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How do pre-kindergarteners spend their time? Gender, ethnicity, and income as predictors of experiences in pre-kindergarten classrooms

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ABSTRACT

The current paper considers how children spend their time in state-funded pre-kindergarten programs and how time use relates to ethnicity, gender, and family income, based on the assumption that how time is spent in pre-kindergarten is relevant for the programs' success in narrowing achievement gaps. Classroom observations of 2061 children in 652 pre-k programs in 11 states were analyzed. Findings indicated that the pre-kindergarten day was roughly equally divided among free choice, teacher-assigned activities, and meals/routines. Children spent much of their time in language/literacy, social studies, and art, and less time in math and gross motor activities. Much of the pre-k day was spent in 'no coded learning activity.' Children in classes with lower proportions of Latino and African American children and higher average income-to-need ratios were generally engaged in richer and more stimulating experiences. The child-level variables of ethnicity and income were generally unrelated to how children spent their time, above and beyond the effects of classroom-level ethnicity and income. There were generally small, but significant gender differences – always in the gender-stereotyped direction – in how time was spent, especially during free choice time.

1. Introduction

State-funded pre-kindergarten programs have become a primary strategy for addressing income and ethnic disparities in school achievement (Pre-K Now, 2007). Past research indicates that participation in early childhood programs is linked to higher academic and social readiness for school, with higher quality programs linked to greater gains, particularly for the most disadvantaged children (Garces, Thomas, & Currie, 2002; Gormley, Gayer, Phillips, & Dawson, 2005; Howes et al., 2008). Despite ever-increasing access to early childhood programs, achievement gaps persist (Lee & Burkam, 2002; West, Denton, & Germino-Hausken, 2000). For pre-kindergarten to reduce achievement gaps, it is critical that the pre-kindergarten day be used productively and that all participating children experience meaningful activities. If children from different ethnic or income backgrounds, or girls versus boys, are exposed to different types of activities and instruction, pre-kindergarten might

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actually serve to widen achievement gaps, rather than narrow them. Thus, the current paper looks at specific experiences of individual children in the early childhood classroom, rather than global program quality, and investigates the possibility that classroom composition, child ethnicity, family income, and/or gender are linked to those experiences. Whereas measures such as the CLASS and ECERS-R focus on what is being offered to the entire class of children, the Snapshot provides detailed information on what individual children do.

1.1. State-funded pre-kindergarten

Thirty-eight states, plus the District of Columbia, provided some pre-kindergarten services in 2008. In 31 of those states, eligibility for services is based, at least in part, on family income (Barnett, Epstein, Friedman, Stevenson Boyd, & Hustedt, 2008). No state explicitly uses child ethnicity as a criterion for receiving services, but many states determine eligibility using income and other "risk factors" – such as being an English Language Learner, coming from a single-parent home, or low parental education level – all of which tend to co-vary with ethnicity (McLoyd, 1998). Often, the rationale for pre-kindergarten programs, especially those targeted toward at-risk children, is that differences in early childhood experiences are partially to blame for later differences in academic success. For instance, North Carolina's More at Four program is "based on the premise that all children can learn if given the opportunity, but at-risk children have not been given the same level of opportunity" (Peisner-Feinberg & Schaaf, 2007, p. 5). In some states, such as New Jersey and South Carolina, the courts have mandated that pre-kindergarten programs be provided for some low-income children based on the belief that better access to early childhood education is one reason that higher income children achieve at higher levels than their lower income counterparts (Barnett et al., 2008; Education Law Center, n.d.).

1.2. Past research on time use in pre-kindergarten

Numerous studies, including several using the current data set, have linked various aspects of global classroom quality to children's outcomes (Burchinal et al., 2000; Howes et al., 2008; Mashburn et al., 2008; Peisner-Feinberg et al., 2001). From that work we know that the presence of engaging materials, coupled with teachers who provide sensitive instruction, is associated with significant, but modest, gains in academic and social skills in preschool. Past work on global quality, however, does not provide information about how resources, such as learning activities and interactions with the teachers, are distributed across children within a classroom. Further, the modest size of the associations between global quality and children's outcomes indicates that there is much we do not yet know about pre-kindergarten experiences. A more fine-grained understanding of how time is used in the classroom is needed.

There has been some recent work on time use in early childhood programs. For instance, Winsler and Carlton (2003) considered the behavior and activities of children in a single high-quality, university-affiliated laboratory preschool. They found that children spent most of their time on-task, engaged in non-aggressive behavior, with positive or neutral affect; however, they were engaged with teachers less and were off-task more than their teachers believed.

In another study of time use, using the current data set, Chien et al. (in press) employed latent class analysis to classify children into four profiles of classroom activity. The four profiles were free play accompanied by little adult interaction, individual instruction, group instruction, and scaffolded learning. Demographic characteristics were not a primary focus of that paper, but those analyses did control for ethnicity, poverty, and gender and found some between-group differences. Children in the individual and group instruction profiles were more likely to be Latino or Black than children in the free play or scaffolded learning profiles. Children in the individual instruction profile were also most likely to be poor compared to all other children. No gender differences emerged between the profiles.

The current paper builds on the work of Chien et al. (in press) by presenting more detailed descriptive information about time use in the pre-kindergarten classroom, especially with regard to how time is used within the settings of free choice, teacher-assigned, and meals/routines. Further, the current paper takes an in-depth look at how time use varies depending on children's demographic characteristics of ethnicity, income, and gender.

1.3. How should time be used in pre-kindergarten?

Past research provides limited guidance on how much time children should devote to various classroom activities or types of learning; however, there is general professional guidance in this area derived primarily from theory and practice. Below we review the professional knowledge and recommendations around settings (e.g., free choice, teacher-assigned), activities (e.g., reading, fine motor), and teaching (e.g., didactic, scaffolded).

1.3.1. Setting

In the broadest terms, time in pre-kindergarten classrooms can be split into three different categories: 1) *free choice*, during which children choose what to do from a variety of materials and specified areas (e.g., center time); 2) *teacher-assigned*, during which children participate in an activity chosen for them by the teacher along with the entire class (e.g., circle time), as part of a small group of other children (e.g., teacher selected small group-work), or working alone (e.g., individual worksheets); and 3) *meals/routines*, where children are engaged in personal or classroom activities (e.g., eating, using the bathroom, cleaning up, or transitioning between activities). Most early childhood professionals would agree that

children should spend time in each of these settings each day, but specific guidance for appropriate proportions is lacking. The Early Childhood Environment Rating Scale-Revised (ECERS-R; Harms, Clifford, & Cryer, 1998), one of the most widely used measures of quality in early childhood settings, shows a clear preference for high amounts of free choice. For example, a classroom can only be scored in the "good" range or above on the "free play" item (and several of the activities items) if free choice makes up a "substantial portion of the day," defined as one-third of the time. On the other hand, to score in the "good" range or above on the "group time" item, whole group gatherings must be limited to "short periods." Classrooms with "long periods of waiting" must be scored lower than "good" on the "schedule" item. However, Chien et al. (in press) found that children whose days were characterized by high levels of free play and low levels of interactions with adults evidenced the smallest academic and social gains during pre-kindergarten. This finding reminds us that all free time is not equal and that the value of free time may vary with the types of adult interactions in the classroom. Likewise, the Pre-K Version of the Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2008) places a heavy emphasis on the quality of teacher–child interactions, across settings. The current paper provides detailed information about how children spend freetime and what types of teaching interactions they experienced during free time, as well as how teacher-assigned time and meal/routine time are spent.

1.3.2. Activity

Understanding how subject-matter content is approached in the various activity settings is also critical for understanding pre-kindergarten experiences. Policy makers are increasingly concerned with discrete, testable "school readiness" skills, especially in pre-literacy and numeracy. However, many early childhood professionals believe that optimal learning in young children occurs through integrated, hands-on experiences and play, rather than through specific or distinct lessons focused on a single subject area. For example, recommendations for improving specific early academic skills also emphasize using a variety of modalities and incorporating rich, hands-on experiences. The National Research Council's book *Preventing Reading Difficulties in Young Children* (Snow, Burns, & Griffin, 1998) reviews the early literacy research and argues that young children's conversations with adults, exposure to books, and experiences with activities designed to promote phonological awareness, such as rhyming games, are all linked to later reading ability. Similarly, Bowman, Donovan, and Burns (2001) argue that preschool teachers need to value children's early math and science understanding and work to consolidate those understandings by providing opportunities to use and extend math and science concepts and skills. The various subject areas are linked for young children and instruction of discrete skills is often decontextulalized and unstimulating. For those reasons, children in pre-k settings should experience a rich variety of early academic, motor, artistic, and social activities.

1.3.3. Teaching interactions

Teachers play a critical role in the classroom, both in terms of selecting settings and activities for children and in terms of their interactions with children. Interactions between teachers and children designed to promote learning can be divided into two main types: scaffolded and didactic. Scaffolding refers to interactions in which the teacher works within the child's "zone of proximal development." That is, the teacher is aware of the child's knowledge, skills, and interests and provides new challenges and information that are beyond what the child can currently accomplish on his/her own, but within his/her reach with adequate support. Children's knowledge and skills advance when the needed supports are provided (Berk & Winsler, 1995; Bodrova & Leong, 1996; Vygotsky, 1978). Didactic instruction is more rote in nature and involves provision of information from teachers to children. Teachers using a didactic approach provide information to the children through modeling, practice, explanation, recitation, and closed-ended questioning (Smerdon, Burkam, & Lee, 1999).

Most early childhood professionals agree that scaffolded instruction is generally preferential to didactic instruction in terms of helping children understand new information and skills more deeply and maintaining children's interest and motivation. For example, one of the principles listed in NAEYC's position statement on developmentally appropriate practice indicates that "Development and learning advance when children are challenged to achieve at a level just beyond their current mastery, and also when they have many opportunities to practice newly acquired skills" (NAEYC, 2009, principle 11, p. 15). However, didactic instruction clearly has a place in the early childhood classroom. Repetition and recitation help children to consolidate new knowledge (Cornell, Senechal, & Broda, 1988), and different children respond to different types of instruction (Doyle & Rutherford, 1984; Hopkins, McGillicuddy-De Lisi, & De Lisi, 1997). Highly skilled teachers have a variety of teaching approaches in their repertoire. Good instruction involves balancing and blending the different approaches and recognizing the individual needs of children.

1.4. Classroom and child-level demographic characteristics

The achievement gaps that pre-k programs are often designed to address are present when children start kindergarten (Lee & Burkam, 2002; West et al., 2000). One possible explanation for such discrepancies is that children spend their time differently prior to kindergarten entry. For that reason, the current paper looks at the role of ethnicity, family income, and gender in predicting how time is spent in pre-kindergarten.

1.4.1. Ethnicity and socio-economic status (SES)

Lee and Ginsburg (2007) found that preschool teachers of low- versus middle-SES children had different beliefs and goals for their students. Teachers of middle-SES, predominantly White, children were more focused on the needs and interests of individual children and on promoting social skills than the teachers of low-SES, predominantly Latino and African American children. Teachers of the low-SES children, on the other hand, were more focused on preparing children for kindergarten, especially with regard to math and literacy. Likewise, there is some evidence that White and African American children spend their time differently in child care. Tonyan and Howes (2003) found that White children over three years of age in child care were more likely to experience a pattern of high-level interactions with adults and less likely to experience a pattern characterized by high amounts of non-play and non-educational activities than African American children.

1.4.2. Gender

There is a substantial body of evidence demonstrating the effects of gender on early interests and skills that may shape children's experiences in the classroom. From very early in life, boys and girls exhibit distinct interests and behavioral preferences. For example, boys' play involves more gross motor, blocks, and sports and action figures; whereas, girls' play involves more activities that promote fine motor skills (e.g., drawing) and more activities that rely heavily on verbal mediation (see Ruble, Martin, & Berenbaum, 2006). These gender-specific interests and behavioral preferences may lead to boys being differentially involved in cognitively stimulating activities, especially when given a choice of activities, possibly resulting in boys having less exposure to experiences that promote school readiness skills. Indeed, Tonyan and Howes (2003) found that, among children over three years of age in child care, girls were more likely than boys to be in a group characterized by higher levels of creative play or a group that engaged in higher levels of language arts activities, as compared to a group characterized by high levels of non-play and non-educational activities.

1.5. Purposes of the current paper

The goals of the current paper are to detail children's time usage in pre-kindergarten programs on a moment-by-moment basis and to ascertain if these experiences differ by child and classroom-level measures of family income, ethnicity, and children's gender. Understanding how children typically spend time in pre-kindergarten classrooms, and exploring between-group differences in how the pre-k day is spent, may be fruitful avenues for understanding how pre-kindergarten can be improved and why children arrive at kindergarten with different skills. This paper places special emphasis on ethnicity, income, and gender as predictors of classroom experiences, predicated on the belief that what children do and encounter in pre-kindergarten might provide a key to understanding the sources of academic success or continuing difficulties for certain subgroups of children.

Past work does not provide a clear picture of the effects of these demographic characteristics at the classroom versus child level. For instance, children may receive different experiences as a function of the group's characteristics (e.g., a predominantly African American class might have systematically different experiences from a predominantly White class) or an individual child who differs from the majority (e.g., a child from a low-income family in a large class of children from largely middle income families) might have systematically different experiences than the other children in the same class. The multi-level models presented in this paper include ethnicity, family income, and gender at both the classroom- and child-levels as a means of disentangling the different levels of effect.

2. Method

2.1. Study descriptions

The data used in this paper come from two large-scale studies of state-funded pre-kindergarten programs: the National Center for Early Development and Learning's (NCEDL) Multi-State Study of Pre-Kindergarten and the Study of State-Wide Early Education Programs (SWEEP). The two studies shared common goals: to understand variations among pre-kindergarten programs and in turn, how these variations relate to child outcomes at the end of pre-kindergarten. SWEEP data were collected with the intention of combining them with the Multi-State Study data, thus the studies shared most of the same procedures, measures, and coordinating staff.

A detailed description of state selection, recruitment, stratification, and sampling can be found in Early et al. (2005). The Multi-State Study of Pre-Kindergarten collected pre-kindergarten data in 2001–2002 in six states: California, Georgia, Illinois, Kentucky, New York, and Ohio. The SWEEP Study collected pre-kindergarten data in 2003–2004 in five additional states: Massachusetts, New Jersey, Texas, Washington, and Wisconsin. In 2001–2002 (when the Multi-State Study of Pre-Kindergarten began), 79% of all children in the United States who participated in state-funded pre-kindergarten were in one of these 11 states (Barnett, Hustedt, Robin, & Schulman, 2003).

In both studies, programs were selected using a stratified random sampling procedure from all pre-kindergarten programs receiving at least some state funds. In total, 705 schools/centers participated. Across the two studies, 77% of eligible programs that were initially selected agreed to participate. Programs that refused to participate were replaced by another randomly selected program from the same strata whenever possible.

One pre-kindergarten classroom in each center/school was selected at random for participation. Ninety-four percent of the originally selected teachers agreed to participate. When a teacher declined to participate, another teacher was selected at random. Participating teachers completed questionnaires, helped to recruit children and families, and allowed multiple days of observation in their classrooms. In the Multi-State Study, teachers were given $100 in the fall and $100 in the spring in appreciation of their participation. Teachers in the SWEEP Study were given $100 for the entire year, because that project involved fewer days of observation.

2.2. Participating children

The participating teachers helped the data collectors recruit children into the study by sending packets home with all children enrolled in the classroom containing 1) a consent form describing the study, 2) a family contact information sheet, and 3) a short demographic questionnaire. Parents returned these packets to the teacher. Teachers received an additional $20 if 75% of parents returned the consent form, regardless of whether they agreed to participate.

In each classroom, four children were randomly selected to participate from all eligible children in the room. Whenever possible, two girls and two boys were selected in each classroom. Eligible children were those who 1) would be old enough for kindergarten the following fall, 2) did not have an Individualized Education Plan, according to the teacher, 3) spoke English or Spanish well enough to understand simple instructions, according to the teacher, and 4) had parental consent. On average, 61% of parents of otherwise eligible children in each classroom consented to have their child participate in the Multi-State Study of Pre-Kindergarten, and 55% of parents of eligible children in each classroom consented to have their child participate in the SWEEP Study. These consent rates are comparable to those reported in other large studies, such as the National Institute of Child Health and Human Development Study of Early Child Care (National Institute of Child Health and Human Development Early Child Care Research Network, 1997) that reports a 58% positive consent rate. The final complete sample included 2966 children.

2.3. Subsample for the current analyses

A subsample of children was selected for inclusion in the current analyses to meet some specific analytic goals. A primary goal of this paper was to consider the role ethnicity plays in children's experiences in pre-kindergarten settings, thus we include only children from the ethnic groups that were large enough to make meaningful cross-ethnicity comparisons. We excluded the 401 children whose parents reported they were Native American ($n = 21$), Asian ($n = 83$), or multiracial ($n = 297$). Additionally 68 children were excluded due to missing ethnicity information. This left 2497 Latino, African American, and White children.

In order to account for the role of family income, we created an income-to-needs ratio variable, by dividing the family's income by the federal poverty guideline for the family's size, using information gained from the family questionnaire. Children with missing income or family size data ($n = 176$) were excluded. Likewise, children with missing information about how many hours per week the class met ($n = 107$) were excluded. Finally, 153 additional children were excluded from the sample because we did not have information on their classroom time usage (i.e., Emerging Academic Snapshot data were missing). This left us with a final sample of 2061 children. These children were in 652 different pre-kindergarten classrooms. See Table 1 for the demographic characteristics of the subsample of children included in the analyses.

2.4. Measures and procedures

2.4.1. Family questionnaire

As noted above, questionnaires were sent home with all children in each classroom, regardless of eligibility for the study. The child-level variables of ethnicity gender, and income-to-needs ratio come from the family questionnaire. The child sample was selected from those who were eligible and had returned the questionnaire and consent, so the response rate for family questionnaires among study-children was 100%; however, as noted above, some families did not answer the income question, leading us to exclude some children.

Additionally, data from family questionnaires from all children in the class (regardless of study eligibility or selection) were combined to create estimates of the proportion of children in the class who were Latino, African American, and White. Classrooms averaged a 66% return rate on the questionnaire. We believe these are accurate estimates of the ethnic composition of the classes because they correlate highly (over .95) with teacher reports, but the teacher reports had more missing ethnicity data, leading us to use the parent reports here.

2.4.2. Emerging academics snapshot (Ritchie, Howes, Kraft-Sayre, & Weiser, 2001)

The Emerging Academics Snapshot (Snapshot) is a moment-by-moment observation measure that describes children's experiences within their program. Each Snapshot observation day lasted for the entire class period in part-day programs, or until nap-time in full-day programs. In Multi-State Study of Pre-Kindergarten classrooms, the Snapshot was conducted on two separate days in the spring. Due to funding constraints, in SWEEP classrooms, the Snapshot was conducted on a single day in the spring. On average, children in the current subsample were observed and coded 50.0 times ($SD = 22.4$, *Range* = 15–152). Data collectors began by observing the first participating child from a classroom for a 20-s observation

Table 1
Descriptive characteristics of subsample ($n = 2061$).

	n	Percent
Ethnicity		
Latino	599	29.1%
African American	444	21.5%
White	1018	49.4%
Gender		
Male	1037	50.3%
Female	1024	49.7%
Maternal Education		
Less than High School Diploma	368	17.9%
High School Diploma or GED	421	20.4%
Post high school technical training or certificate	336	16.3%
Some college, but no degree	416	20.2%
Associate's	147	7.1%
Bachelor's or higher	354	17.2%
Missing	19	0.9%
Language(s) child speaks at home		
English only	1505	73.0%
Spanish only	214	10.4%
Other language only	16	0.8%
English and Spanish	262	12.7%
English and other language	37	1.8%
Missing	27	1.3%

	Mean	*SD*	Range
Income to Needs Ratio (INR)	1.78	1.4	.05–6.0

period, followed by a 40-s coding period. Then, data collectors observed each of the three other study children in succession. After observing and coding all four children, the data collector started over with the first child. After repeating this cycle five times, data collectors stopped for an average of five minutes to observe the entire classroom and code other measures. After completing the other measures, they resumed Snapshot coding.

The Snapshot consists of a list of possible codes. Each is indicated present or absent within each 20-s period. In classes where children or teachers spoke a language other than English, the same codes were used regardless of the language in which the activity/interaction took place. Seventeen codes are relevant to the current analyses, divided into three sections: setting, activity, and teaching interactions.

2.4.2.1. Setting. Each 20-s observation was coded as taking place in one of three, mutually exclusive, settings. *Free Choice* indicates that children were able to select what and where they would like to play or learn. *Teacher-assigned* indicates that the setting was selected for the child by the teacher and includes whole group like circle time or morning meeting, individual time where the child works alone, and small groups when two or more children were assigned to work together. Note, when children choose to play alone or in small groups, that is counted as free choice. Only settings selected by teachers are counted as teacher-assigned. *Meals/Routines* was selected when children were eating meals or snacks or when they were participating in other routine activities such as standing in line, waiting between activities, or using the bathroom.

2.4.2.2. Activity. The activities in which the target child was participating were coded for each 20-s observation. The child could be engaged in one activity, multiple activities, or no activities. Originally, there were 11 activity codes. *Read To* was coded whenever the target child was being read to by an adult. *Pre-Read/Reading* was coded when the child was reading on his/her own or with peers. Examples of *Letter/Sound* activities include practicing alliterations or rhymes, talking about letter sound relationships, identifying letters, sounding out words, and syllabification games. *Oral Language Development* encompassed any conversations with adults like talking about stories, using a flannel board, answering and asking questions. *Writing* included any real or play writing like tracing letters, pretending to write a grocery list in dramatic play, recording observations in science experiments, or journaling. *Math* includes any number, size, pattern or shape experiences such as counting, identifying written numbers, playing counting games, working with the calendar, measuring for cooking, or making graphs. *Science* involved the identification and exploration of any natural phenomena and included activities like working with mirrors, magnets, sand or water, reading books about insects, and trial and error experimentation. *Social studies* is a broad category that includes talking, reading, or engaging in activities about their world (i.e., their neighborhood, their school, the farm, community workers). It includes activities like creating a block structure or a drawing of the post office or participating in dramatic play about family or community roles. *Art* includes all types of visual art, as well as music. Examples of *Art* activities include painting, working with modeling clay, making collages, listening to music, playing instruments and dancing. *Gross Motor* includes any activity that includes the large muscles of the legs and/or arms, such as running, skipping,

jumping, playing ball, and dancing. *Fine Motor* includes any activity that engages the small muscles of the hand such as stringing beads, building with interlocking blocks, or cutting.

For some analyses, we combined the activity codes related to language/literacy (read to, pre-read/read, letter/sound, oral language development, and writing) into a single category. Note that these individual categories were not mutually exclusive, so the language/literacy category is not the sum of the individual codes. Likewise, even after combining these categories, children could be engaged in more than one activity during a single 20-s observation. For instance, if a child was listening to the teacher read a book about the planets, that observation would be coded as both *language/literacy* and *science.*

If the child were not taking part in any of these 11 activities, no code was given. Such observations are referred to in this paper as 'no coded learning activity.' It is important to note that the learning activities coded in the Snapshot are quite broad and not strictly academic in nature. As noted above, the coding system encompasses activities such as fine motor, gross motor, and art. Further, if a child spent 19 of the 20-s unengaged, and then picked up a book for the final one second, that segment was coded as pre-reading. Thus, 'no coded learning activity' truly means that the child did not do any of the coded activities for the full 20-s.

2.4.2.3. Teaching interactions. Two teaching interactions were coded: scaffolded and didactic. These two were *not* mutually exclusive, meaning a single 20-s observation could be coded as scaffolded, didactic, both, or neither. Teaching interactions could be one-on-one between the teacher and target child, between the teacher and another child in a group in which the target child is taking part, or between the teacher and a group of children of which the target child is a part. Two different types of teaching interactions were coded. *Scaffolded* interactions were those in which the teacher showed an awareness of an individual child's needs and responded in a manner that supported or expanded the child's learning. Scaffolding includes activities like asking open-ended questions, helping a child to expand his/her thoughts, or linking classroom activities to the child's own experiences. *Didactic* interactions are those where the teacher is providing instruction, modeling or demonstrating information to the entire class at the start of a lesson, or asking closed-ended questions of the children. This code included engaging children in rote activities such as counting or saying the days of the week, giving children rules of conduct, or engaging the children in closed-ended activities such as worksheets or directed art.

2.5. Data collector training and reliability

Observers were trained using videos and visits to classrooms. For the Multi-State Study of Pre-Kindergarten, inter-observer reliability was tested using live visits with the measure's authors. For the SWEEP study, inter-observer reliability was tested using both live visits with the measure's authors and video recordings. Prior to data collection, each data collector had to attain an overall kappa across all 28 codes of at least .60 with the correct codes from the video tapes or with one of the measure's authors. The average kappa across the two studies' 43 data collectors and 28 codes was .81 (*SD* = .07, *range* = .63–.96).

Additionally, each data collector had to attain a certain kappa for each section, calculated as his/her median of the codes in that section. For the Setting and Activities sections, that minimum was .55, for the Teaching Interactions section it was .50. Across Setting codes, the average median kappa was .88 (*SD* = .10, *range* = .55–1.00). Across Activity codes, the average median kappa was .81 (*SD* = .09, *range* = .65–1.00). The average median kappa across Teaching Interaction codes and data collectors was .67 (*SD* = .12, *range* = .50–.96).

2.6. Analysis plan

Snapshot data could be reduced and analyzed in multiple different ways, including sheer number of observations of each child in each category; total amount of time each child is estimated to spend in each snapshot category across a week, a month, or a year; and proportion of observed time spent in each category. Looking at sheer counts might be an interesting approach if all children were observed for roughly equal number of minutes or if the number of minutes each child was observed was proportional to the number of minutes they were in the classroom. However, as described above, in the case of the current data, there was large variation in the amount of time children were observed, primarily as a function whether they were in the Multi-State Study of Pre-Kindergarten or SWEEP. Thus, reporting sheer numbers of Snapshots in various categories would not provide much information. Total amount of time across a school year, as estimated by multiplying the proportion of observations in which each code was selected by the total amount of time children are in the setting, is an interesting way to analyze these data, when contemplating how child activities are related to outcomes or other variables. The current paper, however, is meant to consider how pre-k time is allocated and how it might be improved, regardless of how much time there is. For that reason, this paper focuses on proportion of observations in each Snapshot category. Some consideration of total time is presented in Section 4.5.

As a first step in understanding what children experience in pre-k, simple descriptive statistics for proportion of time spent in each Snapshot category across the entire day and within the three different settings were calculated.

Following the descriptive analyses, Hierarchical Linear Models (HLMs) were used to predict proportion of time that was spent participating in the various Snapshot categories across the entire day. A strength of the Snapshot data is the ability to cross the various variables to understand how children spend their time in a more detailed way. For exam-

ple, we can use these data to learn how much time is spent in free choice, how much in math, and also to learn how much of the free time is spent in math. Thus, additional HLMs were estimated to predict the proportion of time children spent in various activities and teaching interactions 1) when they were in free choice, 2) when they were in a teacher-assigned activity setting (i.e., whole group, small group or individual time), and 3) when they were in meals/routines.

3. Results

3.1. How is the pre-kindergarten day spent?

Table 2 presents mean proportions of time spent in each setting, activity, and teaching interaction for all children in the subsample. It is important to note that each child must be in exactly one setting at a time. That is, s/he is either in free choice, or teacher-directed, or meals/routines for each 20-s observation. Regardless of which setting the child is in, s/he can be in no activities, one activity, or multiple activities during a single 20-s observation. For instance, if a child was talking to an adult about her science project, the activity codes given for that observation would be 'oral language development' and 'science.' If a child were sitting quietly, waiting for his bus at the end of the day, no activity would be coded and that observation would be referred to in this paper as 'no coded learning activity.' Last, regardless of setting and activity, the teaching interactions can be 'scaffolded,' 'didactic,' both, or neither. The teaching interactions are not mutually exclusive and can occur with any setting or activity. If, for instance, during the observation described above where the child and adult were discussing his/her science project, the teacher asked a child to elaborate on his/her thinking about the science project, and then asked a closed-ended question of fact about the topic, that observation would be coded as both 'scaffolded' and 'didactic.'

The first set of columns on Table 2 (means and standard deviations, labeled 'Entire Day') refer to the proportion of the observed day the children spent in each setting, activity, and teaching interaction. The second set of columns (labeled 'During Free Choice') is the proportion of the free choice time spent in each activity and each teaching interaction. The third set of columns is the proportion of the teacher-assigned time spent in each activity and teaching interaction, and the fourth set of columns is the proportion of routines and meals spent in each activity and teaching interaction.

As seen in Table 2, children spent almost 30% of the day in free choice and somewhat more time (37%) in a teacher-assigned setting. Approximately one third of the day (34%) was spent eating meals and taking care of personal and classroom routines such as using the bathroom, waiting for the next activity, and cleaning up.

The second section of rows on Table 2 (labeled 'Learning Activity') presents the activities in which the children were engaged during the day. Children spent relatively little time engaged in any one activity, with social studies and art (15% each) being the most common and writing the least common (1%). About one-sixth of the day was spent in the combined category of 'Language/Literacy.' Surprisingly, a full 44% of the day was spent in none of the learning activities coded by the Emerging Academic Snapshot. From the other columns on Table 2, we see that children spent less time in 'no learning activity' when they were in free choice or teacher-assigned activity settings (19% and 23%, respectively) and quite a bit more time in 'no learning activity' during meals and routines (87%).

The third section of rows on Table 2 (labeled 'Teaching Interactions') indicates that just under one-third of children's time was spent in didactic interactions with the teacher. Scaffolded interactions took place less than one-tenth of the time.

3.2. Hierarchical Linear Models

The next step in the analyses involved using HLM to predict how children spent their time in the three mutually exclusive settings (free choice, teacher-assigned, or meals/routine), eight non-mutually exclusive learning activities (language/literacy, math, science, social studies, art, gross motor, fine motor, plus 'no coded learning activity'), and two non-mutually exclusive teaching interactions (didactic and scaffolds). Those analyses were followed by HLMs predicting learning activities and teaching interactions during the three settings.

HLM was used because children are nested within classrooms. Although Snapshots are collected at the child-level, there is considerable within-classroom homogeneity. For example, if the teacher is reading a book to the entire class for 20 min, all children in the study will receive 'teacher-assigned' and 'read to' codes for that entire 20 min. However, during free choice, one target child might be in the housekeeping area (i.e., social studies), while another sorts colored blocks (i.e., math). Therefore, HLM is the best-suited procedure for these data.

The predictor variables were entered into the HLMs simultaneously, after computing the unconditional models to determine how much variance was accounted for by the nesting of children in classrooms. The primary classroom-level predictor variables of interest were: average classroom income-to-needs ratio (called 'INR' from here forward), proportion of children in the classroom who were Latino, proportion of children in the classroom who were African American, and proportion of children who were male. Hours per week that the class meets (*mean* = 23.11, *SD* = 12.65, *range* = 6.5–60) was also included in the models because more hours in the week may allow for more flexibility in the class, leading to a different pattern of time usage. As noted, two variables were used to account for classroom-level ethnicity: proportion of the class that is Latino and proportion of the class that is African American. Each of these is a continuous variable, ranging from 0 to 1, calculated by dividing the number of children of that ethnic group by the total number of children

Table 2
Proportion of time (mean and SD) spent in various settings, activities, and teaching interactions.

	Entire Day ($n = 2061$)		During Free Choice ($n = 1924$)		During Teacher-Assigned Setting ($n = 2055$)		During Meals/ Routines ($n = 2059$)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Setting (mutually exclusive)								
Free Choice	.29	.17						
Teacher-Assigned	.37	.16						
Meals/Routine	.34	.11						
Learning Activity (not mutually exclusive)								
Language/Literacy	.17	.09	.09	.14	.35	.18	.04	.07
Read to	.05	.05	.01	.04	.14	.14	.00	.02
Pre-read/Read	.03	.04	.03	.10	.05	.08	.01	.04
Letter/Sound	.04	.05	.02	.07	.09	.11	.01	.02
Oral Lang. Development	.06	.06	.02	.05	.12	.13	.02	.05
Writing	.01	.03	.02	.06	.02	.05	.00	.01
Math	.08	.06	.06	.11	.15	.14	.02	.05
Science	.11	.09	.15	.19	.16	.16	.01	.04
Social Studies	.15	.11	.31	.26	.15	.16	.02	.05
Art	.15	.09	.16	.19	.24	.16	.04	.09
Fine Motor	.10	.07	.17	.19	.11	.13	.01	.04
Gross Motor	.06	.06	.16	.21	.05	.09	.00	.02
No Coded Learning Activity	.44	.13	.19	.18	.23	.16	.87	.13
Teaching Interactions (not mutually exclusive)								
Didactic	.31	.16	.13	.16	.50	.22	.26	.20
Scaffolds	.09	.08	.05	.09	.16	.16	.03	.06

Note: Language/Literacy is a combination of read to, pre-read/read, letter/sound, oral language development and writing; however those individual categories were not mutually exclusive, so the language/literacy total is lower than the sum of the individual categories.

in the class. The high level of co-linearity prevents us from also including proportion of White children in the classroom. Proportion Latino, proportion African American, and proportion White are all significantly negatively correlated, but the correlation between proportion Latino and proportion African American was the lowest of the three correlations. In this subsample of classrooms, the correlation between the proportion of children in the classroom who are Latino and proportion who are African American is −.28 ($p < .001$); whereas, the correlation between proportion Latino and proportion White is −.63 ($p < .001$), and the correlation between proportion African American and proportion White is −.47 ($p < .001$).

The child-level predictor variables were: child's INR, child gender, child ethnicity. The proportion variables were not centered because they are on the same metric as the outcome variable (proportion). Child ethnicity was entered as a single, two degree of freedom predictor. When a significant effect was found, individual pairwise comparisons were conducted to discern which groups were significantly different one another. This is a conservative approach recommended by basic research methodology texts (e.g., Goodwin, 2005, p. 273–274; Leary, 2004, p. 284).

Additionally, all HLMs (except the unconditional models) control for state, by including 10 dummy codes to represent the 11 states, because past research using these data has indicated significant between-state variation in pre-kindergarten programming (Pianta et al., 2005). However, our agreements with the state departments of education that helped to facilitate this study prevent us from sharing state-level data or making state-by-state comparisons. Additionally, our models do include several classroom-level variables that one might expect to vary by state and potentially be related to time use. For instance, the models include classroom average income-to-needs ratio, which we would expect to vary with targeted versus universal programs. Further, the models include hours per week that the class meets, which we would expect to vary with full-day versus half day programming. Past analyses, however, have indicated that there is within-state variance on these variables and no set of variables has been identified that accounts for all state-level variation. Thus, controlling for state in these models continues to be important.

Following these analyses, additional models were estimated that included the three two-way interactions between gender, ethnicity, and income, and the three-way interaction. Only 9 of the 172 two- and three-way interactions were significant, and no clear pattern emerged, thus the subsequent presentation does not include these interactions.

The HLMs were estimated in SAS® 9.1 using proc mixed. Restricted maximum likelihood (REML) was used in reporting model parameters, and degrees of freedom were estimated using the Containment method, the SAS default (West, Welch, & Galecki, 2006). The child-level variables of income-to-needs, ethnicity, and gender served as level-1 fixed variables. Classroom, hours per week the class meets, average income-to-needs ratio, proportion Latino, proportion African American, proportion male, and state all served as level-2 fixed variables. The intercept was the only random variable. Effects sizes (d) were calculated by dividing the estimates (B) by the standard deviation for the dependent variable; however, due to the portioning between classroom-level and child-level predictors, one should use caution when interpreting the reported effect sizes because predictors at one level may reduce the variance explained (i.e., effect size) at another level (Roberts & Monaco, 2006). For example, the child-level ethnicity variable – though not predictive for meals and routines – may reduce the variance explained by the classroom-level ethnicity variable.

3.3. Entire day

Table 3 presents the HLMs predicting the proportion of the entire day spent in each of the settings, activities, and teaching interactions. The intraclass correlation coefficient (ICC) for activity setting ranged from .83 (meals/routines) to .92 (free-choice), indicating that between 83 and 92% of the variance in time spent in various settings was due to nesting of children in classrooms. Similarly, the ICC for activity ranged from .49 (fine motor) to .68 ('no coded learning activity') for activities; and .70 for scaffolds and .81 for didactic teaching interactions. These values are generally high, indicating that children were often engaged in the same settings, activities, and teaching interactions as their classmates.

Classes that met for more hours per week spent a higher proportion of the time in free choice/center ($d = .01$) and meals/routines ($d = .01$), and a lower proportion of the time in teacher-assigned settings ($d = .02$). Class hours was also positively associated with proportion of time in gross motor ($d = .02$) and negatively associated with proportion of time in language/literacy ($d = .01$), math ($d = .02$), and didactic teaching interactions ($d = .01$).

Children in classes with a higher mean income-to-needs ratio spent a higher proportion of their time in free choice ($d = .12$) and a lower proportion of their time in meals and routines ($d = .18$). They also spent a lower proportion of their time in 'no coded learning activity' ($d = .08$).

The higher the proportion of Latino and/or African American children in the classroom, the less time the children spent in free choice. As in ordinary least squares regression, the estimates (B) indicate the amount of change in the dependent variable that is associated with a one-unit change in the independent variable. In the case of the two classroom ethnicity variables in these models, both the independent and dependent variables are proportions (ranging from 0 to 1). Thus, the size of the estimates for proportion Latino and proportion African American indicate the differences between a classroom that contains no children of that ethnicity (i.e., proportion equals 0) as compared to a classroom that is entirely made up of that ethnicity (i.e., proportion equals 1). For example, the estimate of −.09 for proportion Latino as a predictor of free choice indicates that classrooms that were exclusively Latino spent 9% less time in free choice than classrooms that included no Latino children. Similarly, children in exclusively African American classrooms spent 13% less time in free choice than children in classrooms that had no African American children. That is, for every 1% increase in proportion African American,

Table 3
HLM predicting proportion of time in various setting, activities, and teaching interactions ($n = 2061$).

		Setting			Activity			
		Free Choice	Teacher- Assigned	Meals/Routines	Language/Literacy	Math	Science	Social Studies
Intercept	*B* (*SE*)	.14 (.03)***	.49 (.03)***	.37 (.03)***	.18 (.02)***	.11 (.01)***	.13 (.02)***	.11 (.02)***
Hours class meets per week	*B* (*SE*)	.002 (.0005)***	−.003 (.0005)***	.001 (.0004)**	−.001 (.0003)*	−.001 (.0002)***	−.0002 (.0003)	.0002 (.0003)
Income to Needs Ratio–Class Mean	*B* (*SE*)	.02 (.01)*	.003 (.008)	−.02 (.01)**	−.0005 (.005)	−.001 (.003)	.001 (.005)	.005 (.01)
Prop. Latino	*B* (*SE*)	−.09 (.02)***	.07 (.02)**	.03 (.02)	.05 (.01)**	−.001 (.01)	−.03 (.01)*	−.01 (.02)
Prop. African American	*B* (*SE*)	−.13 (.02)***	.09 (.02)***	.04 (.02)*	.01 (.02)	−.001 (.01)	−.03 (.02)	−.03 (.02)
Prop. Male	*B* (*SE*)	−.0004 (.04)	−.02 (.04)	.02 (.03)	−.002 (.03)	.004 (.02)	−.01 (.03)	−.02 (.03)
Income to Needs Ratio	*B* (*SE*)	.0003 (.001)	.002 (.001)	−.002 (.001)*	.003 (.001)*	.003 (.001)	.003 (.002)*	.004 (.002)
Ethnicity	*F* (2, 1352)	.98	.11	.70	1.39	.03	2.09	.39
Gender	*F* (1,1352)	1.81	.11	1.11	7.84**	2.21	9.19**	9.17**

		Activity (con't)				Teaching Interaction	
		Art	Fine Motor	Gross Motor	No Coded Learning Activity	Didactic	Scaffolds
Intercept	*B* (*SE*)	.15 (.02)***	.14 (.02)***	.01 (.01)	.48 (.03)***	.33 (.03)***	.13 (.02)***
Hours class meets per week	*B* (*SE*)	−.0002 (.0003)	−.0004 (.0002)	.001 (.0002)***	.001 (.0004)	−.001 (.0005)**	.0002 (.0002)
Income to Needs Ratio–Class Mean	*B* (*SE*)	.007 (.005)	−.002 (.004)	.004 (.003)	−.01 (.01)*	−.004 (.01)	−.004 (.004)
Prop. Latino	*B* (*SE*)	.05 (.01)***	.001 (.01)	−.01 (.01)	−.01 (.02)	.02 (.02)	−.01 (.01)
Prop. African American	*B* (*SE*)	.003 (.02)	.01 (.01)	−.02 (.01)**	.04 (.02)	.06 (.02)*	−.04 (.01)**
Prop. Male	*B* (*SE*)	−.05 (.03)	−.02 (.02)	.03 (.02)	.02 (.04)	.06 (.04)	−.03 (.02)
Income to Needs Ratio	*B* (*SE*)	−.001 (.002)	.001 (.001)	−.001 (.001)	−.003 (.002)	−.003 (.002)	.002 (.001)
Ethnicity	*F* (2, 1352)	.70	1.52	2.72	.10	.08	.53
Gender	*F* (1,1352)	50.25***	17.89***	25.61***	1.70	7.22**	.01

Note: $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$. All variables were entered simultaneously. The state in which the pre-k program was located is controlled in all models using 10 dummy variables to represent the 11 states. Hours class meets per week, income-to-needs ratio-class mean, proportion Latino, proportion African American, and proportion male are all classroom-level variables. Income to needs ratio, gender, and ethnicity are child-level variables. For ethnicity, post hoc between-group comparisons for ethnicity were conducted only when the 2 df *F* test was significant.

there is a .13% drop in the proportion of time spent in free choice. The effect size for proportion Latino was .53 and.76 for proportion African American.

Children in classrooms with a higher proportion Latino or African American children spent more time in teacher-assigned settings (*d* for Latino = .44, African American = .56). Children in classrooms with a higher proportion of African American children spent more time eating meals or engaged in routine activities (*d* = .36). As the proportion of Latino children in the class increased, so did the proportion of time children spent in language/literacy activities (*d* = .56) and art (*d* = .56). Proportion Latino was negatively associated with amount of time spent in science (*d* = .33). As the proportion of African American children in the class went up, the proportion of time spent in gross motor activities increased (*d* = .33). When there was a higher proportion of African American children in the classroom, children spent a higher proportion of time in didactic teaching interactions (*d* = .38) and a lower proportion of time in scaffolded teaching interactions (*d* = .38). The gender composition of the classroom (proportion male) was not related to any of the time use variables.

The child-level variables of income-to-needs ratio, gender, and ethnicity were related to some settings, learning activities, and teaching interactions; however, all findings are small. In these models the adjusted means for significant between-group differences only differed by 1–3% and effects sizes were always small (*range* = .003–.22).

Children from families with higher income-to-needs ratios spent less of their time in meals/routines (*d* = .02) and more of their time in language/literacy (*d* = .03) and science (*d* = .03). The child's ethnicity was not associated with any settings, activities or teaching interactions, in these models that also account for the ethnic composition of the class.

Gender was not significantly related to proportion of time spent in any of the settings. Boys spent less time than girls in language/literacy (*adjusted mean* = .16 vs. .17, *d* = .11), art (*adjusted mean* = .14 vs. .16, *d* = .22), and fine motor (*adjusted mean* = .10 vs. .11, *d* = .14). Girls spent less time than boys in science (*adjusted mean* = .10 vs. .11, *d* = .11), social studies (*adjusted mean* = .15 vs. .16, *d* = .09), gross motor activities (*adjusted mean* = .06 vs. .07, *d* = .17). Further, girls spent less time in didactic interactions with teachers than boys (*adjusted mean* = .28 vs. .29, *d* = .06). As anticipated, the 10 dummy codes entered to control for state-level variation were largely significant, even in these models that control for hours per week and classroom income-to-needs ratios (*range of ds* = .002–1.6).

3.4. Free choice time

The same variables were used to predict the activities children selected and the types of teaching interactions they had while they were in free choice. The sample size for these analyses was 1924 because 137 children from the subsample were never observed in free choice and thus could not be included in analyses. During free choice, the proportion of variance accounted for by the nesting of children in classes ranged from .25 (math) to .66 (gross motor). These values for activities and teaching interaction during free choice are markedly lower than they were for the entire day, as would be expected given that each child can choose his/her own activities during free choice.

The associations between these predictors and time use during free choice were largely null; for that reason, they do not appear on a table. The number of hours the class meets per week did not predict time use during free choice, except that children in classes that met for more hours spent a slightly higher proportion of their time in 'no coded learning activity' ($B = .001$, $SE = .001$, $p < .05$, $d = .01$). The mean income-to-needs ratio in the class did not predict any of the time use during free choice variables.

Likewise, the proportion of the class that was Latino or African American was generally unrelated to the activities in which children engaged during free choice. The only exceptions were that children in classes with a higher proportion of Latino children spent more of their time in art ($B = .08$, $SE = .03$, $p < .001$, $d = .42$) and children in classes with a higher proportion of African American children experienced a lower incidence of scaffolded teaching interactions during free choice ($B = -.03$, $SE = .01$, $p < .05$, $d = .33$). The gender composition of the class did not predict any of the time use during free choice variables.

Among the child-level variables, gender was related to most of the activities during free choice, always in gender-stereotyped directions. Boys, as compared to girls, spent less free choice time in language/literacy (*adjusted means* = .08 vs. .10, $p < .001$, $d = .21$), art (*adjusted mean* = .13 vs. .18, $p < .001$, $d = .26$), and fine motor (*adjusted mean* = .17 vs. .19, $p < .05$, $d = .11$). Girls spent less free choice time than boys in science (*adjusted mean* = .14 vs. .17, $p < .001$, $d = .16$), social studies (*adjusted mean* = .30 vs. .33, $p < .05$, $d = .12$) and gross motor (*adjusted mean* = .15 vs. .18, $p < .001$, $d = .14$). Gender was not related to proportion of free choice time spent in math, 'no coded learning activity,' or in didactic or scaffolded teaching interactions.

The child's ethnicity was entirely unrelated to his/her free choice activities or interactions in these models that also included classroom-ethnic composition. Income-to-needs ratio was largely unrelated to free choice activities and teaching interactions, with one exception: children from higher income families did participate in slightly more science during free choice ($B = .01$, $SE = .004$, $p < .05$, $d = .05$). As in the 'entire day' models, the 10 dummy codes entered to control for state-level variation were largely significant (*range of ds* = .02–1.06).

3.5. Teacher-assigned time

We used HLM to predict children's activities and the types of teaching interactions that occurred during teacher-assigned time, using this same set of independent variables. Six children were never observed in a teacher-assigned setting, so are not

included in these analyses, resulting in a final sample size of 2055. During teacher-assigned time, the intraclass correlation coefficients (ICC) ranged from .49 (math) to .71 (science).

As with free time, few associations were found between classroom and child characteristics and time use during teacher-assigned time. The number of hours per week a class meets did not significantly predict any activities or teaching interactions during teacher-assigned time. The only association between average classroom income-to-needs ratio was in predicting gross motor time. Children in classes with higher income-to-needs ratio spent a lower proportion of teacher-assigned time in gross motor activities ($B = -.01$, $SE = .005$, $p < .05$, $d = .11$). The proportion of the class that was Latino was not associated with any of the teacher-assigned time activities or teaching interactions. Children in classes with a higher proportion of African American children did spend a higher proportion of the teacher-assigned time in fine motor ($B = .05$, $SE = .02$, $p < .05$, $d = .38$) and less teacher-assigned time in scaffolded teaching interactions ($B = -.06$, $SE = .03$, $p < .05$, $d = .38$). The proportion of the class that was male was not associated with any of the activities or teaching interactions during teacher-assigned time.

Among child-level variables, few associations were found with time use during teacher-assigned time. Children with higher income-to-needs ratios did spend more time in fine motor ($B = .004$, $SE = .002$, $p < .05$, $d = .03$). Girls spent slightly more teacher-assigned time in art (*adjusted mean* = .25 vs. .24, $p < .05$, $d = .06$) and fine motor than boys (*adjusted mean* = .12 vs. .11, $p < .01$, $d = .08$). All other associations in these models were non-significant. As in the 'entire day' models, the 10 dummy codes entered to control for state-level variation were largely significant in these models (*range of ds* = .001–.85).

3.6. Meals and routines

Last, the HLMs were repeated predicting activities and teaching interactions during meals and routines. Two children were never observed in meals or routines, resulting in a final sample size of 2059. The ICC for the unconditional models indicated that between 15% (gross motor) and 76% (art) of the variance during meals and routines was due to nesting of children in classes.

In the HLMs, classes that met for more hours per week spent more meals/routine time in art activities ($B = .001$, $SE = .0003$, $p < .01$, $d = .01$). The class's mean income-to-needs ratio, the proportion of the class that was Latino, and the proportion of the class that was African American were not significantly related to the proportion of meals/routines spent in any of the activities or teaching interactions.

Very little meal/routine time was spent in any of the learning activities; however, boys spent slightly more meal/routine time than girls in gross motor activities (*adjusted mean* = .005 vs. .003, $p < .01$, $d = .10$). Boys also experienced more didactic teaching interaction during meals and routines than girls (*adjusted mean* = .22 vs. .24, $p < .001$, $d = .10$). African American children spent less meals/routine time in math (*adjusted mean* = .01) than Latino (*adjusted mean* = .02) or White children (*adjusted mean* = .02) ($p < .05$, d for African American vs. Latino = .20; d for African American vs. White = .20). Income-to-needs ratio was unrelated to time use during meals and routines. As in the 'entire day' models, the 10 dummy codes entered to control for state-level variation were largely significant in these models predicting time use during meals and routines (*range of ds* = .002–1.0).

4. Discussion

4.1. Is time well used in pre-kindergarten?

4.1.1. Activities

As described in Section 1, professional recommendations in early childhood emphasize that young children learn from a wide array of activities, including activities that are not typically considered academic for older children, such as art and gross motor. When early academics are defined using this broad definition, children spent over one-half of the day (56%) engaged in some type of early academic activity.

The large proportion of the day spent in 'no coded learning activity' is, however, cause for concern. The learning activity options for the Snapshot were very broad. Further, data collectors were always instructed to 'code up'—meaning that if the child was not engaged in any of the coded activities for 19 s, and then began an activity during the final 1 s of the observation cycle, the activity of that final second was coded. Thus, the fact that children spent so much time not engaged in any of the learning activities indicates that a large portion of the day was spent unoccupied, engaged in routine or maintenance activities like hand-washing, or possibly talking with another child without codable content and without adult interaction. 'No coded learning activity' made up 44% of the entire day and 88% of meals and routines.

Other research has indicated that children in preschool settings are unoccupied a lot of the time. For example, in their study of a high-quality preschool, Winsler and Carlton (2003) looked at 'goal-directed' versus 'non-goal-directed' behavior (e.g., aimless wandering, transitioning between activities). They found that, overall, 4-year-olds spent 33% of their time in 'non-goal-directed activities.' While that number is somewhat lower than the 44% of 'no coded learning activity' found in the current study, given the differences in samples (e.g., high-quality vs. a range of quality) and the fact that the coding systems were somewhat different, their findings tend to support the idea that preschoolers spend a lot of time unoccupied.

It may be that some structural features of pre-k programs are leading to long periods of time without learning activities. For instance, in pre-kindergarten programs that were housed in public schools, the bathroom used by the pre-kindergarteners was often down the hall from the classroom, necessitating that all children use it at the same time. This led to a lot of time waiting in the hall, while the classmates used the facilities. School policies often prohibited any noise in the halls, making it difficult for teachers to use the time for learning activities like singing or conversation. Likewise, some students ate lunch with the older children in the school cafeteria where, in some schools, all conversation was prohibited.

Some may argue that time spent in 'no code learning' activity can help children prepare for success in elementary school, by strengthening patience and self-regulation. If such skills are truly developed in this way, then that time may have some long-term benefits for children. However, we also must acknowledge that some of the behaviors needed to be "good" in school (e.g., waiting in line, sitting quietly for long periods of time) may not be the lifelong learning behaviors we most want to foster. Strengthening literacy, numeracy, and high-order thinking skills – as well as enthusiasm toward learning – is likely to benefit children more as they enter elementary school.

4.1.2. Teaching interactions

Teaching interactions were more than three times as likely to be didactic than scaffolded. During teacher-assigned time, didactic teaching interactions were especially prevalent. Both scaffolded and didactic teaching interactions were less common during free choice than during teacher-assigned time. As discussed earlier, good teachers employ a wide variety of teaching approaches, so some didactic instruction is appropriate. However, by definition, scaffolded interactions take the needs of the child into account and help the child expand his or her knowledge and sophistication of thought. Thus, high-quality preschool instruction involves a high proportion of scaffolded interactions, during both free choice and teacher-assigned time. These data indicate that such interactions are not commonplace.

Didactic instruction may be prevalent for several reasons. Didactic instruction is easier to implement in large groups, requires less individualization and possibly less skill on the part of the teacher as compared to scaffolded instruction. The accountability movement may encourage use of prescriptive curricula that promote didactic instruction so that discrete, demonstrable skills are being addressed during most interactions (NAEYC, 2009; Stipek, 2004).

4.2. How could time-use be improved?

The large proportion of time in 'no coded learning activity' and the low proportion of time in scaffolded teaching interactions beg the questions about how time use could be improved, within the constraints of the pre-k day. Clearly, meals and routines are a necessity. However, ideally that time would be used in a more meaningful way for learning activities and conversations, as well. For example, meals are an excellent time for adults to engage children in conversations about their activities, home-life, and interests. Time spent waiting in line can be used for singing songs, word games, and silent finger plays (in schools where silence is required outside the classroom). Clean-up and preparation for meals can be use for math and science activities such as counting chairs or napkins or categorizing blocks. Hand-washing can be used as a time to discuss hygiene or sing songs that help children understand how long they need to wash their hands (e.g., a verse of Row, Row, Row, Your Boat).

4.3. Is time used equally well in all classrooms?

In general, classrooms with a lower average income-to-needs ratio, and those made up of a higher proportion of Latino or African American children, were somewhat less stimulating and rich. All differences were small, but the direction of the effects always favored wealthier, White children. Lower average income-to-needs ratio was associated with less time in free choice and more time in 'no coded learning activity.' A higher proportion of Latino children in the classroom was associated with less free choice, more teacher-assigned time, and less science. Classrooms with a higher proportion of African American children had less free choice and more teacher-assigned time and meals and routines, and gross motor activities. Further, there were more didactic teaching interactions and less scaffolded teaching interactions when the class included a higher proportion of African American children.

These effects are all small, but they may be important given the consistency of the pattern and the persistent achievement gaps that continue to plague our schools. These between-group differences may be both a cause and a result of achievement gaps. Teachers may feel a need to provide a narrower, more prescriptive and didactic curriculum for children from lower income backgrounds and children of color as a means of directly addressing the achievement gap (Lee & Ginsburg, 2007). This strategy may be backfiring by giving children less time to explore materials on their own and fewer scaffolded teaching interactions, inadvertently exacerbating achievement gaps by reducing children's autonomy and minimizing the press for higher order thinking. Questions of how specific activities and teaching interactions relate to gains in pre-kindergarten for children from different demographic groups will be explored in a future paper.

There is one notable exception to this pattern of less rich experiences when the classroom contains a higher proportion of non-White children. Classes with a higher proportion of Latino children spent more time in language/literacy activities. There is a strong correlation ($r = .84$, $p < .001$) between the proportion of children in the class who are Latino and proportion of children in the class whose parent reported that their first language was not English. Programs serving a high proportion

of English Language Learners may have specific goals that involve increasing children's English language knowledge as a means of improving their readiness for school.

4.4. Are girls' and boys' experiences in pre-kindergarten different?

For the most part, teachers did not actively encourage different activities or systematically use different types of instruction for girls and boys, as evidenced by the few significant gender differences during teacher-assigned time. However, when children selected their own activities, there was a small but consistent pattern of children choosing gender-stereotyped activities. Girls chose to spend more time in language/literacy, art, and fine motor activities. Boys chose to spend more time in science, social studies, and gross motor play. This pattern is consistent with other research indicating a preference for language rich and fine motor activities among girls and more active play among boys (Briggs & Nichols, 2001; Connor & Serbin, 1977). What is not clear from these data is the extent to which these differential interests stem from some innate preferences or from early reinforcement of gender-stereotyped patterns of interest. Regardless, it is encouraging that teachers do not appear to be systematically providing different experiences for children based on gender.

For the most part, this gender pattern was not evidenced when teachers selected activities for the children. Boys do, however, experience more didactic teaching interactions during meals/routines, but not during free choice or teacher-assigned time. Disciplining children for misbehavior and explaining rules are generally didactic interactions. It may be that the rules associated with meals/routines, especially the need to be quiet much of that time, leads to increased misbehavior on the part of boys, resulting in increased didactic interactions.

4.5. Are the between-group differences meaningful?

On average, the pre-kindergarten classes that the children in this subsample attended meet for 23 h per week ($SD = 12$) for 36 weeks ($SD = 4$), meaning children get an average of 828 h of pre-kindergarten across the school year. Thus, the finding that boys spend 1% more time in gross motor activities than girls translates into about eight hours more gross motor time across the entire school year. It is difficult to imagine that so little time would impact children's outcomes; however if these consistent, but small, differences at this age translate into larger differences in later time-use or into larger differences in other settings, they still might be meaningful in understanding later gender gaps.

The HLM estimate of −.09 for proportion of the class that is Latino as a predictor of time in free choice means that a child in a class that is entirely Latino spends 75 fewer hours in free choice during the year than a child in class that contains no Latino children and about 37 fewer hours in free choice than a child in a class that is one-half Latino. The HLM estimate of .06 for proportion of the class that is African American as a predictor of time in didactic teaching means that a child in a class that is entirely African American spends about 50 more hours in didactic teaching interactions than a child in a class that includes no African American children. These larger differences for class-level ethnicity appear to be meaningful and concerning.

4.6. Limitations

Although these data give more information about the minute-by-minute experiences of children in classrooms than have been previously published, they are still somewhat limited in their specificity. For example, recent research in the area of early math instruction emphasizes the need for children to learn much more than counting and shapes. Concepts of comparison (larger, smaller), measurement, and spatial relations should all be emphasized. The math code on the Early Academic Snapshot does not make distinctions among various math concepts, so these data provide no insight into the richness of the math experiences. Likewise, didactic instruction can be meaningless recitation and repetition or it can be used to solidify children's understanding of concepts in interesting and connected ways, but these data do not permit such distinctions.

Further, despite the breadth of the Snapshot coding scheme, there is at least one type of meaningful activity that might be missed by the Snapshot: conversations among peers. If children were chatting amongst themselves (i.e., no adult involved) and the topic of the conversation did not fit into one of the other activity categories (i.e., the conversation could not be coded as science or social studies), no learning activity was coded. There is evidence that conversations with peers are linked to program quality and positive outcomes for young children (Howes, Phillips, & Whitebook, 1992; Ladd, Kochenderfer, & Coleman, 1996), thus this omission may be meaningful. However, our experience in these classrooms indicates that this type of peer-to-peer conversation that lacks any codable topic is rare. Thus, most of the 'no coded learning activity' time during free choice and teacher-assigned activity settings was truly spent unoccupied and the 'no coded learning activity time' during routines and meals was spent engaged only in those routines or eating, not also engaged in productive early learning activities or in meaningful interactions with teachers.

The current sample is large and drawn at random from many of the states making significant investments pre-kindergarten. However, some stratification was used in each of the two original studies when selecting the pre-kindergarten classrooms and different numbers of classrooms were selected in different states, so the current sample is not equivalent to

a simple random sample. We have no reason to believe that our findings would be different in a simple random sample, but we do caution readers against interpreting these findings as representative of the nation or the participating states.

4.7. Next steps

Global classroom quality is related to children's gains in pre-kindergarten (Howes et al., 2008; Mashburn et al., 2008); however, we know little about how individual children's experiences relate to their academic gains. As a next step, these data will allow us to consider more specific classroom experiences and teaching interactions as predictors of children's gains during the pre-kindergarten year. Further, we will consider if classroom experiences are differentially related to children's gains depending on gender, ethnicity, and family income.

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