Kindergarten in a Large Urban District

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Abstract. Using data from 82 classroom observations conducted in a large urban school district, we explore how kindergarteners spend their time in general and across schools serving children from lower and higher income households. Consistent with prior research, we find that kindergartners spend the majority of instructional time on reading and mathematics, with little time devoted to other subjects. Two and a half hours per day, on average, are spent on non-instructional activities such as transitions. Kindergarteners in lower income schools spend more time on reading and mathematics and experience more non-instructional time. They also spend substantially less time being physically active and have fewer opportunities to choose their own activities than their peers in higher income schools.

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For decades, kindergarten has been the entry point to formal schooling, serving as the transition from childcare or preschool to the K-12 education system for most young children in the nation. As such, the kindergarten year has the potential to shape children's expectations for, and attitudes toward, schooling. Further, academic gains made during kindergarten are highly predictive of later outcomes (e.g., Claessens, Duncan, & Engel, 2009; Duncan, et al., 2007). Despite its importance, however, there is relatively little empirical evidence documenting children's experiences. Most of the research published on kindergarten in the last 15 years has been based on the nationally representative Early Childhood Longitudinal Study Kindergarten (ECLS-K), and ECLS-K:2011 cohorts. While the ECLS-K has many strengths, kindergarten data for the more recent cohort is now over ten years old. Further the study relies on a single teacher survey administered during the spring of kindergarten for information on instruction, and it likely misses important nuance regarding the kindergarten experience. Given the pivotal role that kindergarten plays in the transition to formal learning, a more detailed investigation of time use in kindergarten, using observational data, is warranted.

Studies using the ECLS-K have explored both instructional time and content coverage, finding that teachers report placing a greater emphasis on reading than mathematics, and that they emphasize rudimentary mathematics content (Claessens, Engel, & Curran, 2014; Engel, Claessens, & Finch, 2013; Engel, Claessens, Watts, & Farkas, 2016). Bassok, Latham, and Rorem (2016) document substantial changes to the kindergarten day between the 1998-99 and 2010-11 school years. Kindergarten teachers surveyed in Spring 2011(ECLS-K:2011) describe kindergarten as substantially more academic in nature than their counterparts reported in the spring of 1999 (ECLS-K), with sizable increases in reported time on reading and mathematics (Bassok, Latham, & Rorem, 2016; Engel et al., 2016). The increased emphasis on math and

reading coincided with decreases in reported time spent on other subjects, including art, music, and science.

Bassok, Latham, & Rorem (2016) also find that teachers serving large numbers of non-White students and students from households with low income report more time on academics, a more didactic approach to instruction, and less access to center-based, hands-on learning experiences than their counterparts serving more White and/or affluent students. Further, they find that these differences across contexts increased substantially between 1999 and 2011, documenting that instruction can change markedly over a relatively short timeframe.

Despite the useful and intriguing information produced using these data sets, studies using the ECLS-K cohorts to understand kindergarten classroom experiences rely entirely on a single teacher survey administered in the spring of kindergarten. Surveys can be unreliable for gathering information on instructional practices (Rowan, Jacob, & Correnti, 2009). Individuals can have difficulty recalling and accurately describing events that do not occur in close proximity to a survey's administration (Mayer, 1999). Further, when teachers complete surveys they may not be using a shared understanding or vocabulary, and thus may interpret questions in substantively different ways (e.g., one teacher might report learning to tell time as math while another might consider it literacy). Conducting classroom observations, with trained observers, eliminates recall error and also helps ensure that reporting is consistent and comparable across observations.

Classroom observations can also provide a more comprehensive depiction of instruction. The strengths of large-scale single-point-in-time surveys covering a broad range of topics lie in their breadth as opposed to depth. While extremely useful for 'taking the pulse' of a nationally representative sample, they are not designed to capture a nuanced or complete picture of

children's experiences in school. For example, aside from teacher survey items on meals and recess, the ECLS-K does not collect information on the quality or quantity of non-instructional time students experience in school. While the ECLS-K provides information about the average amount of time teachers report devoting to particular subjects, it does not provide information on what children experience during any given day, or how those daily experiences vary across classrooms.

There have been few observational studies of kindergarten. La Paro and colleagues (2009) used observational snapshots of approximately 700 kindergarten classrooms in six states during the 2002-2003 school year to compare instruction in kindergarten and preschool. They found that most kindergarten instructional time was spent on literacy and mathematics and that kindergarteners spent more time in whole group instruction and less time in centers than preschoolers (La Paro et al., 2009). Stipek (2004) observed that kindergarten and first grade teachers serving larger proportions of students of color and/or from households with low income were more likely to engage in didactic teaching practices than their counterparts in schools serving students from households with higher income. While informative, data for these studies were collected nearly twenty years ago. Further, neither study involved full-day classroom observations.

Finally, with the exception of Bassok, Latham, & Rorem (2016) and Stipek (2004), there is limited evidence regarding whether and how kindergarteners' experiences vary across school contexts. Non-White students and students from households with low income, on average, start kindergarten with lower levels of academic skills and knowledge than their White and higher income counterparts (Bassok, Finch, Lee, Reardon, & Waldfogel, 2016; Reardon & Portilla, 2016). These average differences are typically maintained or widen as children progress through

school (Reardon, 2011). On a variety of measures, children from households with low income begin school in "lower quality" elementary schools where quality is defined in terms of student achievement, school resources, teacher qualifications, or school and neighborhood conditions (Lee & Burkam, 2002). However, relatively little is known about how day-to-day school experiences vary systematically for kindergarteners from higher versus lower socioeconomic status households.

More recent, detailed evidence on the kindergarten experience is needed to inform policy and practice. The current study aims to fill that gap using data collected over three years in a large urban school district. Analyzing data from 82 full-day observations of kindergarten classrooms in 34 schools, this paper explores how kindergarten students spend their day, and addresses the following questions:

1. How much time is devoted to **instructional content** and how is time distributed across various content types?
2. How much **non-instructional time** is there across the kindergarten day and how is that time spent?
3. How is time distributed across different **instructional groupings** (e.g., whole group versus small group)?
4. Does the kindergarten day **differ across classrooms** in schools serving students from lower- versus higher-income households?

Similar to studies using the ECLS-K, we explore how instructional time is spent in kindergarten classrooms. In contrast to prior research using the ECLS-K, however, we are able to accurately document detailed information about instructional content, including the amount of

time devoted to activities involving more than one subject area (e.g., reading and science) and how non-instructional time is spent.

Although there is no consensus regarding what content is most important to cover in kindergarten or what an optimal kindergarten day should look like, the content that children are exposed to is important. A range of early skills, including mathematics, literacy, and self-regulation skills are predictive of future success (e.g., Claessens, Duncan & Engel, 2009; Duncan et al., 2007). Further, exposure to social studies and science provides opportunities to both build content knowledge in these areas and to apply mathematics and literacy skills across content areas. Increased content-area knowledge can produce gains in reading achievement and comprehension (Romance & Vitale, 2001; Rawson & Kintsch, 2002; Rawson & Kintsch, 2004). Beyond academic content, activities that build gross motor skills and encourage physical activity are important for child health, well-being, and cognitive development (Datar & Sturm, 2004; Chaddock-Heyman, Hillman, Cohen, & Kramer, 2014; Pellegrini & Bohn, 2005; Sibley & Etnier, 2003; Ramstetter, Murray & Garner, 2010). Thus, exposure to a range of content and activities in kindergarten is likely desirable.

The current study documents the amount of time devoted to instructional vs. non-instructional activities. A number of studies have demonstrated the importance of instructional time for academic achievement (Andersen, Humlum & Nandrup, 2016; Fryer, 2014; Jensen, 2013; Kikuchi, 2014; Parinduri, 2014), finding that more time on instructional content leads to greater learning gains. We quantify non-instructional time, detail how non-instructional time is spent, and describe variation across classrooms in non-instructional time.

Finally, the current study documents instructional grouping in the kindergarten classrooms we observed. Prior research indicates that when compared to whole group

instruction, small groups offer more opportunities for individualization, hands-on activities, and peer interaction (Webb, 1991; Yackel, Cobb, & Wood, 1991). Small group instruction is particularly appropriate for young children, because it can provide opportunities for increased quantity and quality of student-teacher interactions and facilitates language acquisition and comprehension (Wasik, 2008; Phillips & Twardosz, 2003).

Positive teacher-child relationships and one-on-one interaction with adults are important prerequisites for learning in early childhood (Bowman, Donovan, & Burns, 2001). Studies consistently find that small group instruction has positive impacts on student achievement (e.g., Slavin, Lake, Davis, & Madden, 2010). At the same time, small group student-led activities (e.g., center time) provide opportunities for students to practice important academic, social, emotional, language, and self-regulation skills (Bodrova & Leong, 2006; Skinner, 2018; Vygotsky, 1978). Unlike prior research using the ECLS-K, the current study documents not only the types of instructional grouping used by teachers, but also the context in which different groupings are employed. For example, we can distinguish between small groups led by a teacher, small groups that involve students working in pairs, or small groups that are part of center time activities.

We provide an empirical summary of time use across classrooms, including a comparison between students attending schools serving predominantly higher- or lower-income populations. Further, our results include qualitative descriptions of school days we observed, portraying the day-to-day experiences of kindergarteners. This descriptive study of kindergarten in a large urban district answers the questions we pose while also raising new ones. Our intent is to provide new insights to inform policy, practice, and future research.

Methods

Sample

Our observations were conducted in one of the 25 largest school districts in the nation. The district is diverse and decentralized. Schools are able to choose from several approved ELA and math curricula, which align with both Common Core and state learning standards. These include Pearson's *ReadyGen Phonics, Wilson Language Training Foundations* for kindergarten ELA instruction, and *Eureka* and *GoMath!* for kindergarten mathematics instruction. Teachers and schools have autonomy with regard to curricular decisions. Guidance from the district states, *"Starting from the structure of curriculum programs, teachers can make important decisions about what curricular components to select, omit, and refine and how to adapt the program to meet their students' needs (such as by adding/changing context in a problem)."*

District professional development is decentralized as well. Schools are encouraged to articulate professional development goals and to form teams dedicated to instruction and leading instructional improvements but are given wide latitude in these areas. State policy for the district where our study took place requires schools to provide 120 minutes of physical education per week to all students, and K-3 students are supposed to be physically active every day.

Full-day kindergarten is universal, and the district does not conduct school readiness assessments.

-- Table 1 about here –

Timeline. Table 1 provides information on the study's data collection timeline. The study team conducted a total of 82 full-day observations, in 48 kindergarten classrooms, across three years. Thirty observations were conducted during Wave 1 (2015-16 school year), 16 during

Wave 2 (2016-17 school year) and 37 during Wave 3 (2018-19 school year)[1]. Half of the observations were conducted in the fall (November-mid-December) and half in the spring (late February-early April). When possible, during each wave of data collection, the same teachers were observed in both fall and spring. However, in each of the three waves, almost all of the teachers we observed were new to the study; only four teachers were observed in more than one year.

School Sample. The primary sample for the study consists of 24 schools serving students from households with low income. The 24 schools were participating in a larger study of early childhood education. To be eligible for participation in that study, schools had to serve a student body where at least 70 percent of students were eligible for free or reduced-price lunch (FRPL). Schools were blocked by geographic location, and a randomized list of schools was generated within each block. Schools were then asked to participate in that random order. A large majority of recruited schools agreed to participate.

During Wave 3, the 2018-19 school year, we conducted observations in an additional 8 schools from the same district that served a large majority of students from households with higher income. We added these schools to compare the kindergarten day across schools serving students from different backgrounds. Ten schools were randomly selected from city schools serving student populations with fewer than 34 percent of students eligible for FRPL. As with the original 24 schools, we generated a randomized list of eligible schools and recruited schools in that random order. While 10 schools originally agreed to participate, we conducted observations in a total of 8, as two principals later opted out of the study.

We refer to the two sets of classroom observations as coming from schools serving students with higher income (SSHI) or schools serving students with lower income (SSLI).

Conducting classroom observations in SSHI and SSLI classrooms within a single district allows us to make within-district comparisons, holding geography, urbanicity, state, city, and district-specific instructional factors constant (e.g., state and district mandates, curricular expectations).

Classroom Selection. After school administrators consented to participate, the study team met with eligible teachers to provide study information, obtain consent, and gather scheduling information. All kindergarten teachers in the 32 schools, with the exception of those assigned to classrooms designated special education and those where instruction was conducted entirely in a language other than English, were recruited to participate in the study. The teacher consent rate across the three waves of observations was 72 percent.[2]

-- Table 2 about here --

Sample school composition. Table 2 shows the average sample school composition in SSLIs and SSHIs. In SSLIs, an average of 93% of students were eligible for free or reduced-price lunch (FRPL), and the vast majority came from traditionally underserved racial/ethnic groups. On average, half of students in the SSLIs were Hispanic, 41 percent were Black, and approximately five percent were White. Fewer than 2 percent were Asian, and, less than 2 percent indicated race/ethnicity as "more than one." On average, 14 percent were English language learners. Parent Teacher Association (PTA) expenditures in these 24 schools averaged $15,000 in 2018-2019.

Among the SSHIs, on average, 13 percent of students were FRPL eligible and 49 percent were White. Approximately 15 percent were Asian, 5 percent were Black, 12 percent were Hispanic, and around 8 percent indicated race/ethnicity as "other." On average, three percent of

students in these schools were identified as English language learners. Average PTA spending among the SSHI schools in 2018-2019 was $780,000; over 50 times greater than expenditures in SSLIs.[3]

Teacher participants. As shown in the bottom panel of Table 2, among the SSLIs, sample classrooms averaged 18 students and one teacher during observations, with 30 percent of classrooms also having a teacher's aide for at least some portion of the school day. On average, sample teachers had approximately 18 years of teaching experience. Thirty percent of teachers were White, 20 percent were Black, and 50 percent reported more than one race/ethnicity. In the SSHIs, the average number of students per classroom was 23, and 50 percent of classrooms had an aide. Teachers reported an average of 15 years of teaching experience, 56 percent were White, 33 percent were Asian, and 11 percent identified as Hispanic.

Data Collection Training and Procedures

Full-day kindergarten classroom observations were conducted by trained observers, including the study's principal investigators, professional research associates, postdoctoral researchers, and graduate students. All observers completed a two-day training that provided extensive guidance and practice using the observation protocols, and were required to pass a certification test with at least 80 percent reliability. Ten percent of field observations were double-coded, with observations conducted by two certified observers to ensure fidelity in implementing the observation protocol.

Measures

We used an adapted version of the *Narrative Record Observation for Classrooms* (Farran & Bilbrey, 2004) to track and record time use. The *Narrative Record* is a semi-structured protocol for recording all activities that occur during a classroom observation. It provides a

"running record" of the day. Using the protocol, observers record instructional episodes. Each episode is logged with a narrative description and start and end times. Observers also indicate the instructional content (e.g., math, gross motor, none) and activity type (e.g., whole group or small group instruction, meal) for each episode. A new episode is recorded when teachers switch content (e.g., from reading to mathematics or from science to no instructional content) or activity type (e.g., from whole class instruction to individual seatwork) and that new activity or content lasts for at least one minute.

The *Narrative Record* includes the following instructional content codes: Literacy/language, Math, Science, Social Studies, Social-Emotional, Art/Music, Gross Motor, Mixed Content (multiple types of content delivered simultaneously or each type for under a minute in quick succession) and No Content (e.g., transitions, meals). Detailed definitions and examples for each code are provided in online Appendix Table 1. Here, we note that to code an instructional episode as Mixed Content, multiple types of content would have been occurring simultaneously or for under a minute each (e.g., during morning meeting students sing, take attendance, hear announcements, and discuss the calendar with each activity lasting less than a minute; varied activities in small groups that include both math and science; center time). If students read a book focused on a particular content area (e.g., science) reading time was coded as language/literacy. Discussion and activities related to the book were coded with the relevant content code (i.e., science).

The following codes for activity type were used: Whole Group, Small Group, Seat Work (students completed work or tasks such as worksheets, workbooks, silent reading on their own), Meal, Transition (any time the teacher and students switched, waited, or prepared for an activity

and that transition lasted at least one minute) and Out (any time at least 75% of the class was outdoors). Detailed definitions for each of these codes are provided in online Appendix Table 1.

Observers typically followed the lead teacher. However, when the lead teacher left their students (i.e., during lunch, when they had a prep period, or when students were taught by a different teacher for particular content), observers followed the class. If students were in multiple settings (e.g., a small group of students was pulled out for special education services or English language instruction), the observer stayed with the majority of the class.

We utilize the narrative descriptions that accompany the subject and grouping codes for the qualitative descriptions of classroom activities provided in our vignettes and in the discussion section of the paper.

Analysis

For each content code and activity type we calculated summary statistics (mean, standard deviation, 25^{th}, 50^{th}, 75^{th} percentiles, minimum and maximum values) separately for each wave and school type (SSLI or SSHI). Not all observations lasted exactly the same amount of time. Students were occasionally dismissed early and some schools had slightly different schedules. Therefore, we standardized minutes to reflect a 365-minute school day, the average across the 82 observations. Deviations from 365 minutes tended to be small with a maximum difference of 10 minutes.

When we analyzed the data collected during the first two waves of observations (n=46), we found that the vast majority included a substantial amount of time with no instructional content (approximately 2.5 hours of a 6 hour day). To further understand these results, we conducted additional analyses and developed a set of more detailed codes to describe non-instructional time. These include (a) start or end of school day transitions (e.g., taking off coats,

packing backpacks, lining up to wait for bell), (b) transitions within or between lessons (e.g., switching from whole class instruction to seat work and thus moving from the floor to sit at tables and taking out materials), (c) moving to or from special classes, meals, or recess; typically involving lining up and often including waiting in the classroom, lunchroom, outdoors, or in hallways, (d) meals (i.e., breakfast, lunch, and/or snack, including preparation and cleanup), (e) behavioral management, and (f) other (e.g., a child getting sick, the teacher taking a call from the main office).

In coding observations from our third and final wave of data collection (n=37), when we added the eight SSHIs, we found that a substantial amount of time during SSHI classroom observations was spent on mixed content. Detailed analysis of these results led to the development of three mixed content sub-codes. These include (a) morning meeting, including calendar time, (b) center time during which children rotated to or selected from center options that included different or varied content, and (c) miscellaneous, which often involved activities that targeted two or more content areas, such as singing (art/music) and dancing (gross motor), or involved students working on varied content at their seats (e.g., some students reading books, some working on math worksheets, and others drawing pictures).

-- Figure 1 about here --

Results

Instructional content

Figure 1 summarizes how the school day was spent during the 65 full-day kindergarten observations conducted in the 24 SSLI schools. Table 3 provides additional details about time

use. The first two columns of Table 3 describe results from the 65 observations we conducted in SSLIs during the three waves (Wave 1, 2015-2016; Wave 2, 2016-2017; and Wave 3, 2018-2019). The second set of columns present information on how time was spent across the 17 observations conducted in SSHI classrooms during Wave 3 (2018-2019). The final columns in Table 3 report mean differences between SSLI and SSHI kindergarten classrooms. We note that we did not test for statistical significance of mean differences between SSLI and SSHI classrooms as our school and classroom samples are not probability samples and are therefore not designed for drawing statistical inferences.

-- Table 3 about here --

Online Appendix Table 2 provides a breakdown of how time was spent during observations separately in each wave. While results from the third wave of observations in SSLI classrooms differ somewhat from the first two waves, the general patterns hold when we compare SSLI and SSHI classrooms in wave 3 only, or when we compare results across all three waves of observations in SSLI schools to results for SSHI schools from Wave 3. We note discrepancies between the third wave and the three-wave average, where relevant. We first report results for SSLI schools, followed by results from SSHI schools and a comparison across the two contexts.

As Figure 1 shows, kindergarten teachers in the SSLI classrooms we observed devoted the majority of instructional time to reading and mathematics. On average, teachers spent 85 minutes per day on literacy and 57 minutes per day on math, over one-third of the school day.

Much smaller portions of the school day were devoted to social studies, science, and social emotional learning, with a total of around five percent of the school day, or 18 minutes, on average, devoted to these content areas. An average of 5 percent of the day was devoted to art/music. Kindergarteners in SSLIs spent around 5 percent (18 minutes) of the day engaged in gross motor activities including physical education, recess, and being active in the classroom. In SSLIs across the three waves of data collection, kindergarteners spent 4 percent of the school day (14 minutes) on mixed content.

Non-Instructional Time

During nearly all observations, we witnessed a substantial amount of time where no instruction occurred. Figure 1 shows that an average of 42 percent of the school day in SSLIs, over two and a half hours, did not involve instructional content. As we note above, physical education, recess, art, music, and free play were all coded as content and are not considered non-instructional time. Table 3 provides details on how non-instructional time was spent. On average, 22 minutes were devoted to beginning and end of day transitions, 38 minutes were spent transitioning to specials or lunch, and 32 minutes per day were spent on transitions between lessons. Over 25% of the school day in SSLIs was spent on these different types of transitions. Students in SSLI classrooms spent 47 minutes per day, on average, eating or preparing for meals.

Instructional Grouping

Table 4 shows summary statistics for instructional grouping for the four core content areas (reading, math, science, and social studies). Whole class instruction, where the teacher works with the entire class, was the most common instructional grouping we observed. An average of 101 minutes per day, or 65 percent of instructional time on core subjects, was spent as a whole group in SSLI classrooms.

-- Table 4 about here --

The seatwork code was used when students worked independently at their seats. This was the second most frequently observed instructional modality, with 27 percent of instructional time in core subjects (42 minutes per day, on average) spent doing seat work in SSLI classrooms. During seatwork, students often worked in workbooks or on worksheets while teachers walked around the classroom, checking in on students and answering questions.

Small group instruction –either the teacher working with small groups of students or students working in small groups independently – was observed infrequently, accounting for only 8 percent of instructional time across SSLI observations. Instructional grouping did not vary across core content areas.

-- Figure 2 about here --

Figure 2 provides a detailed description of the school day from an observation conducted in a kindergarten classroom in an SSLI during Wave 1. This observation is typical of what we observed in many SSLIs. Both literacy and mathematics instruction were conducted in solid blocks that were composed exclusively of whole group instruction and seatwork, typically involving workbooks or worksheets. There was no break during these lesson blocks, aside from transitions to and from seats to the rug and time spent passing out worksheets and papers. There was virtually no interaction among peers. Limited time was spent on subjects other than literacy and mathematics, beyond a discussion of the seasons and the calendar during the morning

meeting and listening to a story about butterflies that did not include any discussion. At the same time, the classroom was orderly and students were engaged with their tasks—at no point was instruction interrupted for behavior management or disciplinary reasons. Finally, during this school day, students did not engage in any gross motor activities. This was the case for nearly one-third (32%) of the observations we conducted in SSLI classrooms.

Comparing SSLI and SSHI Kindergarten Classroom Observations

Our final research question compares results from the observations we conducted in SSLI classrooms with results from 17 observations we conducted in 8 SSHI schools during Wave 3 of data collection (2018-2019). Although these comparisons are exploratory with a relatively small number of observations from SSHI classrooms, the differences observed are, nonetheless, striking.

Academic Content. As Table 3 shows, substantially less time was devoted to reading and math in SSHI classrooms. In SSHIs, 28 percent of the school day was devoted to literacy and math instruction, compared with 39 percent in SSHIs. We find time-use to be similar across SSLIs and SSHIs in science, social emotional learning, and art/music.

Gross motor. In contrast, we find substantial differences between SSLI and SSHI classrooms in the amount of time devoted to gross motor activities. In SSLIs, students engaged in 18 minutes per day, on average, of gross motor activities, with 32 percent of SSLI observations including no time on gross motor (see Figure 2 for an example). In contrast, students in SSHIs spent an average of 44 minutes per day on gross motor – nearly half an hour more than their counterparts in SSLI classrooms.[4] Relatedly, across SSLI classrooms, kindergarteners spent an average of 7 minutes of the school day outdoors, compared with an average of around 18 minutes in SSHIs.

Mixed Content. We also observed differences across contexts in terms of time spent on mixed content. Students in SSLI classrooms spent less than 15 minutes per day on mixed content. In contrast, students in SSHIs spent over 50 minutes per day on mixed content (4% vs. 15% of the school day, respectively). We recorded three different types of mixed content—mixed content that occurred during center time, mixed content that occurred during morning meeting, and miscellaneous mixed content.

Table 5 shows the percentage of observations that included the three types of mixed content, as well as the average time spent in each area across all episodes separately for SSLI and SSHI observations. Students in SSHI classrooms spent a substantial amount of time in centers. We recorded center time in 11 of 17, or 65 percent of SSHI observations. Across the 17 observations, students in SSHI classrooms spent an average of 33 minutes in centers.

In many cases, during center time students could choose to engage in activities across multiple content areas. Students were either allowed to change centers as they chose or were told to change after a specific amount of time. The teacher sometimes used this time to work with individuals or small groups of students.

-- Table 5 about here –

Students in SSLI classrooms spent virtually no time in centers—we recorded center time in 8 of 65 observations (12 percent), averaging two minutes of center time across all observations. Mixed content during morning meetings and "miscellaneous" mixed content time was observed both more often and for longer periods of time in SSHI classrooms.[5] However, the

large differences across school types we observed in mixed content time are driven by time spent in centers.

Non-Instructional Time. In SSHI classrooms, about 33 percent of the school day was spent on non-instructional activities (see Table 3), compared with an average of 42 percent of the day in SSLIs. We observe the largest difference in non-instructional time between SSLI and SSHI classrooms in time spent on meals. In SSHIs, students spent just over half an hour (32 minutes) eating meals, compared with 47 minutes in SSLIs. These observed differences are driven by two main factors. First, students in SSHI classrooms typically went to recess immediately after lunch. In contrast, students from classrooms in SSLIs often waited in the lunchroom or auditorium for their teachers to pick them up and return to class. Second, SSLIs were more likely to serve breakfast than SSHIs. Breakfast was served during approximately half of SSLI classroom observations, compared with one SSHI observation.

Across all categories, with the exception of "other," students in SSLI classrooms experienced slightly more non-instructional time than those in SSHIs. Students in SSLI classrooms spent approximately 5 more minutes on activity transitions and 9 more minutes per day on lesson transitions than their peers in SSHIs.[6]

Instructional Grouping. Table 4 shows that students in SSLI classrooms spent 101 minutes as a whole group compared with 81 minutes during SSHI observations. And, students in SSLI classrooms spent an average of 42 minutes per day engaged in seatwork, compared with 32 minutes per day in SSHI classrooms.

Time in small groups was similar in SSLI and SSHI classrooms, with students spending an average of 12 minutes per day in small groups in SSLIs compared with 14 minutes in SSHIs. As a percentage of instructional time, SSLI and SSHI classrooms are very similar in terms of

grouping. However, students in SSHI classrooms experienced an average of around 30 minutes less time per day on instruction in core subjects (126 minutes compared with 155 minutes in SSLI observations).

-- Figure 3 about here --

Figure 3 provides a detailed description of the school day from an observation conducted in a kindergarten classroom in an SSHI. Several aspects of this record underscore differences across SSLI and SSHI classroom observations. First, students had multiple opportunities to engage in gross motor activities during the day including a full block of physical education at the start of the day and outdoor recess. Further, the students had center time both during a science lesson which included playing a game, and had "free choice time" where they, again, had the opportunity to move around the classroom and were able to choose from a set of play-based activities. There were several opportunities for interactions with their peers including playing a game with dice, working in small groups with the Rekenrek, and for discussion. Students did not work in workbooks or complete worksheets and there was an entire class period devoted to science. There was also less time devoted to literacy than in the SSLI observation described in Figure 2.

Variability in Time Use. In addition to comparing average time use across contexts, we explored variability across classrooms. Table 6 reports measures of central tendency (mean, median) and spread (standard deviation, 25^{th} and 75^{th} percentiles, minimum, and maximum) for all of the content areas and overall non-instructional time. We note two striking differences, in terms of spread, between the classrooms we observed in SSLIs and SSHIs. First, we find much more variability in total time devoted to instructional content among our 65 SSLI observations,

where the standard deviation for total instructional time was 36 minutes, compared with 12 minutes across the 17 SSHI classrooms. Reflecting this, the minimum time devoted to instruction across all content areas in SSLIs was 126 minutes (just over 2 hours), compared to a minimum of 227 minutes (nearly 4 hours) among the SSHIs. The maximum recorded time spent on instruction among SSLIs was 294 minutes (nearly 5 hours), compared with 266 (around 4.5 hours) in SSHIs. Thus, while SSLIs typically spent more instructional time on core subjects (with the exception of Social Studies) than SSHIs, total time devoted to instruction, overall, was higher in SSHIs. This difference was driven by time on gross motor and mixed content, as described above.

-- Table 6 about here --

Similarly, while the interquartile range (IQR, or spread between the 25th and 75th percentiles) in time devoted to instructional content among the SSHIs is 19 minutes, the IQR among SSLI kindergarten observations is 45 minutes. Thus, we observe substantially more variability across SSLI classrooms.

A second difference highlighted in Table 6 is that students in SSLI classrooms at the 25th percentile spent no time (0 minutes) engaged in gross motor activities. This is the case for nearly a third (32%) of the classrooms we observed in SSLI schools. These kindergarteners did not experience recess, physical education, or any other opportunities to move their bodies during the school day on which they were observed. Further, SSLIs classrooms at the 50th percentile spent only 17 minutes a day on gross motor activities. In contrast, students in SSHI classrooms at the 50th percentile spent 50 minutes engaged in gross motor activities, and those at the 25th

percentile spent 30 minutes. Only two SSHI classrooms (approximately 12%) that we observed spent no time on gross motor activities.

While these differences are striking, similarities are also noteworthy. Across both SSLI and SSHI contexts, classrooms at the 25th percentile spent no time on science, social emotional content, or art and music. In addition, SSLI classrooms at the 25th percentile spent no time on social studies or mixed content.

Discussion

Our results expand upon findings from recent work using the ECLS-K. Similar to Bassok, Latham, & Rorem (2016), we find that kindergarten teachers spend the majority of instructional time on reading and mathematics—with little time devoted to other subjects, including science, social studies, social emotional learning, music, and art. Further our results are consistent with Bassok and colleagues (2016) finding that teachers reported spending more time on reading and mathematics in schools serving larger proportions of students of color and from households with low income.

The current study also highlights several important aspects of the kindergarten experience that are beyond the scope of studies using the ECLS-K. First, our observational data reveal that a substantial amount of the kindergarten day is spent on non-instructional activities. Non-instructional activities, as we define them, do not include play, recess, PE, art, or music. In addition to meals, most non-instructional time is spent on transitions between instructional activities, lunch, and specials. Students in SSLI classrooms spend more time on these non-instructional activities than their peers in SSHI classrooms. This is consistent with prior observational research (e.g., La Paro et al., 2009) and also aligns with prior research which found large amounts of non-instructional time in Chicago (Smith, 2000). We also document substantial

variability across classrooms in terms of quantity of non-instructional time, with at least a quarter of SSLI classrooms we observed spending nearly half the day (3 of 6 hours) on non-instructional activities.

Second, we find that students in the SSLI classrooms we observed spend less time on gross motor activities than their peers in SSHI classrooms, consistent with Bassok, Latham, & Rorem, 2016. Of potentially greater concern, during many SSLI observations, there was no opportunity for gross motor activity at all. Third, we find that students in SSLI classrooms were less likely to engage in activities involving mixed content, with the most pronounced disparity across SSLI and SSHI classrooms being that SSLI students spent virtually no time doing center-based activities. The instruction we observed in SSLI classrooms typically involved long blocks of whole group instruction and seat work, with few opportunities to work in small groups or with peers.

We discuss these three key findings, extensive non-instructional time, limited gross motor time, and a lack of center-based and free choice time for students in the SSLI classrooms we observed in more detail below.

Non-instructional time

Downtime and transitions are necessary aspects of any school day. However, the amount of time students spent transitioning to and from activities in the classrooms we observed often involved long stretches where children waited quietly in line or at their seats without engaging in any activity at all, including socialization or play. For example, one class spent an hour and a half in the gymnasium waiting to be photographed on picture day. Another spent 23 minutes waiting to be seated in the auditorium, viewed a short video on social emotional learning, followed by an additional 22 minutes transitioning back to class. During another observation,

students were taken to the auditorium after lunch and told to sit quietly. When one kindergartener tried to organize a game of "I Spy" with his classmates, he was reprimanded and told to sit down. These were not isolated instances; 25 percent of classrooms observed in SSLIs had over 3 hours of non-instructional time.

Implications. A number of studies have demonstrated the importance of instructional time for academic achievement (Andersen, Humlum & Nandrup, 2016; Fryer, 2014; Jensen, 2013; Kikuchi, 2014; Parinduri, 2014). While it would be unreasonable to expect little to no downtime and transitions in busy kindergarten classrooms, this time could be used to engage students in movement, conversation, or games that would enhance opportunities to learn. Supporting teachers in being reflective about their practices and habits, including how time is used and what happens during non-instructional time, could go a long way in addressing this problem. Staffing may also have contributed to differences across contexts. The SSLI classrooms we observed typically had fewer adults available than did SSHI classrooms. Many examples of extensive waiting or transitions involved times when students were away from the classroom (e.g., in the auditorium for an assembly or in the cafeteria after lunch). With fewer adults available, supervising and engaging students likely presents more of a challenge for teachers in SSLI contexts.

Gross Motor Time

Almost one-third of the SSLI classrooms (n=18) spent no time on gross motor activities during the six hour school day, compared with only 12 percent of SSHI classrooms we observed (n=2). There were no systematic differences in the physical space available for outdoor activities between SSLIs and SSHIs based on casual observation and a review of architectural designs for the schools where we observed. We did not collect data about weather on the days we observed,

but there is no reason to think that weather would have varied systematically between SSLI and SSHI classroom observations. Further, gross motor activities for young children do not require access to the outdoors or even a gymnasium. Kindergarteners can dance, stretch, or exercise guided by a teacher, a video, or an audio recording in their classrooms, in the auditorium, or even while waiting in line. Finally, the observed differences across SSHI and SSLI classrooms do not result from policy. As noted earlier, state policy for the district requires 120 minutes of physical education per week for all students, and K-3 students are supposed to be physically active every day.

We do not know why opportunities for gross motor activities were limited. Anecdotal evidence suggests that teachers in SSLI classrooms may have been reluctant to engage in activities that would result in a lack of control over the class. For example, one teacher, who was leading students in song and exercise, told the students "*Do exactly what I do and keep your mouth shut or you sit down.*" During a different observation, students went to the gym after lunch, but, rather than engaging in physical activity, they sat along the wall and sang songs with the lunch supervisor, and then stood quietly in line to take turns shooting a basket. In physical education during another observation, students went to the gymnasium and sat along the wall while one child at a time ran around the perimeter of the gym. As with non-instructional time, staffing may have been a contributing factor to the differences we observed. Opportunities for gross motor activities after lunch, for example, might have been easier to facilitate if more adults had been available to supervise students in SSLIs.

Implications These findings are concerning, given the strong evidence regarding the benefits of physical activity. Studies of elementary school-age children find that physical activity and physical fitness are positively associated with both cognitive development and academic

achievement (Chaddock-Heyman, Hillman, Cohen, & Kramer, 2014; Pellegrini & Bohn, 2005), with a meta-analysis on this topic finding a strong, positive, and statistically significant association between physical activity and cognition (effect size =.32; Sibley & Etnier, 2003). Further, research finds that recess benefits children's cognitive, emotional, physical, and social well-being, particularly among boys (Ramstetter, Murray & Garner, 2010). The Council on School Health (2013) notes that*, "Even minor movement during recess counterbalances sedentary time at school*" (p. 184). Children from households with low income are typically among the least physically active (Chang & Kim, 2017), and, our results suggest that schools may be reproducing and reinforcing these disparities.

Consistent implementation of state physical activity requirements within the district across schools, encouraging teachers to take up both structured and informal opportunities for physical activity for their students (i.e., using some of the non-instructional time described above), and strategic staffing to ensure that teachers in the earliest grades are adequately supported to meet their students' needs are possible means for increasing young children's opportunities to be physically active in school. School leaders might also consider conducting a time-use analysis to support teachers in ensuring that young children have access to gross motor activities and recess.

Center Time

We also found substantial differences in opportunities for center time between SSHI and SSLI classrooms. Resource constraints may have played a role in this disparity. The facilities for the SSHI classes we observed were newer, often including spaces such as science and music rooms. The differences in yearly PTA expenditures (again, averaging $780,000 among the 8 SSHIs compared with $15,000 for the 24 SSLIs) alone speak to the contrast between these two

sets of schools. The SSHI kindergarten day described in Figure 3 included a trip to the science room where students engaged in science-related centers. This was something that never occurred across all kindergarten observations in SSLIs.

Differences in classroom norms may also have precluded center-based activities. Children in SSLIs were expected to sit quietly during instructional time and to remain seated at their tables or on the rug during whole group instruction. Teachers paused, briefly and often, to remind students to stop squirming, wiggling, or moving. When engaged in seatwork, students were expected to sit with their feet flat on the floor and their bottoms in chairs that were pushed in closely to their table or desk. The clear and systematic expectation in the SSLI classrooms we observed was that students were not to talk to their classmates unless they were instructed to do so. These more regimented classroom environments may have been, in part, a function of the smaller number of adults, making classroom management more difficult.

Implications. There are many ways to structure a classroom, and center time activities may not be the most appropriate, or the most effective, way to deliver instruction in all contexts. At the same time, centers and recess were, in the classrooms we observed, the primary contexts where kindergarteners had some agency in choosing how to spend their time, how to interact with materials, and how to interact with their peers. Without these opportunities, students may miss out on the chance to hone important academic, social, emotional, language, and self-regulatory skills (Bodrova & Leong, 2006; Skinner, 2018; Vygotsky, 1978).

At the same time, researchers must take care not to impose the worldview of the dominant culture on all classrooms, including the assumption that opened-ended, free choice activities are necessarily superior. A more controlled and directed instructional environment may be culturally appropriate in some contexts (Delpit, 1995).

Limitations

Although the current study provides new insight into how time is spent in kindergarten in a large urban school district, we note several important limitations. First, the study was conducted in a single district. While this allows for comparison across schools serving different student populations while holding both state and district factors constant, the extent to which our results generalize to other contexts is unclear. However, several of our findings are similar to results of studies using nationally representative samples (e.g., Bassok et al., 2016) and past observational studies of kindergarten (e.g., La Paro et al., 2009).

In addition, the number of observations we conducted in SSHI classrooms is not large (n=17). More research involving in-depth observations of kindergarten classrooms across a range of settings (e.g., suburbs, small cities) is needed.

Although the schools and classrooms in our sample were recruited to participate in the study in a random order, they were not randomly sampled. We also did not randomly sample the days on which we conducted observations. This was out of respect for the needs and preferences of the kindergarten teachers who graciously allowed us to spend time in their classrooms. Teachers identified dates and times when they were available for observations, and we scheduled accordingly. We were careful to schedule observations on days that were more likely to be typical school days. We did not schedule observations near holidays, breaks, or the beginning or end of the school year. However, it is possible that our results are not representative of the entire school year, or, of how time is spent in schools and classrooms where we did not observe.

Finally, the current study does not include outcome data, nor does it delve into teachers' thoughts and intentions. Future research exploring the kindergarten experience would benefit from the inclusion of student outcomes as well as in-depth teacher interviews to

determine whether, how, and for whom time use in kindergarten matters most. Future research should also explore factors that might account for the variability we observed in instructional time across SSLIs. Factors to consider include staffing levels, class or school size, teacher demographic characteristics, and differences in teacher training or professional development. There was not sufficient information and/or variability in our study to allow us to explore the role these factors may have played.

Conclusion

Using three waves of kindergarten classroom observational data (n=65) from schools serving students from households with low income in a large urban school district, we find that nearly 40 percent, on average, of a 6 hours school day was spent on reading and mathematics instruction with limited time devoted to other subjects. Further, over 40 percent of the day was taken up by non-instructional activities, the majority of which involve transitions, with little time left for other subjects, play, or physical activity.

Whether the narrowly focused and academically driven version of kindergarten we observed in SSLI classrooms is optimal for young children during their first year of formal schooling is something that should be explored in future studies. However, as Bassok, Claessens & Engel (2014) note, “Engaging and challenging academic instruction...does not have to supplant play or child-initiated activities.” Young children need opportunities to make choices and be physically active while engaged in developmentally appropriate learning experiences. Our study indicates that kindergarten experiences are likely to vary systematically by school context. If, as our results suggest, young children of color and those from households with low income have more sedentary and restrictive classroom experiences, this may be one of a myriad of

examples of inequitable access to educational opportunities that contribute to persistent inequalities in educational outcomes.

Notes

1. Due to a gap in funding we were not able to conduct observations during the 2017-18 school year.
2. SSLIs had higher teacher consent rates than SSHIs. We believe this is due, at least in part, to the fact that the classroom observations were originally conducted in conjunction with the larger ECE study, resulting in more familiarity with and buy-in from school administrators and teachers. Teacher consent rates in SSLIs were 73% in 2015-16, 97% in 2016-17, and 83% in 2018-19. In the SSHIs the teacher consent rate was 60%.
3. One SSLI school was an outlier at over $100,000 in PTA expenditures in 2018-2019. When we exclude this school from our calculations, the average PTA expenditure in the 23 remaining schools was under $8,000 in that year. Similar levels of PTA expenditures to those reported for our SSHI sample have been observed in many higher income schools. See, for example, “The Power of a Wealthy PTA” in the November 5, 2019 issue of the Atlantic, as well as “Hidden Money: The Outsized Role of Parent Contributions in School Finance” by the Center for American Progress from April, 2017.
4. As shown in online Appendix Table 2, we observed some variability in average time spent on gross motor activities in SSLI classrooms across waves. Compared with the 18 minutes averaged in Wave 1, students spent only 13 minutes on gross motor activities in Wave 2. In Wave 3, SSLI classrooms spent an average of 25 minutes per day on gross motor activities. While this is more than was observed during the first two waves of data collection, it is still substantially less time (19 minutes, on average) than was observed in SSHI classrooms.
5. Not all morning meetings involved mixed content, so the information in Table 5 does not include all morning meeting time.
6. During the third wave of data collection, SSLI classrooms had slightly less non-instructional time than was observed during the first two waves – 38% of the school day compared with 41% in Wave 1 and 48% in Wave 2 (see online Appendix Table 2).

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Table 1

Sample Size and Timeline for Full Day Kindergarten Classroom Observations (n=82)

		SSLI Schools (n=24)		SSHI Schools (n=8)	
Wave	School-Level Den	Observations	Classrooms	Observations	Classrooms
Wave 1	2015-16	30	17	--	
Wave 2	2016-17	15	10	--	
	2017-18	--	--	--	--
Wave 3	2018-19	20	10	17	10
Total		65	37	17	10

Table 2

School-level, Teacher, and Classroom Descriptives for Sample Schools and District

	SSLI Schools (n=24)	SSHI Schools (n=8)	District
	School-Level Demographics (% and describing students unless noted otherwise) [a]		
Race/Ethnicity			
White	5	49	15
Black	41	5	25
Asian	2	15	15
More than one	1	8	5
Hispanic	50	12	40
English Learners	14	3	15
Special Education	22	15	20
FRPL Eligible	93	13	70
PTA Expenditures [b]	$15,000	$780,000	--
	Sample Teacher and Classroom Demographics (% except years teaching and average students per class) [c]		
Race/Ethnicity			
White	30	56	--
Black	20	0	--
Asian	0	33	--
Hispanic	0	11	--
More than one	50	0	--
Female	100	89	--
Years Teaching	18	15	--
Average Students Per Class	18	23	--
Classroom Aide	30	50	--

Notes. Schools Serving Students with Lower Income (SSLI); Schools Serving Students with Higher Income (SSHI); Free or Reduced-Price Lunch (FRPL). Percents and means rounded to nearest whole number, district information rounded to nearest 5. District-level demographics reported for 2018-2019 school year. a School-level student demographics averaged across 2014-2015 to 2018-2019. b PTA Expenditures are for the 2018-2019 school year. Among SSLI Schools, one school was an outlier. Without that school, PTA expenditures for SSLI schools averaged less than $8000. c Sample teacher demographics were collected only for the 2018-2019 via teacher self-report.

Table 3

Average Time Use in Kindergarten for SSLIs, SSHI, and the Difference Between the Two School Types

Content Type	SSLIs Waves 1-3 (n=65)		SSHIs Wave 3 (n=17)		Difference (SSLI-SSHI)	
	% of day	Minutes	% of day	Minutes	% of day	Minutes
Instructional Time						
Core Subjects						
Literacy	23	85	15	55	8	31
Math	16	57	13	48	2	8
Science	3	9	2	8	0	1
Social Studies	1	4	4	15	-3	-12
Other Subjects						
Social Emotional	1	5	1	3	1	2
Art/music	5	19	5	16	1	3
Gross motor	5	18	12	44	-7	-26
Mixed	4	14	15	53	-11	-39
Total Instructional Time	58	211	67	243	-9	-31
Noninstructional Time						
Starting or ending the school day	6	22	5	19	1	2
Lesson transitions	9	32	7	24	2	9
Moving to or from specials/recess/lunch	11	38	9	34	1	5
Meals	13	47	9	32	4	15
Behavior management	1	2	0	1	0	1
Other	3	12	4	13	0	-1
Total Noninstructional Time	42	154	33	122	9	32
Total Time During Full-Day Observations	100	365	100	365	0	0

Note. Schools Serving Students With Lower Income (SSLI); Schools Serving Students With Higher Income (SSHI); not all columns sum to 100% due to rounding. Observations were conducted in SSLIs across 3 waves (2015-2016, 2016-2017, and 2018-2019). We collected data in SSHIs during wave 3 (2018-2019) only.

Table 4

Instructional Grouping During Core Subjects for SSLI and SSHI Classrooms

	SSLIs Waves 1-3 (n=65)		SSHIs Wave 3 (n=17)		Difference (SSLI-SSHI)	
ch	% of time	Minutes	% of time	Minutes	% of time	Minutes
Instructional Grouping						
Whole Group	65	101	64	81	1	20
Seat work	27	42	25	32	2	10
Small Group	8	12	11	14	-3	-1
Total Time on Core Subjects	100	155	100	126	0	29

Note. Schools Serving Students With Lower Income (SSLI); Schools Serving Students With Higher Income (SSHI). Percentages and means rounded to the nearest whole number and percentages may not add up to 100 due to rounding. Core subjects include reading/literacy, math, science, and social studies.

Table 5

Classroom Observation Time Coded as "Mixed Content" Across SSLIs and SSHIs

	SSLI (n=65)	SSHI (n=17)
Average Time per day on Mixed Content (min)	14	53
Percent of School Day on Mixed Content	4	15
Breakdown of Mixed Content Time		
Centers		
Percent of Observations	12	65
Average Time Across All Observations (min)	2	33
Morning Meeting		
Percent of Observations	41	76
Average Time Across All Observations (min)	3	8
Miscellaneous (e.g., singing and dancing)		
Percent of Observations	34	71
Average Time Across All Observations (min)	6	10

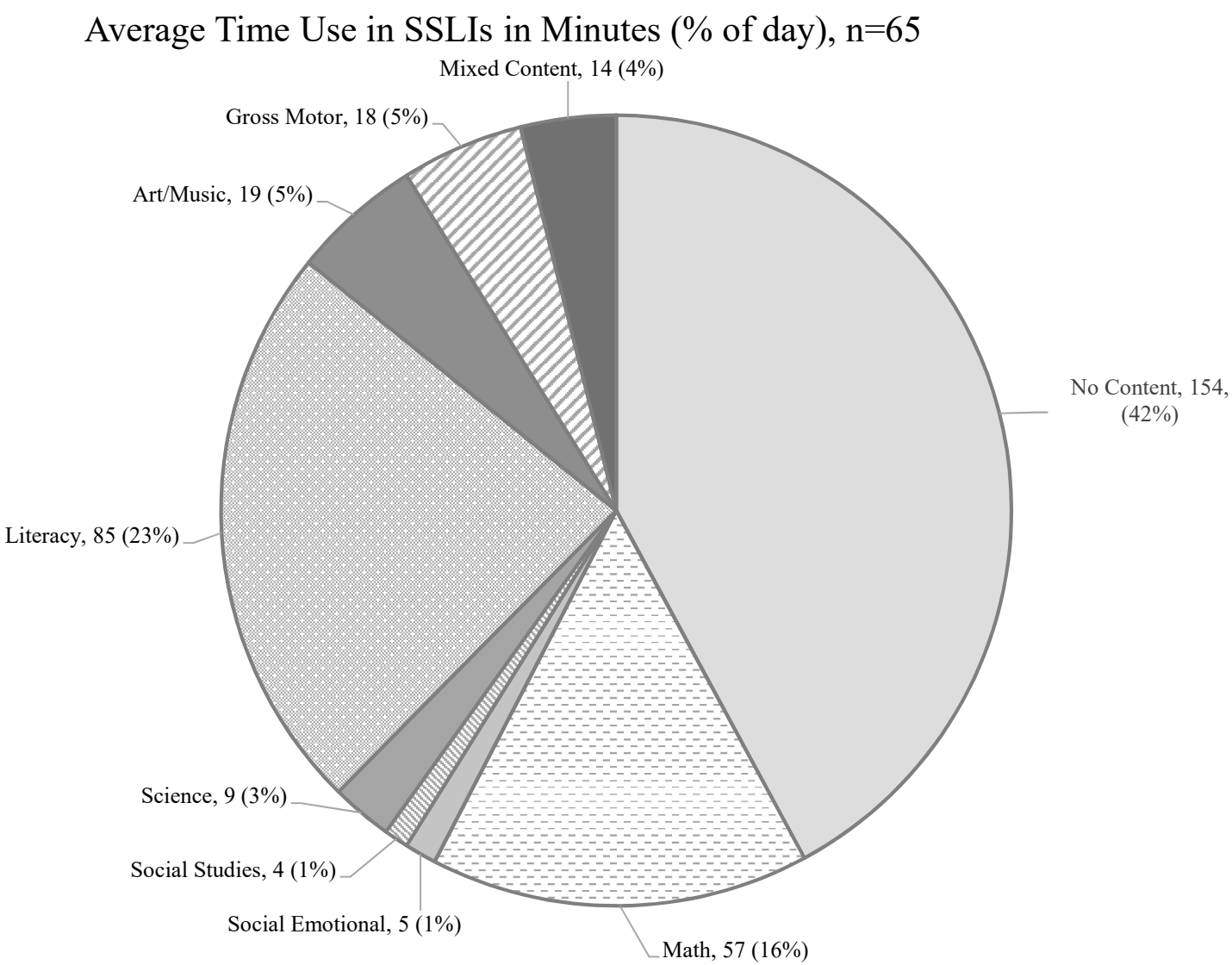
Note. Schools Serving Students With Lower Income (SSLI); Schools Serving Students With Higher Income (SSHI).

Table 6

Variability in Time Use Across SSLI and SSHI Kindergarten Classrooms (n=82)

	Mean	Standard Deviatio	25%	50%	75%	Min	Max
	SSLIs (n=65)						
Core Content							
Literacy	85	32	64	86	107	15	156
Math	57	22	43	54	67	16	153
Science	9	15	0	0	14	0	75
Social Studies	4	7	0	0	4	0	53
Other Content							
Social Emotional	5	9	0	0	5	0	44
Art/music	19	19	0	16	35	0	64
Gross motor	18	18	0	17	31	0	60
Mixed	14	17	0	8	22	0	66
Total Instructional Time	211	36	186	214	231	126	294
Total Noninstructional Time	153	36	133	152	176	66	254
	SSHIs (n=17)						
Core Content							
Literacy	56	21	40	52	72	16	91
Math	49	24	34	50	67	11	88
Science	8	18	0	0	0	0	57
Social Studies	16	13	8	15	21	0	46
Other Content							
Social Emotional	3	5	0	0	3	0	17
Art/music	17	18	0	11	28	0	50
Gross motor	45	27	30	50	60	0	91
Mixed	54	27	49	55	68	0	101
Total Instructional Time	248	12	241	246	260	227	266
Total Noninstructional Time	125	14	118	123	135	91	147

Note. Schools Serving Students With Lower Income (SSLI); Schools Serving Students With Higher Income (SSHI).



Note: Schools Serving Students with Low Income (SSLI). See Table 1 for addition details.

Figure 1.

Average Time Use in SSLI Classrooms During the Kindergarten Day in Minutes, Percentages in Parenthesis (n=65)

For the first morning activity, the teacher plays videos about the alphabet, months, and seasons while students sing along. Morning meeting includes a discussion about seasons, days of the week, and the date. The teacher plays a video to review sight words until the internet connection is disrupted, at which point she shifts to writing the words on the chalkboard.

The class discusses parts of a story and vocabulary to begin the reading lesson, which is interrupted by morning announcements and the pledge of allegiance. They return to reading and discuss parts of the story "Mouse and Lion". The teacher provides directions for a worksheet. Students return to their desks to complete the worksheet, drawing pictures to represent the beginning, middle, and end of the story. Students show completed work to the teacher and have a snack.

The class transitions to watching a movie, "Enchanted Forest," with a different teacher. The movie stops because the battery on the laptop the teacher was using died. The teacher rings a chime and asks the students to make a wish and share it with the class. Then they listen to a story about butterflies and draw pictures of them.

The children clean up and go to lunch. After lunch they go to the auditorium for indoor recess. The students are not physically active during this time. They play some games and watch other students dance. The lead teacher returns to bring the students back to classroom and get settled.

To begin the math lesson, the teacher reads a book about comparing quantities at the market and using a number line to compare. She then engages students in activities about writing and representing the number eight. Students move to tables to work individually. They count 8 cubes and place them on a ten frame. They watch a video about counting. The students do a worksheet about different ways to compose the number 8, practice writing and spelling eight in their workbooks, and then find 8 items in a picture on the board. The math block ends and students prepare to go home.

Figure 2.
Details from an observation of a kindergarten classroom conducted in a SSLI, Wave 1.

Students begin the day in PE. Afterwards, the lead teacher walks them to their classroom. She takes attendance and they have morning meeting. Then, students work in small groups to play a math game where they roll dice and record the number. They clean up the math game and the teacher plays guitar while they sing a greeting song, followed by practicing songs that they will sing for an upcoming program. They discuss the schedule and the museum field trip they will be taking the next day, and also discuss the calendar.

The class moves to the science classroom where they engage in science centers and play games related to dinosaurs, which is interrupted by school-wide announcements. They continue centers and then share what they learned before returning to the regular classroom.

The teacher again discussing the field trip planned for the next day, reviewing appropriate bus and museum behavior. The class has a snack, after which the teacher reads a book, "The Sleep Over". Students answer math questions related to the book. Then, students work in small groups discussing different ways to make 8 using a Rekenrek. The teacher continues reading aloud while the students create combinations of 8 on the rekenrek.*

After math, students have free choice time with options including planting, building, drawing, playing with plastic animals, a dollhouse, puppets, and making jewelry. They clean up and go to lunch. Students, eat, clean up, and go outside for recess. After recess the class goes to the library. The teacher reads the book "The Seven Silly Eaters" aloud. Students are then paired to discuss and draw pictures of their favorite foods. Then they check books out and read until the lead teacher picks them up.

The students return to their classroom and pack up for the day. The teacher reads a book about dinosaurs while they wait for dismissal.

*A Rekenrek is a calculating frame/arithmetic rack. It looks like a simplified abacus, featuring two rows of 10 beads, with each row in sets of five, similar to a 10 frame.

Figure 3.

Details from an observation of a kindergarten classroom conducted in a SSHI, Wave 3

Appendix Table 1

Examples of Content Codes from Narrative Records used During Classroom Observations

Content Codes	Definitions	Examples			
Literacy/Language	School-Level Demographics (% and describing students unless noted otherwise) [a]	"LT works with a group of 14 students on phonetics letters B & K. Remaining 9 students work on making sentences and words with blocks, computer."	"Transition to writing workshop. Students are writing about things they like to do using the pattern of the book they just read."	"LT gives entire class a word to spell with their individual magnetic boards. Then she changes one sound (middle or ending letter) and the children re-spell the new word."	"Going through the letters. Saying the letter name, sound, example. Teacher holds up letter cards. Call and response. Going over sounds. Tapping out words and calling on students to find the letters in the words."
Math	Mathematics instruction and activities (e.g., numbers, counting, comparing quantity, addition).	"Students are doing a sing along counting forward from 1 to 20. Students are doing another sing along. The teacher does calendar time for the month of March. She does a pattern of apple apple book book. Teacher has students counting by 100s up to 116 by 1s."	"In small groups students explain how to make 8 based on the story read to them using a reck and rack (Rekenrek)."	"The students are doing seat work on math problems with their counter chips and workbook present. Using the ten frame to count"	"Math centers 1) 3-D Go Fish with LT 2) Replicate a model with connecting cubes 3) Creating 3-D shapes with play doh 4) Matching a 3-D shape to a 2-D picture."
Science	Science instruction and activities (e.g., health, nature, weather, physical properties, biology).	"Students draw pictures of life cycle of caterpillar then color them."	"Laws of motion demonstration. 12:30 pm kids get up to take turns with a lever - every action has an equal and opposite reaction."	"Identifying fresh vegetables."	"Talk about bugs - still on carpet with LT and discuss a book about bugs."
Social Studies	Social studies instruction and activities (e.g., geography, history, current events, cultural activities).	"Students do the pledge of allegiance and sing the national anthem. Then they review the days of the week."	"Talk about different types of families; family facts – related group of people, different size, formed differently, students will draw their family/identify people"	"All on rug, teacher reading book "One Land Many Cultures", talking about people where they come from and live"	
Social Emotional	Social emotional instruction and activities (e.g., cooperation, getting along with others, paying attention, feelings/emotions, greeting peers).	"Morning meeting practice "thinking with our eyes". "How do you know your friend is ready to say "hi"" What are silent ways to say good morning."	"On rug - LT uses puppy & snail puppet to talk about feelings, expressing & reading them, being friends."	"Mindfulness time. Breathing exercises, talk about sharing & sharing good thoughts."	"Discussion of classroom rules. Running, helping with clean up."
Art/Music	Art or music instruction (e.g., painting, coloring, singing, playing instruments).	"Students work cutting a picture of a spout, spider, sun, and rain. They color the cutouts, put all pieces together."	"Art teacher came in for class. Lesson on Matisse and collages."	"Sing song about ways to say Hello in different languages"	
Gross Motor	Any activity where students were physically active including recess and physical education, as well as dance, stretching, or breaks with structured or unstructured movement.	"Recess, outdoor play"	"Students dance along with the Go Noodle video doing aerobic exercises."	"Students are running laps around the gym. Music is being played. Gym teacher tells students to do 20 jumping jacks and side shuffles. A 2nd group of students participates in the activity."	"LT leads student in exercise in hall while others use bathroom."
Mixed Content	Multiple types of content occurring simultaneously or for under a minute each (e.g., during morning meeting students sing, take attendance, hear announcements, and discuss the calendar with each activity lasting less than a minute; varied activities in small groups that include both math and science; center time). If students read a book focused on a particular content area (e.g., science) reading time was coded as language/literacy. Discussion and activities related to the book were coded with the relevant content code (i.e., science).	"Lead teacher leads class in calendar time, which includes discussion about March, March song, date, pattern on calendar, days of the week"	"Choice time. Blocks, computer, playdoh, molding sand, Legos, reading, board games, paper crafts. Some just sitting."	"Sitting on rug, while teacher asks students questions (some math, some reading) students get stickers for answering"	"Students eat snack, watch video about class writing poems, a little social emotional (working with a partner and learning about someone now)"

(Appendix Table 1, continued)

No Content	This category includes transitions, meals, or downtime with no instructional content. If students sang a song while lining up, it was coded as art/music. When they played a counting game while waiting, it was coded as math. Active play was coded as gross motor. Social or pretend play was coded as social emotional.	"Put books away, line up to go to gym, then walk down to gym."	“LT welcomes class, take down chairs, get ready for breakfast.”	“Fire Drill. Students move in file lined up and exit the school grounds.”	“Lunch”
Activity Codes	**Definitions**				
Whole Group	Teacher led activity engaging the entire class.				
Small Group	Teacher (or aide/other adult) led activity engaging small groups of students or students worked in small groups of two or more, not teacher led.				
Seat Work	Students completed work or tasks on their own. Examples include worksheets, silent reading, artwork, or journaling. The teacher may have walked around, engaging with and checking on children but did not lead the activity.				
Meal	Breakfast, lunch, or snack with at least 75 percent of students eating.				
Transition	Any time the teacher and students switched, waited, or prepared for an activity and that transition lasted at least one minute it was recorded. Transitions include starting or ending the school day, going to the bathroom, lining up and walking to activities including lunch, specials, or recess, shifting from one activity, content type, or grouping to another, or getting materials (e.g., workbooks) to begin the next activity.				
Out	Any time 75% of the students in the class are outside the school building (e.g., recess, nature walk).				

Note . Lead Teacher (LT).

Appendix Table 2

Average Time Use in Kindergarten by Wave for Schools Servings Students from Lower and Higher Income Households

	SSLI						SSHI	
	% and describing stu		Wave 2 (N=15)		Wave 3 (N=20)		Wave 3 (N=17)	
Content Type	% of day	Minutes	% of day	Minutes	% of day	Minutes	% of day	Minutes
Core Content								
Literacy	25	93	22	81	20	73	15	55
Math	15	55	12	45	20	72	13	48
Science	2	7	2	7	4	14	2	8
Social Studies	1	4	1	3	1	4	4	15
Social Emotional	2	7	1	4	0	1	1	3
Art/Music	5	20	5	20	5	19	5	16
Gross Motor	5	17	4	13	7	25	12	44
Mixed	3	11	4	16	5	18	15	53
Total Time on Core Content	59	214	52	189	62	225	67	243
No Instructional Content								
Entering/Exiting at Beginning/End of Day	6	22	7	24	5	19	5	19
Lesson Transitions	11	38	9	33	6	23	6	24
Moving to or From Specials/Recess/Lunch	10	38	14	50	8	30	9	34
Eating/Setting and Cleaning Up From Meal	12	44	14	51	14	50	9	32
Behavior Management	0	1	1	4	0	1	0	1
Other	2	7	4	13	5	18	4	13
Total Time No Instructional Content	41	151	48	176	38	140	34	122
Total	100	365	100	365	100	365	100	365

Note. Note. Schools Serving Students With Lower Income (SSLI); Schools Serving Students With Higher Income (SSHI); not all columns sum to 100% due to rounding. Wave 1 data were collecting in 2015-2016, Wave 2 during 2016-2017, and Wave 3 data were collected during the 2018-2019 school year.