated with quality. On the other hand, chaotic classrooms were described by the disruptions and irregularities of the daily schedule as well as by the extent of overstimulation (commotion, noise, and crowding) and cluttered surroundings. Thus, the characteristics of children in the classroom, families, and school personnel were included into the conditions that define chaos besides the spatial characteristics of the classroom (e.g., messiness, small space). Their view fits with the so-called "affordanceless" feature of the physical microsystem encompassing too much and non-specific stimulation from both animate and inanimate sources in the background (e.g., hubbub, crowding, noise) that contribute to the conditions of chaos (Wachs, 1992). Another salient theme was the associated affective experience of teachers, typically described as being out of control and overwhelmed as a result of the erractic disruptions of their activities. This affective experience has also been highlighetd by Fiese and Winter (2010) who argue that environmental chaos operates not only at the event level but also at the adults' interpretation of the event.

In sum, our qualitative data suggested that despite some overlap, Turkish teachers perceived quality and chaos as distinct clasroom features. As shown in Table 1, Turkish teachers' definition of chaos has shown substantial correspondence to chaos dimensions as documented in previous research (Wachs, 2010) and to the LECP items in particular (Kontos & Wachs, 2000). Minor modifications were made to the wording of a few LECP items based on focus group discussions. For example, the metaphors that Turkish teachers used to describe chaotic classrooms were taken into consideration, and the item "*it's a real zoo*" was modified to "*it's a real battleground.*" Yet, the integrity of the LECP scale was maintained for use with Turkish samples by retaining all items.

3.1. Study 2

Using the responses and feedback from teachers in Study 1, we considered using the LECP questionnaire to systematically collect data on classroom chaos from Turkish ECE programs along with data on child care quality indices and child socioemotional functioning. Based on existing research (Jeon et al., 2018), our first hypothesis was that teachers in more chaotic classrooms would be less likely to endorse efficacy in classroom management. Secondly, we predicted that teachers' subjective perception of chaos would be associated with larger group sizes, known as one of the objective dimensions of crowding in child care and the main structural quality variable in the regulations issued by the MoNE in Turkey. Third, we hypothesized that chaos and quality would be negatively, yet moderately related if these two contextual factors are empirically distinct constructs in light of previous research (Wachs et al., 2004). Fourth, we also expected a negative relationship between classroom chaos and the self-regulatory component of temperament (i.e., effortful control) as teachers in focus groups often referred to child characteristics such as impulsivity, activity and difficulty following rules as reasons that act to increase chaos. Finally, we expected that classroom chaos would be a concurrent predictor of children's social competence and externalizing problems, over and above child care program quality and temperamental effortful control.

4. Method

4.1. Participants

Participants were 49 teachers and 251 preschoolers (50.2% boys) and their mothers. On average, child age was 60.96 months (SD = 8.38).

Table 2
Main themes, quotations and corresponding ECERS-R subsacles for classroom chaos.

Theme	Example Comments	# of Groups Endorsed (out of 8)	Corresponding LECP item(s)
Upheaval, hubbub	*"Energetic, very active children, without rules"* *"When children don't know what to do next, a chaotic environment can arise"* *"It's like commotion, no rules"*	8	There is very little commotion in our classroom (R) Staff can talk to each other and to children without being interrupted (R) It's a real zoo in our classroom
Crowding	*"Large number of students"* *"Small spaces"* *"If the class is small, and the number of students is high, this increases chaos"*	8	There are too many children in our classroom given the amount of space we have
Temporal disorganization (disruptions to routines)	*"When you can't manage the flow of the program, for example when we are late for the next activity, chaos starts as children can't make a transition."* *"The program has started, but the child is coming after 1 or 2 hours. That's chaos I think"* *"Phone calls from parents during daily activities"* *"Administrators ask us to complete paperwork in the middle of the day"*	6	No matter how hard we try, we always seem to be running late No matter what we plan for, it usually doesn't seem to work out Interruptions make it difficult to keep a schedule in our classroom
Background noise	*"Uncontrollable noise"* *"Children who cry a lot"* *"Everyone is talking at once"*	6	There is often a fuss going on in our classroom
Environmental traffic	*"Parents who insist to meet the teacher in the middle of the day"* *"Adults stay in the class in the beginning of the school"*	6	There are many people in and out of my classroom during the day
Structural disorganization	*"Classroom can be messy"* *"Materials can be all around"*	3	We can usually find things when we need them(R) We rarely have enough time to pick up stuff and it tends to pile up

Mothers' mean age was 34.62 years (SD = 4.45), and 74% of the mothers were employed, either full- or part-time. Fathers' mean age was 38.34 years (SD = 5.09), and the majority (95.4%) of them worked full-time. Among mothers, 13.5% had less than a high school degree, 36.6% had a high school diploma, and 49.9% graduated from a 2- or 4-year college or had a higher degree. Among fathers, 21.7% had less than a high school degree, 33.3% had a high school diploma, and 45.1% graduated from a 2- or 4-year college or had a higher degree. Majority of the children (91%) came from intact families. Maternal and paternal education and household income were significantly related (all p's < 0.05). These variables were standardized and averaged to obtain a family SES composite. Overall, the sample consisted of middle SES families.

Children were recruited from 49 classrooms located in 15 municipality-run, public ECE programs in Istanbul, the largest metropolitan in Turkey. Sixty-three percent of the teachers had a bachelor's a degree in child development or early childhood education, and 36.7% had either a vocational school or regular high school degree. All teachers were female. On average, teachers had 6.96 years of teaching experience (SD = 5.67). All municipality-run ECE programs in the present study were selected by convenience sampling. Of all the families contacted by consent forms, approximately 40% gave consent to participate.

4.2. Procedure

After obtaining necessary permission from the University Ethics Committee and school administrations, teachers completed questionnaires on child temperament, externalizing problems and social competence for the participant children. They have also filled out a teacher/classroom information form and questionnaires on their perception of classroom chaos and their efficacy beliefs in behavior management practices. Mothers provided information on child temperament, externalizing problems, and family demographics. Data on child care program quality were collected by graduate psychology students who spent at least three to four hours in each classroom to observe the environment and interviewed the teachers to inquire unobserved quality indicators. For the present study, two graduate students were trained by the first author on the administration and scoring of the ECERS-R. Trainees reached a percentage of agreement of 85% or higher on each item as the criterion of interobserver reliability.

4.3. Measures

Classroom chaos. The original LECP scale (Kontos & Wachs, 2000) was translated into Turkish by the first two authors and back-translated into English by two bilingual researchers specializing in translation to check for compatibility. In the original LECP, items are rated dichotomously, however recent studies relied on a 5-point scale (e.g., Coldwell, Pike, & Dunn, 2006). In previous research, Cronbach's alpha ranged from 0.67 (Wachs et al., 2004) to 0.81 (Jeon et al., 2016). In the present study, teachers completed the 16-item scale on a 6-point Likert scale format (from 1 = *definitely untrue* to 6 = *definitely true*) to prevent midpoint response bias. Cronbach's alpha for the current sample was 0.62. After examining the correlation of each scale item with the total score, and the Cronbach's alpha after dropping each item, Item 6 *"Staff can talk to each other and to children without being interrupted"* was identified as unreliable. Dropping this item increased the alpha to 0.65. Thus, all analyses reported below were conducted based on 15 items.

Child care program quality. The global child care quality was rated with the Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms et al., 1998). ECERS-R consists of 43 items with seven subscales: (1) *Space and Furnishing*: eight indicators about the physical environment that facilitate play, learning, relaxation, and privacy; (2) *Personal Care Routines*: six indicators about the organization of personal care practices (e.g., nap/rest times, meals); (3) *Language-Reasoning*: four indicators about resources and interactions that foster language skills; (4) *Activities*: 10 indicators about developmentally appropriate classroom activies (e.g., fine motor, art, nature/science), (5) *Interactions*: five indicators about the way adults support, supervise, and structure children's interactions, and interactions among children themselves; (6) *Program Structure*: four indicators about the program's daily organization; and (7) *Parents and Staff*: six indicators about personal and professional needs of staff, and parental involvement. Items are rated on a 7-point scale (1 = *inadequate*, 3 = *minimal*, 5 = *good*, 7 = *excellent*). In addition to the subscale scores, an overall score was computed by averaging all items.

In the present study, a Turkish-translated version of the ECERS-R (Yildirim, Kalkan, & Akman, 2009) was utilized, with the same item content as its original version. Available studies in Turkey have shown that the ECERS-R has excellent internal consistency and interrater agreement (Solak, 2007; Yaya-Bryson et al., 2020). Construct validity of the ECERS-R with Turkish samples was also shown by its positive associations

with children' language and socioemotional development (Canbeldek & Isikoglu-Erdogan, 2016; Solak, 2007). Although ECERS-3 (Harms, Clifford, & Cryer, 2015) has been released in 2015 in the US, the third version has not yet been adapted by early childhood researchers in Turkey. In the present study, internal consistency of the ECERS-R was 0.80.

Teacher efficacy. To measure teachers' efficacy beliefs about their effectiveness to enforce classroom rules and cope with disruptive child behaviors, the 8-item Classroom Management subscale from the Teacher's Sense of Efficacy Scale (Tschannen-Moran & Woolfolk-Hoy, 2001) was used. Items were rated on a 9-point Likert scale ranging from 1 = *none at all* to 9 = *a great deal*. Example items include "How much can you do to control disruptive behavior in the classroom?" and "How much can you do to get children to follow classroom rules?" In previous research with Turkish teachers, Cronbach's alphas ranged from 0.79 to.84 for this subscale (Capa, Cakiroglu, & Sarikaya, 2005). Construct validity was shown by significant inverse relations between teachers' classroom managament efficacy and feelings of burnout (Saricam & Sakiz, 2014). Cronbach's alpha for the present sample was 0.77.

Preschoolers' externalizing problems and social competence. Teachers completed the10-item Anger-Aggression (AA) subscale (e.g., "screams or yells easily", "hits, bits, or kicks other children") and the10-item Social Competence (SC) subscale (e.g., "negotiates solutions to conflicts") using the Social Competence Behavior Evaluation-Preschool Edition, Short Form (SCBE-30; LaFreniere & Dumas, 1996). Items were rated on a 6-point scale (1 = *never* to 6 = *always*). Previous studies including those with Turkish samples have shown that the SCBE-30 has good internal consistency, test-retest reliability, and construct validity (LaFreniere & Dumas, 1996; Metin Orta, Corapci, Yagmurlu, & Aksan, 2013). In the present study, alphas for the AA and SC subscales were 0.87 and 0.67, respectively. Mothers also rated their children's externalizing behavior symptoms with the Child Behavior Checklist (CBCL/1.5–5, Achenbach & Rescorla, 2000). The 24-item Externalizing subscale of the CBCL was used in the present study. Items were rated on a 3-point Likert scale (0 = *not true to* 2 = *very true or often true*). Reliability and validity of the Turkish-translated CBCL were satisfactory in several studies with samples from Turkey (Erol, Şimsek, Öner, & Münir, 2005; Yavuz, Selcuk, Corapci, & Aksan, 2017; Yurduşen, Erol, & Gençöz, 2013). In the present sample, the externalizing subscale had satisfactory internal consistency ($\alpha = 0.86$).

Child temperament. Mothers and teachers completed the 12-item Effortful Control (EC) subscale of the Children's Behavior Questionnaire-Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006) on a 7-point Likert scale (from 1 = e*xtremely untrue* to 7 = *extremely true*). Example items included "When drawing or coloring in a book, shows strong concentration" and "When building or putting something together, becomes very involved in what s/he is doing, and works for long periods." The Turkish version of this questionnaire has satisfactory internal consistency and validity (Sari, 2009). In the current study, alphas were 0.67 and 0.85 for mother and teacher ratings, respectively. As teacher and mother ratings were significantly and positively correlated, $r = 0.21$, $p = .001$, an EC composite was computed by averaging both informants' ratings.

Demographic forms. Teachers provided information about their job qualification such as their education level and years of experience as well as the number of children, availability of assistant teachers in their classroom. Parents reported family demographics such as maternal and paternal age, education, occupation, and income level.

4.4. Data Analyses

Zero-order correlations were conducted to examine bivariate relations among all study variables. Next, child outcomes were examined in relation to chaos and quality at the classroom level. As children are nested in classrooms, their adjustment might be affected by the behavior of other children in the same classroom, i.e., children within one classroom might be more similar to each other than children in other classrooms. Therefore, intraclass correlation coefficients (ICC) were obtained from variance component models (i.e., null model with no predictors) for each child outcome. ICC represents the proportion of variance in child outcomes within classrooms compared to the total variance, and serves as an indicator for the hierarchical data structure. ICCs suggested significant variation at the classroom level, both for anger-aggression and social competence, ICC = 0.18 $p = 0.011$, and ICC = 0.44, $p < .001$, respectively. Thus, multilevel linear model analyses were conducted to account for the dependency in child-level data clustered by classrooms (Raudenbush & Bryk, 2002). The maximum likelihood (ML) estimation method was used. The fit of the models was evaluated by using the chi-square statistic, computed by subtracting the -2 log likelihood (-2LL) of the models with random parameters from the -2LL of more basic models. Children's temperament scores were centered within classrooms, whereas classroom chaos and quality were grand mean centered. In the case of mother-reported externalizing problems, there was no significant variation at the classroom level (ICC = 0.0.07 $p = 0.20$). Thus, a MLL analysis with fixed intercept and slope coefficients was conducted. All analyses were performed in SPSS statistical software version 27 (IBM SPSS, Chicago, IL, U.S.A.).

5. Results

5.1. Descriptive Statistics

Descriptive statistics for study variables are shown in Table 3. Outliers in anger-aggression subscale and in years of teaching variable were identified due to extremely high *z*-scores in their distributions ($z > +3.29$). These positively skewed variables were logarithmically transformed. All analyses were conducted with transformed and untransformed values. As results did not differ, we presented untransformed values in tables and text.

5.2. Intercorrelations Among Study Variables

As presented in Table 4, teacher-reported classroom chaos was significantly and negatively correlated with effortful control (mother and teacher composite) and teacher-reported social competence, but positively correlated with both mother- and teacher-reported externalizing problems. Furthermore, group size and child-teacher ratio were significantly and positively related to teacher-reported externalizing problems, while child-teacher ratio was also significantly and positively related to mother-reported externalizing problems. Finally, teacher experience and efficacy were significantly and negatively associated with mother-

Table 3
Descriptive statistics of child- and classroom-level variables.

	M or %	SD	Min	Max
Child variables (N = 251)				
Child sex (% female)	50.2			
Child age	60.96	8.38	39.00	83.00
Family SES	-0.02	0.84	-2.77	1.82
Effortful control (T)	5.63	0.94	1.83	7.00
Effortful control (M)	5.66	0.63	3.33	7.00
Anger-aggression (T)	1.80	0.82	1.00	5.90
CBCL Externalizing (M)	12.38	6.56	0.00	33.00
Social competence (T)	5.08	0.92	2.10	6.00
Classroom variables (N = 49)				
T Education (% college)	63.3			
Number of children	15.67	4.14	8.00	23.00
Child-teacher ratio	8.71	4.45	2.60	19.00
Years of experience	6.96	5.67	1.00	27.00
Teachers'efficacy	4.38	0.38	3.75	5.00
Classroom chaos	2.12	0.47	1.13	3.13
Program quality	3.16	0.58	2.15	4.18

Note. SES = socioeconomic status; T = teacher; M = mother.

Table 4
Intercorrelations among study variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Child age	–													
2. Child sex	.01	–												
3. Family SES	-0.11†	.07	–											
4. Teacher education	-0.05	.07	.06	–										
5. Years of experience	.15*	-0.06	-0.07	-0.46***	–									
6. Teachers'efficacy	.03	-0.02	-0.09	-0.19**	.21**	–								
7. Number of children	.07	.05	.04	.44***	-0.15*	-0.35***	–							
8. Child-teacher ratio	.08	.07	-0.01	.04	-0.15*	-0.38***	.51***	–						
9. Program quality	.16*	.07	.01	.45***	-0.20**	-0.46***	.73***	.56***	–					
10. Classroom chaos	-0.20**	.04	-0.06	.05	-0.10	-0.22***	.23***	.07	.04	–				
11. Effortful control	.33***	0.31***	.11†	-0.14*	.10	.03	-0.05	-0.01	.03	-0.12*	–			
12. Ext (Teacher)	.11†	.14*	-0.03	.09	-0.19**	-0.14*	.13*	.15*	.10	.26***	-0.33***	–		
13. Ext (Mother)	-0.16*	-0.09	-0.06	.03	-0.11†	-0.13*	.07	.17**	.01	.16*	-0.24***	.26***	–	
14. SC (Teacher)	.23***	.12†	.11†	-0.15*	.16*	.14*	-0.07	.02	.01	-0.26***	.63***	-0.53***	-0.19**	–

Note. Child age is in months. Child sex is coded as 0 = boy, 1 = girl. Teacher education is coded as 0 = high school, 1 = college or above. SES = socioeconomic status; Ext = externalizing; SC = social competence.
† $p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

as well as teacher-reported externalizing problems and positively associated with teacher-reported social competence.

Child age, classroom and teacher characteristics were also related with quality and chaos measures. Specifically, higher child care quality and lower classroom chaos were documented for older children. Teachers' education and child-teacher ratio were significantly and positively related to child care quality only, whereas group size was significantly and positively related to both quality and chaos. More experience in teaching and teachers' higher sense of efficacy in behavior management of children were associated with less classroom chaos but also with lower child care quality. Finally, the overall quality (ECERS-R Total) and classroom chaos were not significantly related.

5.3. Prediction of Child Socioemotional Functioning from Classroom Chaos and Quality

Teacher-reported externalizing problems. A multilevel linear model analysis was conducted for teacher-reported externalizing problems. Building on the baseline model (i.e., random intercept with no predictors), the next model (Model 1) included a random intercept for each classroom, and fixed effects for Level 1 variables of child sex, child age as well as effortful control. These child variables were chosen because of their associations with teacher-reported externalizing problems (SCBE-AA) in bivariate analyses. The fit of this model improved significantly over the baseline model, $\Delta\chi^2$ ($\Delta df = 3$) = 21.08, $p < .001$. There was a significant increase in externalizing problems with lower levels of effortful control, b = -0.30, SE = 0.10, t (203.48) = -3.04, p = .003). The variance in intercepts was still statistically significant. The next model (Model 2) included Level-2 predictors of classroom chaos and quality to explain this variation in the intercepts. The fit was significantly improved in Model 2, $\Delta\chi^2$ ($\Delta df = 2$) = 68.68, $p < .001$. As presented in Table 5, classroom chaos significantly predicted teacher-reported externalizing problems over and above child characteristics (i.e., age, sex, effortful control) and child care quality, b = 0.45, SE = 0.17, t (38.62) = 2.75, p = .009. Effortful control remained a significant predictor, b = -0.27, SE = 0.10, t (180.88) = -2.65, p = .009. However, quality was not a significant predictor, b = 0.14, SE = 0.13, t (37.18) = 1.09, p = .280. Given previous research findings that suggested a nonlinear relationship between child care quality and child behavior problems (Setodji, Schaack, & Le, 2018), the quadratic term of the ECERS-R total score was included into the next model. The fit was not significantly improved in this model with the quadratic term, $\Delta\chi^2$ ($\Delta df = 1$) = 0.34, p = ns. Finally, when a random slope term was included, the variance of the random slopes was not significant (p = .168) suggesting that the slopes across classrooms were not significantly different.

Teacher-reported social competence. Similar to the analyses presented above, the linear mixed model that included a random intercept for each classroom, and fixed effects for child sex, child age as well as effortful control improved significantly over the baseline model, $\Delta\chi^2$ ($\Delta df = 3$) = 81.75, $p < .001$. Effortful control was significantly and positively predictive of social competence, b = 0.68, SE = 0.07, t (199.42) = 8.71, $p < .001$, while child age remained marginally significantly, b = 0.02, SE = 0.01, t (53.107) = 1.71, p = .09. Next, classroom chaos and child care quality were included as Level 2 classroom predictors to explain variance in the intercepts. The fit was significantly improved in this model, $\Delta\chi^2$ ($\Delta df = 2$) = 75.06, $p < .001$. As presented in Table 5, chaos was significantly and negatively predictive of social competence after statistically controlling for all variables in the model, $b = -.54$, $SE = 0.22$, t (41.62) = −2.43, p = .020. Effortful control also remained as a significant predictor, b = 0.72, SE = 0.08, t (178.79) = 9.13, $p < .001$. However, the other variables in the model did not contribute unique prediction to social competence. Including the quadratic term of ECERS-R Total score to the next model did not improve the model fit either, $\Delta\chi^2$ ($\Delta df = 1$) = 0.29, p = ns. Finally, the fit was not significantly improved when a random slope term was included, χ^2 ($\Delta df = 2$) = 3.44, p = ns.

Mother-reported externalizing problems. Results of the multilevel linear model with fixed intercept and slope parameters revealed that effortful control was a significant and negative predictor of CBCL externalizing scores based on mother report, b = -1.73, SE = 0.60, t (221) = -2.90, $p < .01$. As seen in Table 5, classroom chaos was also a significant predictor, with other variables in the model controlled, b = 2.05, SE = 0.96, t (221) = -2.13, p = .03. However, ECERS-R did not contribute unique prediction to mother-reported CBCL externalizing scores.

6. Discussion

The goal of Study 2 was twofold. First, we examined the associations of child care chaos with teacher and child care environmental characteristics including quality. Secondly, we explored how chaos and quality were concurrently related to child externalizing problems and social competence in a sample of Turkish ECE programs. Supporting our first hypothesis, teachers in classrooms with higher environmental chaos were more likely to report difficulty in enforcing rules and managing child behaviors. This finding was in line with previous research demonstrating a negative association between classroom chaos and efficacy beliefs among daycare and public pre-K program teachers across the US (Grant et al., 2019; Jeon et al., 2018). Given the cross-sectional data in the present and previous research, one interpretation of these findings is that high levels of ambient background overstimulation and unpredictability in the classroom engender feelings of incompetence in

Table 5
Multilevel linear models predicting child outcomes from child (level 1) and classroom (level 2) variables.

	Teacher ratings of externalizing problems				Teacher ratings of social competence				Mother ratings of externalizing problems			
	B	*SE*	*df*	*t*	*b*	*SE*	*df*	*t*	*b*	*SE*	*df*	*t*
Fixed part												
Level 1 variables												
Intercept	2.18	.61	43.63	3.60***	4.05	.80	45.03	5.09***	10.46	4.39	221.00	2.38*
Child age	-0.00	.01	44.00	-0.39	.02	.01	44.90	1.21	-0.04	.06	221.00	-0.67
Child sex	-0.17	.11	203.80	-1.64	.00	.08	187.62	.04	-0.58	.89	221.00	-0.66
Effortful control	-0.27	.10	180.88	-2.65**	.72	.08	178.79	9.13***	-1.73	.60	221.00	-2.90**
Level 2 variables												
Classroom chaos	.45	.17	38.62	2.75**	-0.54	.22	41.62	-2.43*	2.05	.96	221.00	-2.13*
Program overall quality	.14	.13	37.18	1.10	.01	.17	41.09	.03	.09	.58	221.00	.16
Random part												
Error	.51	.05			.30	.03						
Intercept	.11	.05			.33	.09						

Note. *p < .05. **p < .01. ***p < .001.

teachers, especially if they feel out of control in such an environment (Bandura, 1986). Alternatively, teachers who lack competence in class management might fail to minimize the factors that contribute to high chaos levels in their classroom such as guiding children to quiet activities or stopping quarrel between peers. Finally, it may well be that classroom context and teacher characteristics involve bidirectional relations operating over time.

In support of our second hypothesis, teachers were more likely to report chaos in classrooms with larger group sizes, known as one of the objective measures of child care crowding and one of the structural quality indicators in child care. This finding was consistent with our qualitative findings from Study 1 as teachers in all focus groups have associated classroom chaos with large number of children, small classroom space or the combination of both. Yet, the magnitude of the association between chaos and group size was small, which in turn strengthens the idea that chaos cannot be solely defined as the large number of children in the classroom (Wachs, 2010). The link between group size and classroom chaos may be mediated by continued exposure to uncontrollable crowding leading to a greater fatigue and inefficacy in teachers, greater sensitivity to daily stress, or withdrawal from social interactions over time, which in return might contribute to classroom chaos (Evans & Stecker, 2004). On the other hand, there was no relation between chaos and child-teacher ratio, another objective measure of child care crowding. This null association makes sense within the context of ECE programs in Turkey, where teachers are accompanied by intern students approximately 2–3 days a week. Yet, although interns increase the number of adults in the classroom, they are not expected to assume responsibilities that can minimize classroom chaos such as communicating with interfering parents or program staff. Interestingly, there was a positive association between group size and program quality. This pattern can be explained with program administrators' preference to allocate larger spaces, more materials and resources to classrooms with larger number of children.

Contrary to our third hypothesis, classroom chaos was not significantly related to overall child care quality measured by the ECERS-R. Given that the present study used a relatively homogenous sample of municipality-run public ECE programs, a relatively restricted range of quality scores might have decreased the size of association between chaos and quality. Our sample of ECE programs had on average minimal quality according to the classification system developed by Harms et al. (1998). This finding of barely adequate quality in ECE programs was consistent with previous research from Turkey (Kalkan & Akman, 2009; World Bank, 2015). Standardized measures such as the ECERS-R are not used within the Turkish ECE programs by teachers as a self-assessment tool or by external educational inspectorate as a monitoring tool to guide quality improvement, which might partly explain these low quality ratings. Yet, in the face of minimal quality, Turkish teachers' ratings of chaos were not as high as one would have expected. Furthermore, classroom chaos scores also represented a restricted range on the lower end of the scale, with scores ranging from quite low through the portion of the scale below the midpoint. Yet, the mean LECP score in the present study was comparable to previous findings from the US (Berger et al., 2017; Jeon et al., 2018). As noted above, despite potential range restriction, teacher ratings of chaos were significantly and positively related to group size that had a larger range of scores. Thus, the small magnitude of association between these variables supports the argument that any relation between environmental chaos and quality is a relatively weak one at best.

Going beyond past research (Grant et al., 2019; Jeon et al., 2018), we examined both classroom chaos and quality as contemporaneous predictors of children's socioemotional functioning. Consistent with our fourth and fifth hypotheses, teachers' increased perception of classroom chaos was associated with poorer effortful control and social competence as well as higher levels of externalizing problems in children in their classrooms. Furthermore, externalizing problems and social competence were uniquely predicted by classroom chaos, even after statistically controlling for child care quality and temperament. As both of our classroom chaos and child variables were based on teacher ratings, significant findings might result from shared method variance. Yet, we also obtained data on child externalizing problems from mothers. Our results revealed that mother-reported externalizing problems were also predicted by teacher-reported classroom chaos. This strengthens the argument that the association between chaos and externalizing problems is not likely the result of common method variance, and this association is linked to classroom chaos level since mother-reported externalizing problems have been independently obtained from teacher-reported externalizing problems as well as classroom chaos. Finally, the level of the correlation between teacher- and mother- reported externalizing problems was small, suggesting that parents and teachers have not provided redundant measures of child functioning.

Finally, child care quality did not relate to child externalizing problems and social competence. Recent meta-analyses and systematic reviews have also documented modest associations between child care quality and socioemotional development (Burchinal, 2018; Soliday Hong et al., 2019). Thus, given our relatively small sample, low statistical power and the relatively restricted range of scores on the low end of the ECERS-R as suggested in previous research Le, Schaack & Setodji, 2015) might account for the null association.

7. General Discussion

Compared to a growing number of studies on home chaos (e.g. see Andrews et al., 2021 for a meta-analysis; Marsh, Dobson, & Maddison, 2020 for review), research on classroom chaos in ECE programs is scarce. We have used qualitative and quantitative approaches in investigating classroom chaos. The qualitative approach in Study 1 en-

abled us to capture the depth of Turkish teachers' classroom experiences and has shown both overlapping and distinct components of classroom chaos and quality in ECE programs. As teachers' definition of chaos conceptually mapped well onto an existing measure of classroom chaos (Wachs et al., 2004), systematic data were collected from a larger sample of teachers in Study 2.

Study 2 revealed, for the first time, an association of classroom chaos with child externalizing problems as well as social competence, independent of child care quality, child age, gender, and temperament. These findings extend previous cross-sectional associations between higher classroom chaos and teachers' increased non-supportive responses to children's negative emotions (Jeon et al., 2016) or higher levels of teacher-child conflict (Berger et al., 2017; Jeon et al., 2016), both of which are associated with high risk for behavior problems in children. Yet, the cross-sectional design of previous research and Study 2 does not allow us to identify the direction of the relations between these variables. Just as higher chaos might contribute to more disruptive behaviors, one can also speculate that children with disruptive behaviors or limited social competence might disturb regular routines, increase classroom commotion, resulting in increases of chaos over time, which in turn reinforce externalizing behaviors in children, and vice versa. To our knowledge, there has been only one previous longitudinal study (Bobbitt & Gershoff, 2016) that has shown greater behavior problems over the school year as predicted from the cumulative classroom chaos level. Nonetheless, more longitudinal cross-lagged models are necessary to better understand the dynamic changes in the classroom experiences. A greater sense of fatigue and inefficacy in teachers as well as poor teacher-child interaction quality also remain to be investigated in these transactional processes between classroom chaos and child behaviors in future research.

The second major limitation concerns the generalizability. Study 1 was conducted with a small sample of 24 teachers only. Yet, these teachers were proportionally drawn from diverse ECE programs in line with the prevalence of public and private providers in Turkey, and they were comparable to their counterparts in Study 2 and to ECE teachers in Turkey in terms of their education and experience. Study 2 sample came entirely from municipality-run ECE programs in Istanbul. These programs draw children from lower-middle and middle SES levels. Thus, caution must be exercised when generalizing these findings to the broader Turkish and international context, and replications with larger samples of diverse ECE programs are warranted. Other limitations included reliance on child social competence data from a single informant, the restricted range of scores due to selection of one type of ECE programs and the relatively small classroom sample size (N = 49) in Study 2 that might have also limited our statistical power, the barely adequate internal consistency of the LECP, and use of the ECERS-R rather than the ECERS-3, which has not yet been adapted to the Turkish cultural context.

Despite these limitations, there are a number of strengths to this research. First, as noted above, Study 1 included teachers from a wide range of ECE programs who gave a comprehensive account of the conditions under which they implemented their daily schedule and held available activities. Study 2 relied on multiple informants (mother and teacher) not only for children's externalizing problems but also for effortful control, and an aggregated score was obtained for a more reliable measure for child temperament, a consistently documented predictor of externalizing problems and poor social competence (Eisenberg, Smith, & Spinrad, 2011). Next, multilevel linear model analyses were conducted to account for the dependency in child variables that were clustered by classrooms (Raudenbush & Bryk, 2002). Finally, despite issues of generalizability, our investigation of Turkish ECE programs in Study 1 and 2 expanded the range of societies where classroom chaos is examined. Building on our findings, investigating the link between parent-reported home chaos and teacher-reported classroom chaos in relation to child adjustment is a next step in future research to see whether lower levels of chaos in one context can buffer the impact of higher chaos in the other context; such studies are in progress in our research program.

8. Conclusions and implications

In conclusion, qualitative and quantitave data from this research have converged that chaos and quality represent distinct environmental constructs despite some overlaps. Turkish teachers' accounts in Study 1 revealed that they understood and interpreted chaos not only based on the physical environmental characteristics, but they also highlighted the external forces (e.g., children, parents, school personnel) they see as working against them. Their definition was in line with the current conceptualization of chaos that integrates both the spatial as well as affordanceless dimensions of the environment, and thereby allows animate objects such as people to contribute to the chaotic conditions (Wachs, 1992). Furthermore, data obtained in Study 2 revealed associations among teachers' increased chaos perception, lower efficacy, and poorer child functioning, similar to the patterns derived from research in the US.

Even given the limitations, we believe that the findings have the potential to inform practice in child care programs. Our findings imply that interventions should not only address quality improvement but also ways to reduce chaotic conditions in the classrooms. Strengthening teachers' capacity to handle disorganization and manage children in their classrooms is an important intervention target. Furthermore, our qualitative interviews have suggested that there is the need for regulatory support as well as effective program management to reduce overstimulation and improve the conditions under which teachers carry on their regular activities. Providing regular consultation and ongoing supervision to teachers to help them better cope with the challenging environmental conditions is particularly important in Turkey and within the international context where requirements for accreditation predominantly focus on the physical features and infrastructure of the ECE programs and less on human resources as well as teaching quality.

Credit author statement

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Declaration of Competing Interest

The authors declare that there is no conflict of interest.

References

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the ASEBA preschool forms and profiles*: Vol. 30. Burlington, VT: University of Vermont, Research center for children, youth, & families.

Akın Sarı, S. (2009). *Unpublished PhD Thesis*. Ankara: Gazi University.

Andrews, K., Atkinson, L., Harris, M., & Gonzalez, A. (2021). Examining the effects of household chaos on child executive functions: A meta-analysis. *Psychological Bulletin, 147*(1), 16–32. 10.1037/bul0000311.

Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology, 4*(3), 359–373. 10.1521/jscp.1986.4.3.359.

Berger, R. H., Valiente, C., Eisenberg, N., Hernandez, M. M., Thompson, M., Spinrad, T., … Southworth, J. (2017). Effortful control and school adjustment: The moderating role of classroom chaos. *Journal of Applied Developmental Psychology, 53*, 108–119. 10.1016/j.appdev.2017.10.001.

Betancur, L., Maldonado-Carreño, C., Votruba-Drzal, E., & Bernal, R. (2021). Measuring preschool quality in low-and middle-income countries: Validity of the ECERS-R in Colombia. *Early Childhood Research Quarterly, 54*, 86–98. 10.1016/j.ecresq.2020.08.001.

Bobbitt, K., & Gershoff, E. (2016). Chaotic experiences and low-income children's social-emotional development. *Children and Youth Services Review, 70*, 19–29. 10.1016/j.childyouth.2016.09.006.

Bronfenbrenner, U., & Evans, G. W. (2000). Developmental science in the 21st century: Emerging questions, theoretical models, research designs and empirical findings. *Social Development, 9*, 115–125. 10.1111/1467-9507.00114.

Brown, E. D., Anderson, K. E., Garnett, M. L., & Hill, E. M. (2019). Economic instability and household chaos relate to cortisol for children in poverty. *Journal of Family Psychology, 33*(6), 629–639. 10.1037/fam0000545.

Brunsek, A., Perlman, M., Falenchuk, O., McMullen, E., Fletcher, B., & Shah, P. S. (2017). The relationship between the Early Childhood Environment Rating Scale and its revised form and child outcomes: A systematic review and meta-analysis. *PLoS ONE, 12*(6), Article e0178512. 10.1371/journal.pone.0178512.

Burchinal, M. (2018). Measuring early care and education quality. *Child Development Perspectives, 12*(1), 3–9. 10.1111/cdep.12260.

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Effects of suppression and acceptance on emotional responses on individuals with anxiety and mood disorders. *Behavior Research and Therapy, 44*, 1251–1263. 10.1016/j.brat.2005.10.001.

Canbeldek, M., & Erdoğan, N. I. (2016). Examining the relationship between quality and children's development levels in preschool education institutions. *Journal of Abant İzzet Baysal University Faculty of Education, 16*(3), 792–809. https://dergipark.org.tr/tr/pub/aibuefd/issue/24917/263007.

Capa, Y., Cakiroglu, J., & Sarikaya, H. (2005). The Development and validation of a Turkish version of the Teachers' Sense of Efficacy Scale. *Education and Science, 10*(117), 74–81. http://egitimvebilim.ted.org.tr/index.php/EB/article/view/5074.

Coldwell, J., Pike, A., & Dunn, J. (2006). Household chaos–links with parenting and child behaviour. *Journal of Child Psychology and Psychiatry, 47*(11), 1116–1122. 10.1111/j.1469-7610.2006.01655.x.

Corapci, F. (2010). Childcare chaos and child development. In G. W. Evans, & T. D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 67–82). Washington, DC: American Psychological Association. 10.1037/12057-005.

Eisenberg, N., Smith, C. L., & Spinrad, T. L. (2011). Effortful control: Relations with emotion regulation, adjustment and socialization in childhood. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (2nd ed.)., pp. 263–283. New York, NY: Guilford; 115–136. Washington, DC: American Psychological Association.

Erol, N., Şimsek, Z., Öner, O., & Münir, K. (2005). Behavioral and emotional problems among Turkish children at ages 2 to 3 years. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(1), 80–87. 10.1097/01.chi.0000145234.18056.82.

Evans, G. W., & Stecker, R. (2004). The motivational consequences of environmental stress. *Journal of Environmental Psychology, 24*, 143–165. 10.1016/s0272-4944(03)00076-8.

Harms, T., Clifford, R. M., & Cryer, D. (1998). The early childhood environment rating scale *(Revised ed.)*. Teachers College Press.

Harms, T., Clifford, R., & Cryer, D. (2015). *Early childhood environment rating scale* (3rd ed.). Teachers College Press.

Fiese, B. H., & Winter, M. A. (2010). The dynamics of family chaos and its relation to children's socioemotional well-being. In G. W. Evans, & T. D. Wachs (Eds.), Chaos and its influence on children's development: An ecological perspective (pp. 49–66). Washington, DC: American Psychological Association. 10.1037/12057-005.

Garrett-Peters, P. T., Mokrova, I., Vernon-Feagans, L., Willoughby, M., & Pan, Y.& Family Life Project Key Investigators. (2016). The role of household chaos in understanding relations between early poverty and children's academic achievement. *Early Childhood Research Quarterly, 37*, 16–25. 10.1016/j.ecresq.2016.02.004.

Grant, A., Jeon, L., & Buettner, C. (2019). Relating early childhood teachers' working conditions and well-being to their turnover intentions. *Educational Psychology, 39*, 1–19. 10.1080/01443410.2018.1543856.

Green, J., & Thorogood, N. (2004). *Qualitative methods for health research* (2nd ed.). London: Sage Publications.

Jeon, L., Hur, E., & Buettner, C. K. (2016). Child-care chaos and teachers' responsiveness: The indirect associations through teachers' emotion regulation and coping. *Journal of School Psychology, 59*, 83–96. 10.1016/j.jsp.2016.09.006.

Jeon, L., Buettner, C. K., & Grant, A. A. (2018). Early childhood teachers' psychological well-being: Exploring potential predictors of depression, stress, and emotional exhaustion. *Early Education and Development, 29*(1), 53–59. 10.1080/10409289.2017.1341806.

Kalkan, E., & Akman, B. (2009). Examining preschools' quality in terms of physical conditions. *Procedia - Social and Behavioral Sciences, 1*(1), 1573–1577. 10.1016/j.sbspro.2009.01.276.

Kontos, S., & Wachs, T. D. (2000). Life in early childhood programs scale. *unpublished manuscript. department of child development and family studies*. West Lafayette, IN: Purdue University.

LaFreniere, P. J., & Dumas, J. E. (1996). Social competence and behavior evaluation in children ages 3 to 6 years: The short form (SCBE-30). *Psychological Assessment, 8*, 369–377. 10.1037/1040-3590.8.4.369.

Le, V-N., Schaack, D. D., & Setodji, C. M. (2015). Identifying baseline and ceiling thresholds within the qualistar early learning quality rating and improvement system. *Early Childhood Research Quarterly, 30*, 215–226. 10.1016/j.ecresq.2014.03.003.

Marsh, S., Dobson, R., & Maddison, R. (2020). The relationship between household chaos and child, parent, and family outcomes: A systematic scoping review. *BMC Public Health, 20*(1), 1–27. 10.21203/rs.2.24075/v2.

Matheny, A. P., Jr, Wachs, T. D., Ludwig, J. L., & Phillips, K. (1995). Bringing order out of chaos: Psychometric characteristics of the confusion, hubbub, and order scale. *Journal of Applied Developmental Psychology, 16*(3), 429–444. 10.1016/0193-3973(95)90028-4.

Metin Orta, I., Corapci, F., Yagmurlu, B., & Aksan, N. (2013). The mediational role of effortful control and emotional dysregulation in the link between maternal responsiveness and Turkish preschoolers' social competency and externalizing symptoms. *Infant and Child Development, 22*(5), 459–479. 10.1002/icd.1806.

Morrissey, T. W. (2017). Child care and parent labor force participation: A review of the research literature. *Review of Economics of the Household, 15*(1), 1–24. 10.1007/s11150-016-9331-3.

National Education Statistics. (2020). *Formal education 2019/'20*. Republic of Turkey Ministry of National Education http://sgb.meb.gov.tr/meb_iys_dosyalar/2020_09/04144812_meb_istatistikleri_orgun_egitim_2019_2020.pdf.

National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network. (2000). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Science, 4*(3), 116–135. 10.1207/S1532480XADS0403_2.

OECD. (2020). *Education at a glance 2020: OECD indicators*. OECD Publishing. 10.1787/69096873-en.

Ponitz, C. C., Rimm-Kaufman, S. E., Brock, L. L., & Nathanson, L. (2009). Early adjustment, gender differences, and classroom organizational climate in first grade. *The Elementary School Journal, 110*(2), 142–162. 10.1086/605470.

Putnam, S. P., & Rothbart, M. K. (2006). Development of short and very short forms of the children's behavior questionnaire. *Journal of Personality Assessment, 87*(1), 102–112. 10.1207/s15327752jpa8701_09.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods* (2nd ed.). Sage Publications.

Saricam, H., & Sakiz, H. (2014). Burnout and teacher self-efficacy among teachers working in special education institutions in Turkey. *Educational Studies, 40*(4), 423–437.

Setodji, C. M., Schaack, D. D., & Le, V-N. (2018). Using the early childhood environment rating scale-revised in high stakes contexts: Does evidence warrant the practice? *Early Childhood Research Quarterly, 42*, 158–169. 10.1016/j.ecresq.2017.10.001.

Solak, N. (2007). *Master's Thesis*. Çukurova University.

Soliday Hong, S. L., Sabol, T. J., Burchinal, M. R., Tarullo, L., Zaslow, M., & Peisner-Feinberg, E. S. (2019). ECE quality indicators and child outcomes: Analyses of six large child care studies. *Early Childhood Research Quarterly, 49*(4), 202–217. 10.1016/j.ecresq.2019.06.009.

Shonkoff, J. P., & Phillips, D. A. (2000). *From neurons to neighborhoods: The science of early childhood development*. National Academy Press. 10.17226/9824.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education, 17*(7), 783–805. 10.1016/s0742-051x(01)00036-1.

Valiente, C., Lemery-Chalfant, K., & Reiser, M. (2007). Pathways to problem behaviors: Chaotic homes, parent and child effortful control, and parenting. *Social Development, 16*(2), 249–267. 10.1111/j.1467-9507.2007.00383.x.

Vandell, D. L. (2004). Early child care: The known and the unknown. *Merrill-Palmer Quarterly, 50*(3), 387–414. 10.1353/mpq.2004.0027.

Vandell, D. L., Burchinal, M., & Pierce, K. M. (2016). Early child care and adolescent functioning at the end of high school: Results from the NICHD Study of Early Child Care and Youth Development. *Developmental Psychology, 52*(10), 1634–1645. 10.1037/dev0000169.

Vermeer, H. J., IJzendoorn, M. H., Cárcamo, R. A., & Harrison, L. J. (2016). Quality of child care using the environment rating scales: A meta-analysis of international studies. *International Journal of Early Childhood, 48*, 33–60. 10.1007/s13158-015-0154-9.

Wachs, T. D. (1992). *The nature of nurture*. Sage Publications. 10.4135/9781483326078.

Wachs, T. D. (2010). Viewing microsystem chaos through a Bronfenbrenner bioecological lens. In G. W. Evans, & T. D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 97–112). American Psychological Association. 10.1037/12057-007.

Wachs, T. D., & Evans, G. W. (2010). Chaos in context. In G. W. Evans, & T. D. Wachs (Eds.), *Chaos and its influence on children's development: An ecological perspective* (pp. 3–13). American Psychological Association. 10.1037/12057-007.

Wachs, T. D., Gurkas, P., & Kontos, S. (2004). Predictors of preschool children's compliance behavior in early childhood classroom settings. *Journal of Applied Developmental Psychology, 25*(4), 439–457. 10.1016/j.appdev.2004.06.003.

World Bank (2015). *Supply and demand for child care services in Turkey*. Report No.: 98884-TR. Washington, DC.

Yavuz, H. M., Selcuk, B., Corapci, F., & Aksan, N. (2017). Role of temperament, parenting behaviors, and stress on Turkish preschoolers' internalizing symptoms. *Social Development, 26*(1), 109–128. 10.1111/sode.12192.

Yaya-Bryson, D., Scott-Little, C., Akman, B., & Cassidy, D. (2020). A comparison of early childhood classroom environments and program administrative quality in Turkey and North Carolina. *International Journal of Early Childhood, 52*(2), 233–248. 10.1007/s13158-020-00268-2.

Yildirim, A., Kalkan, E., & Akman, B. (2009). Preschool quality: Opinions of parents from different sociocultural status. *19th Annual EECERA Conference, August 26-29th, Strasbourg, France*.

Yurduşen, S., Erol, N., & Gençöz, T. (2013). The effects of parental attitudes and mothers' psychological well-being on the emotional and behavioral problems of their preschool children. *Maternal and Child Health Journal, 17*(1), 68–75. 10.1007/s10995-012-0946-6.