Do summer time-use gaps vary by socioeconomic status?

Seth Gershenson[◊]
Assistant Professor of Public Policy
School of Public Affairs
American University

July 2013

[◊] Assistant Professor, Department of Public Administration & Policy, American University, 4400 Massachusetts Avenue, NW, Washington, DC 20016-8070. Email: gershens@american.edu.
The author thanks Carl Gershenson, Bradley Hardy, Peter Hinrichs, Alison Jacknowitz, Taryn Morrissey, the associate editor, and two anonymous referees for providing thoughtful comments. Michael S. Hayes provided excellent research assistance. Any remaining errors are my own.

Do summer time-use gaps vary by socioeconomic status?

Seth Gershenson
Assistant Professor of Public Policy
School of Public Affairs
American University

Abstract

Several scholars have suggested that differential rates of summer learning loss contribute to the persistence of achievement gaps between students of different socioeconomic status (SES). The current study tests the hypothesis that differences by SES in both children's and parents' time spent in activities related to children's cognitive and social development widen during the summer vacation using data from two time-diary surveys: the Activity Pattern Survey of California Children and the American Time Use Study. Estimates of Tobit and linear time-use regressions for a variety of activities known to influence children's cognitive and social development provide evidence of statistically and practically significant summer-SES time-use gaps, most notably in children's television viewing.

Keywords: time use, summer learning loss, parental involvement, child development, achievement gap

Much of education policy in the United States aims to eliminate achievement gaps between students of different socioeconomic status (SES). However, such gaps have increased over the past 25 years despite substantial attention and resources having been devoted to their elimination: on both math and reading tests, students at the 90^{th} percentile of the income distribution score about 1.3 standard deviations higher than students at the 10^{th} percentile (Reardon, 2011). Achievement gaps do not necessarily impugn schools' or teachers' performance, however, as neither can directly impact student learning during summer vacation.

Heyns (1978) first suggested that differential rates of summer learning may contribute to the persistence of achievement gaps and several studies have documented significant differences between SES groups in the development of reading and literacy skills during summer vacation (e.g., Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996; Downey, von Hippel, & Broh, 2004). The mechanisms through which summer learning loss operates, therefore, should be of interest to educators and policymakers seeking to improve the academic performance of all students, particularly those of low SES.

The "faucet theory" hypothesizes that the rate of cognitive development of children in low-SES households declines relative to that of more advantaged students during summer vacation because high-SES households are more able to compensate when the flow of resources from the "school tap" is shut off (Entwisle, Alexander, & Olson, 2001). Borman, Benson, and Overman (2005) discuss four potential, and interrelated, mechanisms through which summer learning loss may differentially impact low-SES households. First, investment models hypothesize that high-SES parents have the time and financial resources to invest in the development of children's human capital during the summer vacation (Becker & Tomes, 1986). Second, differences by SES in social and cultural capital may be associated with the use of more effective parenting strategies within high-SES households (Entwisle, Alexander, & Olson, 1997; Heyns, 1978; Lareau, 2003). Third, psychological models hypothesize that parents in high-SES households are more likely to perceive that children and schools desire parental involvement, believe that such involvement will be beneficial, and have higher expectations for children's achievement and behavior, all of which may lead to higher rates of cognitive development during summer vacation (Entwisle et al., 1997; Hoover-Dempsey & Sandler, 1995). Finally, heterogeneity in access or returns to participation in organized summer activities may exacerbate differences in summer learning rates if high-SES students participate in such activities more frequently or gain more from doing so (Cooper, Charlton, Valentine, & Muhlenbruck, 2000). Any combination of these four interrelated sources of differential summer learning rates can cause achievement gaps can grow even when all students learn at the same rate during the school year.

Each of the four mechanisms described in the preceding paragraph suggest that summer-specific differences by SES in children's and/or parent's time use may contribute to summer learning loss and, ultimately, the persistence of the achievement gap. For example, children's participation in activities such as television viewing (Schmidt & Anderson, 2007), reading with parents (Kim, 2006; Kim & White, 2008; Phillips, 2011), conversation with adults (Olson, Bates, & Bayles, 1984; Phillips, 2011), structured play with parents (Slade, 1987), and organized extracurricular activities (Covay & Carbonaro, 2010) is suspected to influence cognitive development. Similarly, parental involvement in children's home and school lives is thought to influence academic performance (e.g., Lee & Bowen, 2006; Avvisati, Besbas, & Guyon, 2010). Accordingly, researchers have examined differences by SES in the time use of both children (e.g., Hofferth & Sandberg, 2001; Bianchi & Robinson, 1997) and parents (e.g., Guryan, Hurst, & Kearney, 2008; Ramey & Ramey, 2010).

However, the existing literature has not tested for summer-specific differences in time use by SES, despite the fact that such differences may contribute to summer learning loss. The current study begins to fill this gap by testing the hypothesis that SES-based gaps in children's and parents' time use widen during summer vacation using time-use data from time-diary surveys of children and parents: the Activity Pattern Survey of California Children (APSCC) and the American Time Use Study (ATUS), respectively. These "summer time-use gaps" are identified by estimating summer×SES interaction effects in both Tobit and linear time-use regressions for a variety of activities known to influence children's cognitive and social development.

Theoretical Background and Literature Review

Summer Learning Loss

Interest in summer vacation's effect on learning dates to the early 1900s. Cooper et al. (1996) reviewed 26 studies on the topic that were conducted between 1906 and 1974, which generally find that math achievement decreases during the summer vacation and either zero or mixed results for reading/literacy. Only one of these early studies stratified the analysis by SES: Hayes and Grether (1969) found that in New York City, high-SES students experienced summer gains in reading achievement, while low-SES students experienced losses.

Cooper et al. (1996) also performed a rigorous meta-analysis of 13 empirical studies of summer learning loss conducted between 1975 and 1995. The authors found that summer learning loss amounts to about one tenth of a test-score standard deviation, which is equivalent to about one month of schooling and is mostly attributable to declines in math achievement. The significantly smaller summer slide in reading/literacy test scores may result from heterogeneity across SES groups in summer learning rates, as the meta-analysis found that high-SES students' reading/literacy test scores significantly improved over the summer vacation, while those of low-SES students significantly declined; no such difference was found for math scores. The SES gap in summer reading gains amounts to about three months of schooling (Cooper et al., 1996).

Two prominent empirical analyses of summer learning loss included in the meta-analysis sample are Heyns (1978) and Entwisle and Alexander (1992, 1994). These studies found evidence of SES-based differences in the summer reading/literacy learning rates of 6th and 7th graders in Atlanta, and in the 1982 first-grade Baltimore public-school cohort, respectively. A critique of both studies is that the results may not generalize to non-urban schools or to urban schools that serve sizable Hispanic populations (Burkam, Ready, Lee, & LoGerfo, 2004).

This critique, and other questions posed by Cook (1996) regarding the validity of testing instruments and the frequency of non-random attrition in the Beginning School Study (BSS) analyzed by Entwisle and Alexander (1992, 1994), indicate the value of methodologically-sound and nationally-representative empirical analyses of summer learning loss. Burkam et al. (2004) and Downey et al. (2004) filled this gap by analyzing the seasonal learning patterns of kindergarten and first-grade students surveyed in the Early Childhood Longitudinal Study – Kindergarten Cohort (ECLS-K). Both studies found significant differences across SES groups in literacy summer learning rates that are similar in magnitude to the results of Cooper et al.'s (1996) meta-analysis. Burkam et al. (2004) also found significant differences by SES in summer gains on math and general-knowledge tests.

Of particular relevance to the current study, Burkam et al. (2004) investigated the direct effect of summer activities including reading, trips, computer usage, and summer school on summer learning and the moderating effects of these activities on the relationship between SES and summer learning. Controlling for summer activities did not substantively change the results described above, as summer-learning gaps between students in the highest and lowest SES quintiles remained greater than 0.15 standard deviations on reading, math, and general knowledge tests. Participating in reading activities was found to have a small but statistically significant positive effect on reading-test gains and educational computer usage was found to have a relatively large and statistically significant positive effect on math-test gains.

A final caveat to the empirical literature on summer learning loss is that the timing of the fall and spring tests used to distinguish summer from school-year learning rates may matter for two reasons. First, because tests are not administered precisely on the first and last days of the school year, simple comparisons of test scores mistakenly count time in school as summer vacation and vice versa. Burkam et al. (2004) and Downey et al. (2004) note the potential importance of this issue and adjust for the actual testing dates in their regression models.

Second, if the stakes of one test are greater than the other, observed differences between fall and spring test scores may result from differential effort levels put forth by students and teachers. This is not a particular concern in analyses of the ECLS-K data, however, as the tests were specifically designed for the survey and had equal stakes. Papay (2011) discusses the importance of both issues in the context of value-added estimates of teacher effectiveness and notes that the unequal distribution of summer learning loss (i.e., students) across teachers likely biases value-added estimates of teacher effectiveness based on spring-to-spring test-score gains.

Children's Time Use, Organized Summer Activities, and Parental Involvement

Differences by SES in the level and quality of parental involvement and children's activities may exist, as wealthier families can afford to invest more time and money in their children's human capital (Becker & Tomes, 1986) and cultural capital (Lareau, 2003). Haveman and

Wolfe (1995) and Borman et al. (2005) reviewed the theoretical literatures on the sources of such differences and the mechanisms through which such differences are likely to impact children's development. Empirical analyses of nationally-representative longitudinal surveys have found causal evidence that home environments and parental involvement influence children's cognitive and non-cognitive development (e.g., Aizer, 2004; Cunha & Heckman, 2008; Todd & Wolpin, 2007), though the precise mechanisms driving such relationships are unclear. Similarly, Ream and Palardy (2008) found that high-SES parents have more social capital than low-SES parents and that the relationship between social capital and academic achievement is positive and stronger in high-SES households.

Using ATUS data from 2003 to 2006, Guryan et al. (2008) showed that better-educated parents spend more total time caring for children despite having fewer children and higher opportunity costs of time (i.e., higher wages). The authors note that if the quality of parental involvement is greater for better-educated parents, quality-adjusted differences would be greater still, which is troubling given the evidence of a causal link between parental involvement and children's development described in the preceding paragraph. Using multiple time-diary surveys from the past 50 years Ramey and Ramey (2010) found that since the mid-1990s maternal time spent with children has increased and that the increase was more than twice as large among college-educated mothers. The authors argue that the latter is at least partly attributable to well-educated mothers attempting to improve their children's chances of being admitted to increasingly selective post-secondary institutions. Mothers typically spend significantly more time with children than do fathers, although this gap has been decreasing recently (Bianchi, 2000). However, the existing literature does not consider the possibility of seasonal variation in differences in parental involvement by SES.

A similar literature examines the differences by SES in children's participation in various activities, along both the extensive (participation) and intensive (time use) margins. Using time-diary data from the 1997 Child Development Supplement (CDS) to the Panel Study of Income Dynamics, Hofferth and Sandberg (2001) found that the children of highly-educated parents tend to spend more time reading and less time watching television. Hofferth (2009) updated this work using data from the 2003 CDS to show that children's time spent reading increased between 1997 and 2003, but did not compute differential growth rates by SES. Unfortunately, the CDS does not collect summer time diaries, which prevents using CDS time diaries to test for summer-SES gaps in children's time use.

To date, the 1989-90 Activity Pattern Survey of California Children (APSCC) was the only time-diary survey of children conducted during the summer months. Bianchi and Robinson (1997) used these data to examine the role of household composition, specifically single motherhood, in determining the amount of time that children spend in four activities: reading, watching television, studying, and performing housework. The authors found that children of college-educated parents spent significantly more time reading and less time watching television than those of less-educated parents. Similarly, children in wealthier households were found to spend significantly more time reading than their counterparts in low-income households. The authors did not, however, examine the possibility of summer-specific differences in children's time use by SES, demographic groups, or household structure.

Two studies have investigated summer-specific differences in the activity patterns of children from different socioeconomic backgrounds, though neither uses time-use data. First, Burkam et al. (2004) compared children's summertime activities across quintiles of household income. The authors show that children in high-income households made more visits to the library and bookstore, read more, and watched less television during the summertime; however, the authors did not compare summertime differences to non-summertime differences in the frequency of these activities. Phillips (2011) reviewed the literatures on children's time spent reading outside of school and parental involvement in children's reading and finds robust evidence of a relationship between the time spent in such activities and children's cognitive development. Similarly, Schmidt and Anderson (2007) reviewed the literature on the impact of television viewing on cognitive development and concluded that the violence contained in entertainment programming likely leads to aggression and disengagement in school-age children and television viewing impedes cognitive development by displacing time spent reading.

Second, Chin and Phillips (2004) conducted an ethnographic study of the summer experiences of 40 fifth-grade students in an urban elementary school in California. The authors found that the largest differences by SES in children's summer activities are not academic in nature, but that students in wealthier households participated in more diverse organized activities. This finding has important implications for the current study, as Covay and Carbonaro (2010) and Hardy and Gershenson (2012) found that participation in organized extracurricular activities is positively associated with academic performance and educational attainment.

Intuitively, academically-oriented summer programs may minimize summer learning loss, and a relatively small, nuanced literature has identified the types of summer programs that most effectively improve student performance. For example, several types of voluntary summer reading programs have been evaluated experimentally (e.g., Kim, 2006; Kim, 2007; Kim & White, 2008). These studies have generally found positive effects of programs that provide books matched to students' reading levels, encourage children to practice reading orally, and are scaffolded; programs that provide books but no parental or teacher support are generally found to be ineffective. Parent scaffolding is a form of parental involvement, as scaffolding is the practice of adults assisting beginning readers only when absolutely necessary by providing "just enough" help to overcome a particular obstacle (Kim & White, 2008).

More generally, recent randomized control trials of high-quality academic summer programs have identified significant impacts of participation in such programs on the literacy skills of low-performing children. For example, Borman, Goetz, and Dowling (2009) found positive and significant effects of the KindergARTen six-week literature and fine arts summer camp on literacy development. The program drew students from over 100 high-poverty schools in Baltimore. The authors note that participants, including children, parents, and teachers, were happy with the program and that such satisfaction is likely a key to the success of summer programs. Similarly, experimental evidence suggests that Building Educated Leaders for Life (BELL), a well-implemented six-week summer program designed to foster academic skills, parental engagement, and social skills, increased the reading skills of low-performing students in New York City and Boston by the equivalent of about one month of schooling (Chaplin & Capizzano, 2006). Borman et al. (2005) investigated the impact of a community-based summer school program targeted to students in impoverished schools and found a significant positive impact on the achievement of students who *attended* the program. Accordingly, the authors stressed that merely providing access to such programs will not work, as parents must encourage and prioritize attendance. The latter finding is particularly relevant to the current study, as recent increases in SES gaps in parental involvement are largely attributable to time spent planning and transporting children to organized activities (Ramey & Ramey, 2010).

Data and Methods

Time-use Data

Interest in time use originated in the 1920s and has increased dramatically since the 1970s (Juster & Stafford, 1991; Fleming & Spellerberg, 1999). However, simple survey questions regarding time use typically yield upward-biased estimates of time spent on both rare and socially-desirable activities. For these reasons, retrospective 24-hour time diaries are the preferred tool with which to measure time use (Juster & Stafford, 1991; Harding, 1997). The current study analyzes data from two such time-diary surveys: the 1989-90 Activity Pattern Survey of California Children (APSCC) and the American Time Use Study (ATUS). Importantly for the current analysis, both surveys conducted time-diary interviews in summer and non-summer months. Because certain demographics, months, and weekends are oversampled, all subsequent analyses are weighted by person-day weights that account for unequal probabilities of selection across households, months, and days of the week.[1]

The APSCC was a random-digit-dial telephone survey designed to measure Californians' exposure to pollutants (Wiley et al., 1991). The data are publicly available and thoroughly described by Wiley et al. (1991) and Bianchi and Robinson (1997).[2] The APSCC interviewed one randomly selected child aged 11 or younger in each of 1,200 sampled households between April 1989 and February 1990. Children aged 9 and older answered and completed their own diary, while children aged 8 and younger were assisted by an adult household member. The population of interest in the context of summer learning loss is school-aged children between the ages of 5 and 12. The APSCC interviewed 652 such children. All subsequent analyses, however, are restricted to the 628 households that reported household income. While the time frame, sample size, and focus on California are limitations of the APSCC, these data are crucial to the current study as the APSCC is the only time-diary survey that interviews U.S. children during both summer and non-summer months.

To compensate for the APSCC's shortcomings, and because parental time spent caring for children is at least as interesting as children's time use, an analogous analysis of parents' time use is conducted using the nationally-representative American Time Use Study. The ATUS is an ongoing time-diary survey of individuals aged 15 and over that has been conducted consistently and annually since 2003 by the U.S. Census Bureau.[3] The ATUS does not directly interview school-aged children, but does ask parents which household members were present for each activity. The current study focuses on the 23,348 households surveyed between 2003 and 2010 that contained one or more school-aged children between the ages of 5 and 12.

Dependent Variables

The APSCC children's time-use diaries contain data on three activities suspected to impact the cognitive development of school-aged children: television viewing, book reading, and conversation with adults. The average daily times spent in each activity are reported in panel A of table 1. Time spent watching television is significantly greater than time spent either reading or conversing with adults. Time-use averages are similar for children of married parents. Sizable percentages of children spent zero time in each activity on the diary day. The implications of this "pile up" at zero are addressed below in the methods section.

There is general agreement that both summer reading and conversation with adults positively impact cognitive development (e.g., Phillips, 2011; Kim, 2006; Olson et al., 1984). However, the decision to consider time spent watching television in the current study merits further discussion, as the nature of television's effect on children's development depends upon the content of viewed programming. Educational programming has repeatedly been found to have both short- and long-term positive effects on numeracy and vocabulary skills, school readiness, and academic performance (Schmidt & Anderson, 2007). Alternatively, time spent viewing entertainment programming may decrease academic performance by displacing time spent reading (Schmidt & Anderson, 2007). Furthermore, a large experimental literature suggests that exposure to violent programming increases aggression, acceptance of aggressive behavior, and desensitization among school-aged children (Murray, 2007).

Unfortunately, the APSCC data do not describe the programming content viewed by children. However, aggregate data on time spent watching television that contrasts the behaviors of high- and low-SES school-aged children is likely informative in the context of the current analysis for two reasons. First, entertainment programming constitutes the majority of school-aged children's television viewing (Schmidt & Anderson, 2007), as most educational programming is aimed at children less than five years of age (Huston, Bickham, Lee, & Wright, 2007; Schmidt & Anderson, 2007). Second, school-aged children in high-SES households watch less total television than their low-SES counterparts, but just as much – if not more – educational programming (Huston et al., 2007). For these reasons, differences across SES groups in television viewing are likely driven by differences in the time devoted to entertainment, rather than educational, programming. Thus, in the current analysis, differential rates of summer television viewing are more likely to impede, rather than promote, summer learning.

A similar comment applies to reading content, as the APSCC distinguishes between time spent reading books and time spent reading periodicals. The current study focuses on book reading because book reading is more likely to positively impact literacy development, although the qualitative results are robust to using total time spent reading in place of book-reading time. Unfortunately, periodical reading is too infrequent to investigate independently in the APSCC.

Panel B of table 1 summarizes parental time spent interacting with children in the nationally representative American Time Use Study. The average parent spent about one hour caring for children on the diary day, where childcare is comprised of time spent in eleven mutually exclusive activities. To better understand summer-SES differences in parental involvement, total childcare is also decomposed into three general categories. Physical care represents about half of total childcare time, on average, and is comprised of time spent watching and caring for children.

Facilitating children's activities constitutes about one sixth of total childcare time and includes time spent planning activities, chauffeuring children, attending events, and waiting for children. While the importance of such activities is not immediately obvious, parental time spent facilitating children's participation in organized activities is likely important, as children's participation in such activities is positively associated with academic performance (Covay & Carbonaro, 2010) and educational attainment (Hardy & Gershenson, 2012). Furthermore, Borman et al. (2005) stress the importance of parents' encouragement of children's attendance.

Parent-child interactions represent the remaining one third of total childcare time and include reading and conversing with children, sport and non-sport play, and arts & crafts; it is generally agreed that such activities stimulate cognitive development (e.g., Phillips, 2011; Kim, 2006; Kim & White, 2008; Slade, 1987; Olson et al., 1984). Average parental time caring for children is similar for married and non-married parents, though employed parents spent about ten fewer minutes per day, on average, caring for children. This difference is primarily driven by differences in time devoted to physical care, which is intuitive. As in the children's time use data, a nontrivial percentage of parents spend zero time in each activity on the diary day.

The analysis of parents' time use will examine both total time spent caring for children *and* time spent in each of the three subcategories defined above. The reasons for considering the former are threefold. First, this is the measure used in much of the previous literature (e.g., Guryan et al., 2008; Ramey & Ramey, 2010). Second, aggregating time spent in each activity into one measure of involvement eliminates the multiple-comparisons problem, as advocated by Schochet (2008).[4] Third, while some categories of parent-child interactions listed in panel B of table 1 may stimulate cognitive development more than others, each is likely to positively impact development in some way. Furthermore, aggregate time spent caring for children can be viewed as a proxy for parental involvement that is robust to measurement error created by time diaries' sampling of person-days, as some of the activities (e.g., arts & crafts) are unlikely to occur on a daily basis. Nonetheless, activity-specific analyses are also conducted to better understand the sources and potential implications of SES gaps in summer time use.

Finally, the current study considers time spent in primary activities only. Several authors have noted that ignoring secondary (or passive) childcare can understate total time spent caring for children by as much as 35% (e.g., Zick & Bryant, 1996; Phillips, 2011). For example, Phillips (2011) speculates that stimulating parent-child conversations may occur in the car, yet are coded as secondary activities in time diaries that code the primary activity as commuting. However, the current study focuses on time spent in primary activities for three reasons. First, interest is in seasonal time-use differences by SES and not in measuring total time spent by parents caring for children. Zick and Bryant (1996) find no significant differences by mothers' educational attainment in secondary childcare time and that wealthier households actually spend more time in secondary childcare. Thus, by restricting the analysis to primary childcare, the current study likely understates SES-based differences in summer time use. Second, primary parent-child interactions are arguably of higher quality (Guryan et al., 2008). As a result, this type of parental involvement is more likely to promote summer learning and thus more relevant to the current study. Finally, a practical reason for restricting the analysis to primary activities is the relatively low quality of data on secondary activities in both the APSCC and ATUS surveys. For example, the APSCC asks about "joint" activities, most of which include watching television while doing something else (e.g., reading or eating), which is problematic as the hypothesized effects of reading and television viewing on children's development are oppositely signed. Similarly, the ATUS asks parents if a child was present for a select group of primary activities such as shopping, working, and eating that are not directly related to children's development.

Independent Variables

The key parameters of interest in the current study are summer vacation-SES interaction effects, the statistical significance of which can be tested, and which quantify summer-specific differentials in time use by SES. This empirical strategy requires that neither time-diary survey conducted season-specific non-random sampling by SES, which is the case and is evidenced by the general lack of significant differences between the summer and non-summer means reported in appendix table A.1. In both surveys, about one quarter of diaries were conducted in the summer, where summer is coded as a binary indicator equal to one for diary days occurring in June, July, or August.[5] Summary statistics for both surveys are reported in appendix table A1.

Discrete measures of parental education and household income proxy for SES, as the existing literature on parental time use stresses the growing differences between college-educated and less-educated parents (e.g., Guryan et al., 2008; Ramey & Ramey, 2010) and household budget constraints likely govern parents' non-work time use and ability to provide access to organized activities.[6] About one third of parents in each survey hold a bachelor degree (or more).

Household income is top-coded and reported in coarse brackets in both surveys, which prohibits using a continuous measure of household income or defining a precise poverty line in the empirical analysis. The APSCC reports household income in increments of $10,000 and top-codes at $70,000. In the ATUS, household incomes are reported in $10,000 increments when below $60,000, $25,000 increments when above $75,000, and are top-coded at $150,000.

As with education, there is substantial variation in household income in both surveys: 20% of APSCC households, and 13% of ATUS households, earned less than $20,000, which is the definition of "low-income household" adopted in the current study. This choice is obvious for the ATUS data, as the U.S. Census' poverty line for a family of four ranged from $18,810 to $21,954 between 2003 and 2010.[7] The 1990 poverty line for a family of four was $13,359, however, making $10,000 a reasonable alternative for the APSCC data. However, low income is defined as < $20,000 in the APSCC analyses, both to facilitate comparisons with the ATUS analyses and for statistical power: only 5% of APSCC households reported income below $10,000. Reassuringly, the main APSCC results are robust to defining low-income as < $10,000.

Control Variables

Several statistical controls are included in the empirical time-use models, both to increase the precision of estimated SES-based gaps in summer time use and to control for potentially confounding omitted variables.[8] The means and standard deviations of these variables are reported in appendix table A.1 and are similar across the two time-diary surveys. Justifications and descriptions of the control variables are provided below in the order they appear in table A.1.

First, to account for possible cultural differences in time use, race and ethnicity indicators are included in the empirical model. Hispanic is coded as a mutually exclusive race category in the APSCC and a non-mutually exclusive ethnicity in the ATUS.

Second, differences across geographic locales in time use are captured by urban, rural, and suburban indicators in the APSCC and a metropolitan area indicator in the ATUS. Such differences may result from differential access to parks, playgrounds, athletic fields, public libraries, performing arts centers, shopping centers, and so on. Similarly, attitudes towards parental involvement may vary across regions of the country for a number of reasons. Empirical analyses of the nationally representative ATUS address this by controlling for state fixed effects, which are important as the intensity of competition for college slots varies by state (Bound, Hershbein, & Long, 2009) and is correlated with parental time use (Ramey & Ramey, 2010).

Third, household composition variables including household size, number of household children, presence of child under the age of two, parent's age, and parents' marital status are included in the empirical models (Zick & Bryant, 1996; Sayer, Bianchi, & Robinson, 2004). Similarly, parents' employment status is accounted for, as employed parents likely have fewer available minutes per day to spend interacting with children. Age is one of the most important predictors of children's time use (Zick & Bryant, 1996), so child's age and a set of grade dummies are included in the APSCC time-use regressions.

Fourth, the day of week, month (for non-summer diaries), and year (for ATUS) are controlled for. Time-use patterns are likely to differ between weekdays and weekends, and even across weekdays (e.g., Fridays may be structurally different from Thursdays). Similarly, time-use patterns may vary by month. For example, the excitement and activities leading to the start of school in September, or the holidays in November and December, may elicit differences in time use. In the ATUS, year dummies control for changes in the national economy, etc.

Methods

Summer time-use gaps by SES are identified by testing the statistical significance of summer-SES interaction effects in multivariate time-use regressions, where SES is proxied for by indicators of "household income below $20,000" and "at least one parent holds a four-year college degree." Time use is greater than or equal to zero, so linear regression is not ideal for two reasons. First, OLS fitted values may be negative. Second, linear models may provide poor approximations of the interaction effects of interest, as table 1 shows that a nontrivial percentage of households spend zero time in each activity.

Thus Tobit regression models are taken as the baseline specification and estimated by maximum likelihood (Wooldridge, 2013; Solon, 2010). The Tobit models are motivated by latent variable models of the form

$$T_i^* = \beta_0 + \beta_1 S_i + \boldsymbol{\beta}_2\mathbf{SES}_i + \delta_1 S_i \times \textit{Low-income}_i + \delta_2 S_i \times \textit{College}_i + \boldsymbol{\gamma}\mathbf{r}_i + u_i, \tag{1}$$

where i indexes individual time diaries, T^* is unobserved (latent) time use (that can be negative), S is a binary indicator of summer vacation, **SES** is a vector of the SES indicators described above, *Low-income* and *College* are indicators that household income was below $20,000 and the parent respondent held a college degree, **r** is the vector of the statistical controls described above, and u is an idiosyncratic error term that, conditional on all observed covariates (**x**), is assumed to be distributed Normal $(0, \sigma^2)$.[9]

The conditional expectation of time use in the Tobit model can then be written

$$E\left(T_i \mid \mathbf{x}_i\right) = \Phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right)\mathbf{x}_i\boldsymbol{\beta} + \sigma \times \phi\left(\frac{\mathbf{x}_i\boldsymbol{\beta}}{\sigma}\right), \tag{2}$$

where Φ and ϕ are the CDF and PDF of the standard-normal distribution, respectively. Testing for the presence of summer time-use gaps requires testing the statistical significance of the summer-SES interaction effects on the RHS of (2). Unlike in linear models, interaction effects in the nonlinear Tobit model are not simply the coefficients on the interaction terms (δ_1 and δ_2), or even the average partial effects (APE) of the interaction terms (Ai & Norton, 2003). Rather, the interaction effect of discrete variables such as the SES indicators is the cross difference

$$\left(\frac{\Delta E\left(T_i \mid \mathbf{x}_i\right)}{\Delta SES} \mid S=1,\mathbf{x}_i \right) - \left(\frac{\Delta E\left(T_i \mid \mathbf{x}_i\right)}{\Delta SES} \mid S=0,\mathbf{x}_i \right). \tag{3}$$

The interaction effect described by (3) is estimated by taking its sample average, which is analogous to the APE of discrete variables. See Wooldridge (2013) for the definition and estimation of Tobit APE.

Standard errors are clustered at the county and state levels in the APSCC and ATUS, respectively. Doing so is important, as clustering at these levels makes statistical inference robust to the presence of unobserved county effects in the APSCC and arbitrary serial correlation within states over time in the ATUS (Angrist & Pischke, 2009; Wooldridge, 2013).[10] Serial correlation would exist within states if, for example, competition for college admissions has increased at differential rates across states (Ramey & Ramey, 2010). Standard errors for the interaction effects are computed via 1,000 bootstrap replications.

A final caveat to the empirical strategy described above is that OLS estimation of linear time-use regressions may be preferable to corresponding Tobit models when records of zero time being spent in specific activities are the result of measurement error caused by time-diary surveys' sampling of household days rather than longer windows (e.g., household weeks) (Stewart, 2009). Foster and Kalenkoski (2010) summarize the debate and test the practical importance of such measurement error using a time-diary survey that interviewed households on two consecutive days. Comparing Tobit and OLS estimates of time-use regressions that use one day's diary to those that aggregate across two days' diaries, the authors find that estimated Tobit partial effects are qualitatively similar to those of OLS. Thus OLS estimates comparable to the main Tobit estimates reported in the text are reported in appendix tables B.1 – B.4 of the online appendix. Reassuringly, OLS estimates are qualitatively similar to estimated Tobit APE.

Results

California Children's Time Use (APSCC)

Table 2 reports the estimated Tobit APE and interaction effects of the SES and summer variables described above on children's time in each of the three activities measured by the APSCC: television viewing, book reading, and conversing with adults. The APE of the control variables included in these models are reported in appendix table A.2 and are generally of the expected sign. Columns 1-3 of table 2 are similar to specifications estimated in the existing literature that restrict δ_1 and δ_2 to equal zero and provide a frame of reference for interpreting summer time-use gaps. For example, column 1 shows that on average the children of college-educated parents watched more than one and a half hours (105 minutes) less television than the children of parents who failed to complete high school. Similarly, the children of high-school educated parents watched nearly one less hour of television than the children of parents who failed to complete high school. There is no such difference in children's television viewing between high- and low-income households.

Columns 4 through 6 of table 2 relax the assumption that δ_1 and δ_2 equal zero, providing a straightforward statistical test for summer time-use gaps. The largest summer time-use gaps are in television viewing, which increases by nearly two hours per day in low-income households relative to high-income households during the summer vacation, and this gap remains strongly statistically significant after making the Bonferroni adjustment for multiple comparisons.[11] The large summer increase in television viewing in low-income households may be attributable to less access to summer activities or adult supervision in such households. To put the summer television gap in perspective, it is similar in size to the overall average difference in television viewing between children of college-educated parents and parents who failed to complete high school observed in column 1 of table 2. Over the course of the summer this amounts to a difference of about 167 hours, or slightly more than one month of school, which is Cooper et al.'s (1996) overall estimate of the "summer setback" experienced by the average student.[12]

The summer gap in television viewing by parents' education is about thirty minutes, though it is imprecisely estimated. Similarly, column 5 shows a ten minute summer gap in reading between children of college-educated parents and parents who failed to complete high school, though again this difference is not statistically significant. The imprecise estimates may result from the small sample size of the APSCC.

Column 6 of table 2 suggests that children in low-income households spend about 12 fewer minutes per day, on average, conversing with parents than their counterparts in wealthier households and this difference remains marginally statistically significant even after making the Bonferroni adjustment for multiple comparisons. Possible interpretations of this finding are that children in low-income households substitute television viewing for conversation during summer vacation or lack access to adults, perhaps due to rigid work schedules. That significant interaction effects are found on the household income terms and not the parental education terms may be related to the findings of Chin and Phillips (2004), who suggest that parents are constrained by income rather than desires or intentions.

To investigate whether summer time-use gaps vary by household structure, table 3 restricts the APSCC sample to children whose parents were married at the time of completing the time diary. Interestingly, the low-income summer gaps in both television viewing and conversation increase in magnitude. Additionally, the college-educated summer gap in television viewing more than doubles. Viewed as a sensitivity analysis, these findings suggest that the main results reported in table 2 are not driven by behaviors in single-parent households.[13] Finally, online appendix tables B.1 and B.2 provide OLS estimates of linear time-use regressions that are otherwise analogous to the Tobit regressions reported in tables 2 and 3. The OLS estimates corroborate the findings discussed above, suggesting that the main results are robust to the measurement issues discussed by Stewart (2009).

Parents' Time Use in the American Time Use Study (ATUS)

Table 4 reports the baseline Tobit APE and interaction effects of the SES and summer variables described above on ATUS parents' total time spent caring for children. The APE of the control variables included in these models are reported in appendix table A.3 and are generally of the expected sign. Column 1 of table 4 restricts δ_1 and δ_2 to equal zero and provides a frame of reference for the interpretation of parental summer time-use gaps. As in the existing literature (e.g., Guryan et al., 2008), column 1 shows significant differences in time use by parents' educational attainment. For example, on average, college-educated parents spend about 16 minutes more per day caring for children than parents who failed to complete high school.

Estimates of the baseline specification are reported in column 2 of table 4. Neither summer-SES interaction effect is precisely estimated and both are smaller in magnitude than the summer gaps in children's time use found in the California data. However, the two interaction effects are jointly significant at 1% confidence, suggesting that summer time-use gaps in parental involvement differ by SES. However, we cannot disentangle the influence of household income from that of parental education on such gaps, perhaps due to the high negative correlation between these two variables: relatively few college-educated parents reside in impoverished households. Nonetheless, the point estimate of the summer-college educated interaction effect is 4 minutes per day, which may be practically significant: this is 25% of the 16-minute overall time-use gap between college-educated parents and parents who did not complete high school.

In column 3 of table 4 the sample is restricted to married respondents, again to verify that the results are not driven by the time-use patterns of single parents. There is no evidence that this is the case, as the interaction effects in column 3 are nearly identical to those in the baseline specification of column 2. Because employment rates are higher among college-educated parents, and employed parents likely have fewer opportunities to participate in childcare, the baseline estimates may be biased downwards by the presence of unemployed, less-educated parents. Column 4 investigates this hypothesis by estimating the baseline specification on a restricted sample of employed respondents. As hypothesized, the point estimate of the summer-college educated interaction effect is larger and becomes marginally statistically significant, but remains similar in magnitude to the baseline estimate in column 2.

To better understand the sources of summer time-use gaps in parental involvement, table 5 reports a series of time-use regressions in which child care is decomposed into time spent physically caring for children, time spent facilitating children's activities, and time spent interacting with children. As in previous tables, the first three columns do not allow for summer-SES interactions. While there are statistically significant differences in time use by parents' education in each of the three activities, the education gaps are largest in physical care and interactions. Interestingly, household income is a better predictor of time spent facilitating children's activities than parents' education, which may be the result of binding budget constraints in low-income households.

Adding summer-SES interactions to the three models in columns 4-6 of table 5 shows that the gap in parents' summer time-use by educational attainment observed in table 4 is largely the product of college-educated parents spending more time facilitating children's summer activities. Additionally, the models estimated in columns 4 and 5 suggest the emergence of an income-based summer time-use gap of 3 to 5 minutes in physical care and the facilitation of activities. The gap in physical care may partially be explained by low-SES households' greater reliance on relative care (Capizzano, Adelman, & Stagner, 2002), though as in the case of total time spent caring for children, the magnitude of these summer time-use gaps may not be practically significant. Again, corresponding OLS estimates of linear parental time-use regressions are qualitatively similar and are reported in online appendix tables B.3 and B.4.

Conclusion and Discussion

This study tests the hypothesis that SES differences in both children's and parents' time use widen during the summer vacation using time-diary data. Identifying such gaps is potentially important, as their presence may contribute to SES differences in summer learning loss, academic performance, and ultimately educational attainment. The largest summer time-use gap is found in children's television viewing, as the analysis of time diaries from the Activity Pattern Survey of California Children (APSCC) shows that children in low-income households watched nearly two more hours per day during the summer vacation than their peers in wealthier households. A smaller, statistically significant summer time-use gap of 12 minutes in conversation with adults is found as well, suggesting that some children in low-income households may substitute television for conversation with parents during summer. Smaller, marginally statistically significant summer time-use gaps in parental involvement by parents' education are found in the nationally representative American Time Use Study (ATUS).

Summer-SES gaps in children's time-use are much larger than those in parents' time use, which is unsurprising given that children's schedules fundamentally change in the summer when they must fill the approximately seven hours normally spent in school. It is also interesting that summer differences in children's time use are primarily observed between households of different income levels, while differences in parents' time use are generally observed between parents of different education levels. Potential explanations of this finding, supported by Chin and Phillips (2004), are that budget constraints and rigid work schedules limit low-income parents' ability to provide access and transportation to summer activities, as well as supervision, which results in increased television viewing by children in low-income households. Indeed, the by-activity analysis of the ATUS in table 5 suggests that parents in low-income households spend significantly less time in summer both physically caring for children and facilitating children's activities, lending additional support to these hypotheses.

The generalizability of California to the greater U.S. is an open and important question, as the strongest evidence of practically significant summer time-use gaps comes from the APSCC. Similarly, because the APSCC was conducted over twenty years ago, it is not obvious that these results generalize to today. Despite these limitations, the APSCC results are interesting for several reasons. First, understanding the behavior of children in as large and diverse a state as California is important in its own right. In fact, the similarities between the summary statistics of the APSCC and ATUS observed in appendix table A.1 suggest that the California sample is approximately representative of the U.S. Second, the summer time-use gaps observed in the APSCC are likely to be at least as large today, as income inequality, SES-based achievement gaps, and disparities in parental involvement between college-educated and less-educated mothers have all increased over the past 25 years (Reardon, 2011; Ramey & Ramey, 2010).

The practical significance of the summer time-use gaps in parental involvement observed in the ATUS time diaries is unclear. While each summer time-use gap is small in absolute terms (e.g., 2 to 5 minutes per day), they represent non-trivial summer-time 25% to 100% increases in overall SES gaps in parental involvement.[14] It is debatable whether an additional five-minute exchange with a parent or five extra minutes reading with a parent before bed directly influences cognitive development, though there may be cumulative effects of these daily differences over the course of a summer. Similarly, short-duration parental activities may create additional learning opportunities and alter children's time use in ways that fall outside the scope of parental involvement, and are thus missed by the ATUS time diaries. For example, a five-minute conversation with a parent may inspire the child to read a book in his or her room. Similarly, a parent spending a few minutes calling another parent to schedule a play date may lead to hours of stimulating play for the child, exposure to new environments, and so on.

Furthermore, the analysis of the ATUS data potentially underestimates the summer time-use gap in parental involvement for at least three reasons. First, if better-educated parents plan more intellectually-stimulating activities, provide more engaging conversation, or encourage the viewing of more educational television programs, quality-adjusted summer time-use gaps would be larger. Second, summer time-use gaps in "per-child" parental involvement may be greater, as better-educated and higher-income households typically have fewer children. Third, if parental time spent caring for children as a secondary activity in time diaries is greater among high-SES parents as well, including secondary activities in a similar analysis may yield larger summer time-use gaps. A fruitful direction for future research includes testing each of these hypotheses.

Finally, summer-specific differences between SES groups in children's and parents' time use are relevant to education policy, as differential rates of summer learning loss potentially contribute to the achievement gap between high- and low-SES students and evidence that participation in stimulating summer activities influences academic performance and educational attainment is mounting. The summer-SES gap in children's television viewing of two hours per day alone amounts to about one month's worth of schooling. How might policy encourage children and/or parents to spend those 110 minutes per day more productively?

First, there may be substantial benefits to the relatively low-cost provision of information that nudges parents, specifically those in low-SES households, to increase the time they spend interacting with, or planning activities for, their children. Recent studies have documented the positive association of children's participation in organized activities with both academic performance (Covay & Carbonaro, 2010) and educational achievement (Hardy & Gershenson, 2012). Furthermore, previous analyses of summer programs have stressed the importance of parents' participation and involvement (Kim & White, 2008; Borman et al., 2005). Simply encouraging or incentivizing parents to take an active role in facilitating children's participation in worthwhile summer activities may be a cost-effective approach to closing the achievement gap, as Chaplin and Capizzano (2006) show that the BELL program had a positive impact on parents' encouragement and facilitation of children's reading activities. Similarly, the summer gap in television viewing suggests the potential benefits of encouraging the production and consumption of educational programming, which is known to positively impact academic performance (Schmidt & Anderson, 2007). Furthermore, there may be large gains to subsidizing the development of high-quality educational programming aimed at older children, as most existing educational programming is intended for preschoolers (Schmidt & Anderson, 2007).

Second, summer learning loss together with a summer time-use gap may provide support for modified year-round school calendars, which have been shown to produce moderate increases in academic achievement, particularly among low-SES students (e.g., Cooper, Valentine, Charlton, & Melson, 2003; Gandara & Fish, 1994). However, modified year-round calendars might negatively impact the social and emotional development of high-achieving students by prohibiting them from independently partaking in privately-provided extended-length camps, and travel programs or pursuing their own academic interests. Therefore, it may be preferable to address inequities in parental involvement either by subsidizing targeted (or voluntary) summer programs or simply subsidizing the summer-program tuitions and fees of children in low-income households, schools, or neighborhoods. For example, summer programs have been shown to increase academic achievement in a variety of urban contexts (e.g., Portz, 2004; Roderick, Jacob, & Bryk, 2004; Chaplin & Capizzano, 2006; Borman et al., 2009). In light of the large summer time-use gap observed in children's television viewing in the current study, it is worth noting that participants in the successful BELL summer program spent significantly less time watching television and playing computer games while attending BELL (Chaplin & Capizzano, 2006). Taken together with the finding that BELL successfully increased parental involvement, these important results suggest that academically-oriented summer programs and policies have the potential to change behaviors, displace unproductive uses of time with more useful activities, and ultimately increase the summer learning rates of low-SES students.

Notes

[1] Both surveys' weights adjust for non-random sampling frames across both households *and* calendar days. The latter results from time-diary surveys' sampling of specific household days rather than households; see Stewart (2009) for further discussion. The ATUS weights also adjust for non-response based on observables. Abraham, Maitland, and Bianchi (2006) create more sophisticated weights to account for non-response in the ATUS using propensity score methods, but find no important differences between analyses that do and do not account for nonresponse.

[2] See http://ucdata.berkeley.edu/data_child.php?recid=23 for APSCC data and documentation.

[3] See http://www.bls.gov/tus/ for ATUS data and documentation.

[4] The multiple comparisons problem occurs when effects on multiple outcomes (dependent variables) or differential effects for multiple sub-groups of the population are considered, thereby increasing the likelihood of finding spurious statistically-significant relationships. Using a single aggregate measure of time spent in childcare, as opposed to multiple measures of time spent in each specific childcare activity, is a way of structuring the data to eliminate the multiple comparisons problem (Schochet, 2008).

[5] A stronger definition of summer vacation is considered in the APSCC data as a robustness check, as about 20% of Californian students attended year-round schools in the early 2000s (Education Bug, 2008). Adding the restriction that children's weekday summer diaries contained fewer than two hours "in school" changes the summer-vacation status of 17 students, or 14% of children who completed weekday summer diaries. Reassuringly, this coding change does not change the main qualitative results of the APSCC analysis.

[6] Unfortunately, indexes or measures of SES that incorporate parents' occupations cannot be constructed because such information is not available in the APSCC.

[7] Source: http://www.census.gov/hhes/www/poverty/data/threshld/.

[8] Specifications that omit the statistical controls produce qualitatively similar results.

[9] The main results are robust to restricting the **SES** vector to only include the college-educated and low-income indicators that are interacted with the summer indicator; these results are reported in table B.5 of the online appendix.

[10] Clustering the standard errors in these ways relaxes the assumption that observations are independently and identically distributed (iid), which is unlikely to be true in the presence of unobserved county effects or repeated observations drawn from states over time even after conditioning on time-invariant state fixed effects (Angrist & Pischke, 2009, p. 318; Wooldridge, 2013, p. 511). Cluster-robust standard errors are also robust to the presence of arbitrary heteroskedasticity. However, it is worth noting that failing to cluster the standard errors does not change the main qualitative results.

[11] The Bonferroni correction is a conservative and robust method for addressing the multiple-comparisons problem that adjusts the critical value used to conduct hypothesis testing by dividing the desired confidence level by the number of comparisons (e.g., to test that a coefficient is significantly different from zero with 5% confidence when M comparisons are made, the critical value becomes 0.05/M). In the current study it is unclear whether the Bonferroni correction should adjust for the three outcomes (activities) being considered (i.e., M = 3) or the three outcomes in conjunction with the two subgroup-specific effects (i.e., M = 6). The ambiguity is a direct result of a tension inherent in multiple-comparison corrections:

> Multiple comparisons corrections should *not* be applied blindly to all outcomes, subgroups, and treatment alternatives considered together. This approach would produce unnecessarily large reductions in the statistical power of the tests. Rather, the testing strategy should strike a reasonable balance between testing rigor and statistical power (Schochet, 2008, p. 4).

With this tension in mind, the current study adjusts for three comparisons (i.e., M = 3) for three reasons. First, this is an exploratory analysis, in which case adjusting for multiple comparisons is less important than in a confirmatory analysis of causal effects. Second, the Bonferonni procedure is conservative by nature in that it overcorrects for the multiple-comparisons problem. Finally, household income and parental education are arguably separate domains, as Borman et al. (2005) suggest that the financial resources associated with former influence time use while the latter may be associated with different parenting techniques. However, the main results for children's television viewing remain statistically significant at 1% confidence even when adjusting for 6 comparisons.

[12] Assuming that the summer is comprised of 90 days, the daily TV gap of 111 minutes amounts to an aggregate gap of 9990 minutes (166.5 hours). Assuming that an average month contains 22 school days and an average school day contains 7 hours of instruction, the average month contains 154 hours of instruction, slightly less than the aggregate TV gap of 166.5 hours.

[13] Estimates for the subsample of households headed by unmarried individuals are not reported, as the sample size is prohibitively small (N = 154).

[14] In column 2 of table 4, for example, the college-summer interaction effect (gap) is 4.2 minutes, which is 28% (4.2/15.1) of the 15.1 minute overall difference in time spent caring for children between college-educated parents and parents who did not complete high school. Similarly, in column 4 of online appendix table B.5 the college-summer interaction effect (gap) is 4.4 minutes, which is 49% of the 9 minute overall difference between college-educated parents and parents who do not hold a 4-year college or university degree.

References

Abraham, K. G., Maitland, A., & Bianchi, S. M. (2006). Nonresponse in the American Time Use Survey: Who is missing from the data and how much does it matter? *Public Opinion Quarterly*, 70(5), 676-703.

Ai, C. & Norton, E. C. (2003) Interaction terms in logit and probit models. *Economics Letters*, 80(1), 123-129.

Aizer, A. (2004). Home alone: supervision after school and child behavior. *Journal of Public Economics*, 88, 1835-1848.

Avvisati, F., Besbas, B., & Guyon, N. (2010). Parental involvement in school: A literature review. *Revue d'Economie Politique*, 120(5), 759-778.

Becker, G.S., & Tomes, N. (1986). Human capital and the rise and fall of families. *Journal of Labor Economics*, 4(3), 1-39.

Bianchi, S. (2000). Maternal employment and time with children: Dramatic change or surprising continuity? *Demography*, 37(4), 401-414.

Bianchi, S.M., & Robinson, J. (1997). What did you do today? Children's use of time, family composition, and the acquisition of social capital. *Journal of Marriage and Family*, 59(2), 332-344.

Borman, G. D., Benson, J., & Overman, L. T. (2005). Families, schools, and summer learning. *The Elementary School Journal*, 106(2), 131-150.

Borman, G. D., Goetz, M. E., & Dowling, N. M. (2009). Halting the summer achievement slide: A randomized field trial of the KindergARTen Summer Camp. *Journal of Education for Students Placed at Risk*, 14(2), 133-147.

Bound, J., Hershbein, B., & Long, B. T. (2009). Playing the admissions game: Student reactions to increasing college competition. *Journal of Economic Perspectives*, 23(4), 119-146.

Burkam, D.T., Ready, D.D., Lee, V.E. & LoGerfo, L.F. (2004). Social-class differences in summer learning between kindergarten and first grade: Model specification and estimation. *Sociology of Education*, 77(1), 1-31.

Capizzano, J., Adelman, S., & Stagner, M. (2002). *What happens when the school year is over? The use and costs of childcare for school-age children during the summer months*. Occasional Paper No. 58. Washington, DC: Urban Institute.

Chaplin, D., & Capizzano, J. (2006). *Impacts of a summer learning program: A random assignment study of Building Educated Leaders for Life (BELL)*. Washington, DC: Urban Institute. Retrieved July 22, 2012, from http://www.urban.org/uploadedPDF/411350_bell_impacts.pdf.

Chin, T., & Phillips, M. (2004). Social reproduction and child-rearing practices: Social class, children's agency, and the summer activity gap. *Sociology of Education*, 77(3), 185-210.

Cook, T. D. (1996). Inequality in educational achievement: Families are the source, but are schools a prophylactic? In A. Booth & J. F. Dunn (Eds.), *Family-school links* (pp. 89-106). Mahwah, NJ: Lawrence Erlbaum.

Cooper, H., Charlton, K., Valentine, J. C., & Muhlenbruck, L. (2000). Making the most of summer school: A meta-analytic and narrative review. *Monographs of the Society for Research in Child Development*, 65(1), 1-127.

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of*

Educational Research, 66(3), 227-268.
Cooper, H., Valentine, J.C., Charlton, K., & Melson, A. (2003). The effects of modified school calendars on student achievement and on school and community attitudes. *Review of Educational Research*, 73(1), 1–52.
Covay, E., & Carbonaro, W. (2010). After the bell: Participation in extracurricular activities, classroom behavior, and academic achievement. *Sociology of Education*, 83(1), 20-45.
Cunha, F., & Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. *The Journal of Human Resources*, XLIII(4), 739-782.
Downey, D. B., von Hippel, P. T., & Broh, B. (2004). Are schools the great equalizer? Cognitive inequality during the summer months and the school year. *American Sociological Review*, 69(5), 613-635.
Education Bug. (2008). Year round school statistics. Retrieved April 19, 2013, from http://www.educationbug.org/a/year-round-school-statistics.html.
Entwisle, D.R., & Alexander, K.L. (1992). Summer setback: Race, poverty, school composition, and mathematics achievement in the first two years of school. *American Sociological Review*, 57, 72-84.
Entwisle, D.R., & Alexander, K.L. (1994). Winter setback: School racial composition and learning to read. *American Sociological Review*, 59, 446-460.
Entwisle, D. R., Alexander, K. L., & Olson, L. S. (1997). *Children, schools, and inequality.* Boulder, CO: Westview.
Entwisle, D.R., Alexander, K.L., & Olson, L.S. (2001). Keep the faucet flowing: Summer learning and home environment. *American Educator*, 25(3), 10-15, 47.
Fleming, R., & Spellerberg, A. (1999). *Using time use data: A history of time use surveys and uses of time use data*. Wellington, New Zealand: Statistics New Zealand.
Foster, G., & Kalenkoski, C. M. (2010). *Tobit or OLS? An empirical evaluation under different diary window lengths*. Australian School of Business Research Paper No. 2010-ECON-01.
Gandara, P., & Fish, J. (1994). Year-round schooling as an avenue to major structural reform. *Educational Evaluation and Policy Analysis*, 16(1), 67-85.
Guryan, J., Hurst, E., & Kearney, M. (2008). Parental education and parental time with children. *The Journal of Economic Perspectives*, 22(3), 23-46.
Harding, D.J. (1997). *Measuring children's time use: A review of methodologies and findings*. Unpublished manuscript, Center for Research on Child Wellbeing: Working paper 97-01.
Hardy, B. L., & Gershenson, S. (2012). *Parental involvement, summer activities, and the intergenerational transmission of educational attainment*. Unpublished manuscript.
Haveman, R., & Wolfe, B. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of Economic Literature*, 33(4), 1829-78.
Hayes, D. P., & Grether, J. (1969). *The school year and vacations: When do students learn*? Paper presented at the meeting of the Eastern Sociological Association, New York.
Heyns, B. (1978). *Summer learning and the effects of schooling*. New York: Academic.
Hofferth, S.L. (2009). Changes in American children's time, 1997 to 2003. *International Journal of Time Use Research*, 6(1), 26-47.
Hofferth, S.L., & Sandberg, J.F. (2001). How American children spend their time. *Journal of Marriage and the Family*, 63(3), 295-308.

Hoover-Dempsey, K. V., & Sandler, H. M. (1995). Parental involvement in children's education: Why does it make a difference? *Teachers College Record*, 97, 310-331.

Huston, A. C., Bickham, D. S., Lee, J. H., & Wright, J. C. (2007). From attention to comprehension: How children watch and learn from television. In N. Pecora, J. P. Murray, & E. A. Wartella (Eds.), *Children and television* (pp. 41–64). Mahwah, NJ: Lawrence Erlbaum.

Juster, F.T., & Stafford, F.P. (1991). The allocation of time: Empirical findings, behavioral models, and problems of measurement. *Journal of Economic Literature*, 29(2), 471-522.

Kim, J. S. (2006). Effects of a voluntary summer reading intervention on reading achievement: Results from a randomized field trial. *Educational Evaluation and Policy Analysis*, 28(4), 335-355.

Kim, J. S. (2007). The effects of a voluntary summer reading intervention on reading activities and reading achievement. *Journal of Educational Psychology, 99,* 505–515.

Kim, J. S., & White, T. G. (2008). Scaffolding voluntary summer reading for children in grades 3 to 5: An experimental study. *Scientific Studies of Reading, 12,* 1–23.

Lareau, A. (2003). *Unequal childhoods: Class, race, and family life*. Berkeley, CA: University of California Press.

Lee, J.S., & Bowen, M.K. (2006). Parent involvement, cultural capital, and the achievement gap among elementary school children. *American Educational Research Journal,* 43(2), 193-218.

Murray, J. P. (2007). TV violence: Research and controversy. In N. Pecora, J. P. Murray, & E. A. Wartella (Eds.), *Children and television* (pp. 183-204). Mahwah, NJ: Lawrence Erlbaum.

Olson, S.L., Bates, J.E., & Bayles, K. (1984). Mother-infant interaction and the development of individual differences in children's cognitive competence. *Developmental Psychology,* 20(1), 166-179.

Papay, J. P. (2011). Different tests, different answers: The stability of teacher value-added estimates across outcome measures. *American Educational Research Journal, 48*(1), 163-193.

Phillips, M. (2011). Parenting, time use, and disparities in academic outcomes. In G. Duncan & R. Murnane (Eds.). *Whither opportunity? Rising inequality, schools, and children's life chances* (pp. 207-228). New York: Russell Sage Foundation.

Portz, J. (2004). Summer school 2000 and 2001: The Boston Public Schools Transition Services Program. In G.D. Borman & M. Boulay (Eds.), *Summer learning: Research, policies, and programs* (pp.103-120). Mahwah, New Jersey: Lawrence Erlbaum Associates.

Ramey, G., & Ramey, V.A. (2010). The rug rat race. *Brookings Papers on Economic Activity*, Spring, 129-199.

Ream, R.K., & Palardy, G.J. (2008). Reexamining social class differences in the availability and the educational utility of parental social capital. *American Educational Research Journal,* 45(2), 238-273.

Reardon, S. (2011). The widening academic achievement gap between the rich and the poor: New evidence and possible explanations. In G. Duncan & R. Murnane (Eds.). *Whither opportunity? Rising inequality, schools, and children's life chances* (pp. 91-116). New York: Russell Sage Foundation.

Roderick, M., Jacob, B.A., & Bryk, A.S. (2004). Summer in the city: Achievement gains in Chicago's Summer Bridge Program. In G.D. Borman & M. Boulay (Eds.), *Summer*

learning: Research, policies, and programs (pp. 73-102). Mahwah, New Jersey: Lawrence Erlbaum Associates.
Sayer, L., Bianchi, S., & Robinson, J. (2004). Are parents investing less in children? Trends in mothers' and fathers' time with children. *American Journal of Sociology*, 110 (1), 1–43.
Schochet, P.Z. (2008). *Technical Methods Report: Guidelines for Multiple Testing in Impact Evaluations* (NCEE 2008-4018). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education
Schmidt, M. E., & Anderson, D. R. (2007). The impact of television on cognitive development and educational achievement. In N. Pecora, J. P. Murray, & E. A. Wartella (Eds.), *Children and television* (pp. 65–85). Mahwah, NJ: Lawrence Erlbaum.
Slade, A. (1987). A longitudinal study of maternal involvement and symbolic play during the toddler period. *Child Development*, 58(2), 367-375.
Solon, G. (2010). A simple microeconomic foundation for a Tobit model of consumer demand. *Economics Letters*, 106(2), 131-132.
Stewart, J. (2009). *Tobit or Not Tobit?* IZA Discussion Paper No. 4588.
Todd, P. E., & Wolpin, K. E. (2007). The production of cognitive achievement in children: Home, school, and racial test score gaps. *Journal of Human Capital*, 1(1), 91-136.
Wiley, J., Robinson, J.P., Cheng, Y., Piazza, T., Stork, L., & Pladsen, K. (1991). *Study of Children's Activity Patterns*. Final Report under Contract No. A733-149, California Air Resources Board: Sacramento, CA.
Wooldridge, J. (2013). *Introductory econometrics*, 5th Edition. Mason, Ohio: South-Western Cengage.
Zick, C. D., & Bryant, W. K. (1996). A new look at parents' time spent in child care: Primary and secondary time use. *Social Science Research*, 25(3), 260–280.

Table 1: Average Daily Time Use (*T*) per Activity (in minutes)

Diaries:	All		Married		Employed	
	Mean *T*	% *T* = 0	Mean *T*	% *T* = 0	Mean *T*	% *T* = 0
Activity	1	2	3	4	5	6
Panel A: Average Children's Time Use in California (APSCC)						
Television	166.0	9.1%	161.9	9.9%		
	(135.3)		(131.0)			
Reading	5.8	86.1%	6.1	85.4%		
	(21.2)		(21.5)			
Convers.	8.5	76.2%	8.1	77.5%		
	(21.6)		(21.9)			
N	628		474			
Panel B: Average Parental Time Use in U.S. (ATUS)						
Child care	61.6	32.3%	61.7	32.7%	51.3	35.3%
	(85.8)		(86.3)		(75.7)	
Phys. Care	32.5	50.0%	31.9	50.1%	25.5	54.4%
	(57.6)		(57.1)		(47.4)	
Activities	10.5	61.8%	10.7	62.6%	9.7	63.3%
	(29.4)		(30.5)		(29.4)	
Interaction	17.8	73.8%	18.2	73.3%	15.4	76.1%
	(46.5)		(46.7)		(43.1)	
N	23,348		18,196		18,231	

Notes: Sample standard deviations are reported in parentheses. Means and standard deviations are weighted adjust for unequal probabilities of sample selection.

Table 2: California Children's Tobit Time-Use Regressions (APSCC)

	No Summer Interactions			Full specification		
Time (minutes):	TV	Reading	Convo.	TV	Reading	Convo.
	1	2	3	4	5	6
Summer (S)	21.6	3.4	-7.4	10.2	3.4	-4.7
	(18.5)	(2.7)	(3.1)**	(24.4)	(2.4)	(3.9)
Low-income·S	.	.	.	111.0+++	1.4	-12.3+
				(30.7)***	(6.0)	(6.0)**
College·S	.	.	.	-31.3	10.0	-4.1
				(33.2)	(8.5)	(3.8)
Household income						
Low (< $20k)	-9.0	2.4	3.7	-31.6	3.9	5.7
	(27.9)	(2.6)	(3.0)	(23.7)	(2.7)	(3.0)*
$20k-$30k	-22.8	-0.4	-0.1	-21.7	-0.5	-0.2
	(16.5)	(2.8)	(2.3)	(15.5)	(2.9)	(2.3)
$30k-$40k	-14.4	-1.3	2.1	-10.7	-1.5	2.1
	(16.3)	(2.4)	(3.6)	(15.1)	(2.3)	(3.6)
$40k-$50k	-49.9	2.5	-2.2	-47.9	2.3	-2.2
	(17.8)***	(2.9)	(2.8)	(16.6)***	(2.8)	(2.8)
$50k-$60k	-22.9	1.3	-3.4	-16.8	0.9	-3.5
	(20.4)	(3.0)	(3.8)	(20.5)	(3.1)	(3.7)
$60k-$70k	-19.6	7.4	0.4	-20.3	7.4	0.4
	(15.2)	(2.4)***	(4.4)	(14.5)	(2.5)***	(4.3)
> $70k	omitted					
Parents' highest degree						
No H.S.	omitted					
High-school	-58.7	-2.4	-6.2	-48.2	-3.2	-6.7
	(26.5)**	(3.2)	(3.7)*	(25.2)*	(3.2)	(3.8)*
Some college	-71.7	-0.2	-7.0	-64.9	-0.7	-7.4
	(27.1)***	(3.1)	(2.9)**	(26.6)**	(3.2)	(3.1)**
4-year degree	-105.6	5.7	-3.7	-94.2	4.9	-3.5
	(26.2)***	(3.2)*	(3.4)	(25.3)***	(3.0)	(3.6)
Pseudo R^2	0.03	0.07	0.05	0.03	0.07	0.05

Notes: N = 628 diaries. Tobit average partial effects are reported that are comparable to OLS estimates. Standard errors are robust to county-level clustering (N = 50). The regressions reported in this table include the full set of controls described in the text; the average partial effects of these controls are reported in appendix table A.2. Low-income is an indicator for total household income < $20,000. College is an indicator for parents holding *at least* a four-year college or university degree. "Summer" indicates a June, July or August diary. ***, **, and * indicate statistical significance at 1, 5, and 10%. +++ and + indicate statistical significance of the SES·S interaction effects at 1 and 10% after making the Bonferonni correction for 3 comparisons. The low-income·S interaction effect in column 4 remains statistically significant at 1% confidence after correcting for 6 comparisons.

Table 3: California Children's Tobit Time-Use Regressions (APSCC)

	Married Parents		
Time (minutes):	TV	Reading	Convo.
	1	2	3
Summer (S)	19.9	3.3	-7.7
	(27.9)	(3.2)	(4.0)*
Low-income·S[1]	140.1[++]	2.6	-26.3[+]
	(53.2)***	(7.7)	(11.1)**
College·S	-60.9	8.0	-4.5
	(35.4)*	(8.3)	(5.9)
HH income			
Low (< $20k)	-34.5	-8.1	8.3
	(23.8)	(4.2)*	(4.1)**
$20k-$30k	8.7	-0.9	0.5
	(17.7)	(3.3)	(3.1)
$30k-$40k	4.4	-2.4	-1.3
	(18.8)	(2.7)	(3.3)
$40k-$50k	-33.8	0.6	-2.1
	(15.4)**	(3.0)	(2.8)
$50k-$60k	-13.2	-2.0	-7.3
	(20.3)	(3.1)	(4.0)*
$60k-$70k	-5.9	5.7	0.3
	(15.7)	(2.8)**	(4.5)
> $70k	omitted		
Parents' highest degree			
No H.S.	omitted		
High-school	-34.9	-5.3	-3.9
	(28.6)	(4.7)	(3.3)
Some college	-55.5	-1.9	-7.3
	(22.0)**	(3.8)	(3.3)**
4-year degree	-69.3	4.3	-3.6
	(18.9)***	(3.5)	(4.1)
Pseudo R^2	0.03	0.07	0.06

Notes: Sample is restricted to children of married parents (N = 474 diaries). Tobit average partial effects are reported that are comparable to OLS estimates. Standard errors are robust to county-level clustering (N = 50). The regressions reported in this table include the full set of controls described in the text and included in the baseline specifications of columns 4-6 of table 2. Low-income is an indicator for total household income < $20,000. College is an indicator for parents holding *at least* a four-year college or university degree. "Summer" indicates a June, July or August diary. ***, **, and * indicate statistical significance at 1, 5, and 10%. ++ and + indicate statistical significance of the SES·S interaction effects at 5 and 10% after making the Bonferonni correction for 3 comparisons.

Table 4: National Aggregate Childcare Tobit Time-Use Regressions (ATUS)

Specification:	No S int.	Baseline	Married	Employed
	1	2	3	4
Summer (S)	-5.1	-5.8	-5.4	-7.7
	(1.4)***	(1.7)***	(2.2)**	(2.0)***
Low-income·S	.	-2.8	-2.8	1.9
		(4.0)	(6.1)	(4.6)
College·S	.	4.2	3.4	4.9
		(2.6)	(2.9)	(1.8)*
Household income				
Low (< $20k)	1.1	1.9	2.4	1.3
	(2.9)	(2.9)	(4.5)	(3.2)
$20k-$30k	-2.7	-2.7	-2.4	-0.8
	(2.7)	(2.7)	(3.3)	(2.3)
$30k-$40k	-1.6	-1.6	-1.7	-2.1
	(3.4)	(3.4)	(3.4)	(3.0)
$40k-$50k	-1.3	-1.3	0.7	-2.9
	(2.6)	(2.6)	(2.9)	(2.7)
$50k-$60k	-0.9	-0.9	-1.3	-2.2
	(2.3)	(2.3)	(2.4)	(2.1)
$60k-$75k	-1.4	-1.4	-1.0	-2.4
	(2.2)	(2.2)	(2.4)	(2.2)
$75k-$100k	-1.4	-1.4	-1.3	-1.9
	(2.0)	(2.0)	(2.2)	(1.9)
$100k-$150k	0.2	0.2	0.2	-1.6
	(2.0)	(2.0)	(2.1)	(1.8)
> $150k	omitted			
R's education				
No H.S.	omitted			
High-school dipl.	6.3	6.3	5.8	4.3
	(2.1)***	(2.1)***	(2.4)**	(2.6)*
Some college	8.0	8.0	9.1	6.1
	(1.8)***	(1.8)***	(1.9)***	(2.6)**
4-yr. college deg.	15.9	15.1	16.3	11.9
	(1.7)***	(1.7)***	(1.9)***	(2.3)***
Observations	23,348	23,348	18,196	18,231
Pseudo R^2	0.05	0.05	0.05	0.05

Notes: Tobit average partial effects are reported that are comparable to OLS estimates. Standard errors are robust to state-level clustering. The regressions reported in this table include the full set of controls described in the text; the average partial effects of these controls are reported in appendix table A.3. R refers to the parent respondent. The sample in column 3 is restricted to married R and the sample in column 4 is restricted to employed R. Low-income is an indicator for total household (HH) income < $20,000. College is an indicator for R holding *at least* a four-year college or university degree. "Summer" indicates a June, July or August diary. ***, **, and * indicate statistical significance at 1, 5, and 10%.

Table 5: National Childcare Tobit Time-Use Regressions by Activity Type (ATUS)

Activity:	Phys. Care	Activities	Interact.	Phys. Care	Activities	Interact.
	1	2	3	4	5	6
Summer (S)	-3.9	-3.9	-1.1	-3.7	-4.4	-1.4
	(1.1)***	(0.6)***	(1.0)	(1.4)***	(0.6)***	(1.3)
Low-income·S	.	.	.	-4.9	-3.0+++	1.8
				(2.7)*	(0.75)***	(2.9)
College·S	.	.	.	1.2	2.2++	-0.3
				(1.6)	(0.67)***	(1.7)
Household income						
Low (< $20k)	3.2	-5.7	2.2	4.3	-5.3	1.7
	(1.8)*	(0.7)***	(1.7)	(1.8)**	(0.7)***	(1.8)
$20k-$30k	-1.2	-4.6	2.3	-1.2	-4.7	2.3
	(1.5)	(0.9)***	(1.8)	(1.5)	(0.9)***	(1.8)
$30k-$40k	0.9	-3.0	0.3	0.9	-3.0	0.3
	(1.3)	(0.8)***	(2.1)	(1.3)	(0.8)***	(2.1)
$40k-$50k	-1.1	-1.7	1.2	-1.1	-1.8	1.2
	(1.5)	(0.7)**	(1.8)	(1.5)	(0.7)**	(1.8)
$50k-$60k	0.5	-2.5	1.3	0.5	-2.5	1.3
	(1.4)	(0.7)***	(1.6)	(1.4)	(0.7)***	(1.6)
$60k-$75k	-0.4	-2.1	-0.0	-0.5	-2.1	-0.0
	(1.4)	(0.8)***	(1.4)	(1.3)	(0.8)***	(1.4)
$75k-$100k	-1.2	-1.4	0.7	-1.2	-1.4	0.7
	(1.1)	(0.6)**	(1.1)	(1.1)	(0.6)**	(1.1)
$100k-$150k	0.0	-0.1	1.1	-0.0	-0.2	1.1
	(1.1)	(0.8)	(1.1)	(1.1)	(0.8)	(1.1)
> $150k	omitted					
R's education						
No H.S.	omitted					
High-school	4.2	0.6	1.6	4.2	0.6	1.6
	(1.6)***	(0.7)	(1.2)	(1.6)***	(0.7)	(1.2)
Some college	5.6	1.1	3.5	5.6	1.1	3.5
	(1.7)***	(0.5)**	(1.3)***	(1.6)***	(0.5)**	(1.3)***
4-yr. college	8.4	1.9	8.7	8.2	1.4	8.7
	(1.6)***	(0.7)***	(1.4)***	(1.5)***	(0.7)**	(1.3)***
Pseudo R^2	0.08	0.05	0.02	0.08	0.05	0.02

Notes: N = 23,348 diaries. Tobit average partial effects are reported that are comparable to OLS estimates. Standard errors are robust to state-level clustering. The regressions reported in this table include the full set of controls described in the text. R refers to the parent respondent. Low-income is an indicator for total household (HH) income < $20,000. College is an indicator for R holding *at least* a four-year college or university degree. "Summer" indicates a June, July or August diary. ***, **, and * indicate statistical significance at 1, 5, and 10%. +++ indicates statistical significance at 1% after making the Bonferonni correction for either 3 or 6 comparisons.

Table A.1: California and National Time Diary Summary Statistics

California Children (APSCC)			U.S. Parents (ATUS)		
Variable	Overall Mean (1)	S/Non-S Mean Difference (2)	Variable	Overall Mean (3)	S/Non-S Mean Difference (4)
Summer (S)	20.9%	n/a		25.0%	n/a
Low-income·S	4.2%	n/a		3.2%	n/a
College·S	6.3%	n/a		7.6%	n/a
Low income (< $20k)	19.6%	0.8%		13.2%	-0.4%
HH inc. $20-$30k	17.2%	-0.3%		10.3%	-0.2%
HH inc. $30-$40k	13.0%	4.8%		11.9%	1.2%*
HH inc. $40-$50k	17.0%	0.9%		8.9%	-0.6%
HH inc. $50-$40k	8.7%	7.7%*		9.5%	0.1%
HH inc. $60-$70k	9.6%	-4.9%	HH inc. $60-$75k	12.0%	0.6%
HH inc. > $70k	15.0%	-9.0%*	HH inc. $75-$100k	16.4%	-0.2%
			HH inc. $100-$150k	10.6%	0.0%
			HH inc. > $150k	7.2%	-0.6%
No H.S. diploma	9.7%	-2.1%		14.1%	0.6%
H.S. diploma	21.1%	1.3%		28.6%	-0.5%
Some college	32.7%	8.9%		26.2%	0.6%
4-year college degree	36.4%	-7.9%		31.1%	-0.6%
White	69.5%	-5.8%		82.5%	0.7%
Black	5.3%	-0.1%		11.4%	-0.2%
Hispanic	19.1%	8.3%		21.2%	-0.1%
Asian	4.3%	-2.1%		3.8%	-0.1%
Other race	1.5%	-0.3%		2.3%	-0.3%
Suburban locale	41.5%	4.6%	Metro statistical area	82.6%	0.0%
Rural locale	19.3%	-2.0%	Northeast region	17.1%	0.5%
Urban locale	37.5%	-3.0%	Southern region	34.0%	0.2%
			Midwest region	24.0%	1.5%*
			Western region	24.8%	-2.2%*
Household members	4.6	-0.1		4.4	0.0
	(1.4)			(1.3)	
Household children	2.1	-0.1		1.5	0.0
	(0.9)			(0.7)	
Child (< 2) present	7.8%	3.7%		12.5%	0.7%
Child R's age	8.1	0.3	Parent's age (R)	21.1	2.5***
	(2.0)			(16.5)	
Child R is male	52.3%	0.3%	Male parent R	23.7%	3.7%***
Single parent	18.1%	-1.3%		14.8%	0.0%
Cohabitating parents	3.8%	-1.3%		3.1%	-0.1%
Married parents	78.1%	2.6%		82.2%	0.1%
Unemployed R	4.7%	-4.3%		4.8%	0.0%
Employed R	92.9%	0.9%		77.5%	-1.7%**
Weekday diary	57.9%	1.4%		56.8%	-0.2%
Friday diary	12.9%	4.2%		14.4%	-0.5%
Weekend diary	29.2%	-5.6%		28.8%	0.7%
January diary	11.8%	n/a		8.9%	n/a

February diary	13.8%	n/a		7.0%	n/a
March diary	0.0%	n/a		7.9%	n/a
April diary	5.5%	n/a		8.8%	n/a
May diary	9.6%	n/a		8.7%	n/a
September diary	3.4%	n/a		8.5%	n/a
October diary	19.0%	n/a		8.7%	n/a
November diary	9.7%	n/a		8.4%	n/a
December diary	0.1%	n/a		8.1%	n/a
First-grade	16.2%	1.2%	2002 diary	3.3%	n/a
Second-grade	14.5%	-4.2%	2003 diary	12.5%	-0.3%
Third-grade	15.0%	9.1%*	2004 diary	12.5%	0.1%
Fourth-grade	10.8%	3.6%	2005 diary	12.4%	0.4%
Fifth-grade	14.2%	-1.3%	2006 diary	12.4%	-0.7%
Sixth-eighth grade	11.6%	-7.3%**	2007 diary	12.3%	-0.3%
			2008 diary	12.3%	0.5%
R's spouse employed	71.7%	4.1%	2009 diary	12.3%	1.1%
R's spouse unempl.	1.4%	-0.1%	2010 diary	10.0%	3.5%
N (unweighted)	628			23,348	

Notes: Sample standard deviations of non-binary variables are reported in parentheses. Variable definitions are identical in both surveys unless otherwise noted. R stands for respondent and HH for household. Means and standard deviations in both surveys are computed using sampling weights that adjust for unequal probabilities of sample selection across both households and days. ***, **, and * indicate the statistical significance of the mean differences between the summer and non-summer means reported in columns 2 and 4 at 1, 5, and 10% confidence, respectively.

Table A.2: California Children's Tobit Time-Use Regressions (APSCC)

	No Summer Interactions			Full specification		
Time (minutes):	TV	Reading	Convo.	TV	Reading	Convo.
	1	2	3	4	5	6
White	omitted					
Black	-20.1	-3.9	3.7	-25.8	-3.5	4.3
	(21.8)	(3.7)	(3.4)	(19.8)	(3.9)	(3.4)
Hispanic	-34.6	-2.9	-5.7	-31.3	-2.8	-5.7
	(19.3)*	(1.6)*	(2.4)**	(17.9)*	(1.7)	(2.4)**
Asian	12.8	-3.7	-3.0	15.3	-3.7	-3.1
	(17.7)	(3.2)	(2.8)	(17.5)	(3.1)	(2.8)
Other race	7.9	7.0	-1.5	5.9	7.3	-1.4
	(29.2)	(4.2)*	(4.2)	(29.3)	(4.3)*	(4.3)
Child's age	14.6	0.7	-1.6	14.3	0.9	-1.6
	(6.5)**	(1.0)	(1.0)*	(5.9)**	(1.0)	(1.0)
Male child	11.0	-1.6	0.7	8.2	-1.5	1.0
	(9.3)	(1.8)	(1.6)	(9.6)	(1.7)	(1.7)
Child's grade						
Kindergarten	49.4	8.0	-5.8	46.3	8.7	-5.7
	(39.7)	(6.8)	(6.2)	(35.5)	(6.8)	(6.6)
First	15.0	11.4	-7.1	10.2	12.2	-6.9
	(35.0)	(5.5)**	(5.1)	(31.6)	(5.6)**	(5.4)
Second	1.9	9.0	-5.0	-2.5	9.5	-4.9
	(28.7)	(5.3)*	(4.9)	(25.2)	(5.3)*	(5.0)
Third	35.0	3.9	-4.7	31.0	4.4	-4.4
	(28.1)	(4.7)	(3.4)	(25.3)	(4.6)	(3.5)
Fourth	33.3	5.6	-2.0	33.9	5.7	-2.3
	(28.9)	(4.0)	(3.7)	(28.9)	(3.8)	(3.7)
Fifth	39.5	10.4	-3.7	31.7	10.9	-3.0
	(22.2)*	(3.5)***	(2.5)	(21.9)	(3.6)***	(2.5)
Sixth – Eighth	omitted					
Suburban	omitted					
Rural	-20.5	-1.0	-2.4	-20.7	-0.9	-2.3
	(14.5)	(1.8)	(2.1)	(13.7)	(1.8)	(2.1)
Urban	18.6	-1.8	-2.4	18.5	-1.9	-2.1
	(8.9)**	(1.8)	(1.8)	(7.8)**	(1.9)	(1.7)
HH size	-0.5	0.9	1.6	-1.3	1.0	1.6
	(6.3)	(0.8)	(0.9)*	(5.6)	(0.8)	(0.8)*
HH children	17.9	-2.5	-0.8	20.4	-2.6	-1.1
	(9.3)*	(0.9)***	(1.2)	(9.0)**	(0.9)***	(1.1)
Baby in HH	-42.1	-5.6	-5.4	-42.8	-5.4	-5.2
	(13.8)***	(3.1)*	(4.1)	(15.0)***	(3.0)*	(4.0)
Single parent	omitted					
Cohabitating	29.5	0.3	6.5	27.7	0.1	6.4
	(25.8)	(3.8)	(2.6)**	(26.7)	(3.7)	(2.5)**
Married	2.4	7.0	5.1	4.1	7.0	4.8
	(22.3)	(4.1)*	(3.0)*	(21.2)	(4.0)*	(3.0)
R employed	35.6	-3.3	6.0	39.5	-3.6	5.5
	(23.6)	(2.8)	(3.3)*	(21.1)*	(2.8)	(3.1)*
R unemployed	-2.5	-0.2	2.3	5.7	-0.9	1.4
	(32.9)	(3.2)	(5.0)	(30.2)	(3.4)	(4.9)

Spouse empl.	-16.4	-7.2	-8.4	-22.3	-6.8	-8.0
	(17.5)	(3.1)**	(2.4)***	(16.5)	(2.7)**	(2.3)***
Spouse unempl.	6.5	-64.7	-2.5	-16.7	-63.7	0.0
	(43.6)	(8.5)***	(6.0)	(44.3)	(8.3)***	(6.5)
Weekday diary	omitted					
Friday diary	2.2	-3.1	0.5	-2.0	-2.8	0.9
	(27.1)	(2.3)	(3.1)	(24.1)	(2.2)	(3.2)
Weekend diary	69.0	-4.8	1.9	68.7	-4.7	2.0
	(12.8)***	(1.7)***	(2.4)	(12.7)***	(1.7)***	(2.3)
January diary	omitted					
February diary	1.0	3.3	-5.5	3.8	3.0	-5.6
	(15.0)	(2.8)	(2.4)**	(15.0)	(2.8)	(2.4)**
April diary	-44.0	2.8	-15.6	-38.8	2.2	-15.8
	(25.9)*	(4.5)	(5.9)***	(25.9)	(4.3)	(5.7)***
May diary	-23.4	-1.5	-10.7	-18.6	-1.8	-11.3
	(21.3)	(3.6)	(3.2)***	(20.4)	(3.5)	(3.1)***
Sept. diary	68.3	-9.5	-1.8	77.2	-9.8	-2.3
	(45.9)	(4.8)**	(3.9)	(46.5)*	(4.8)**	(4.1)
October diary	3.2	0.5	-12.0	8.4	0.2	-12.3
	(22.1)	(3.0)	(2.6)***	(20.4)	(3.0)	(2.6)***
Nov. diary	4.5	1.0	-6.0	6.1	0.8	-6.2
	(26.5)	(2.4)	(2.4)**	(26.7)	(2.4)	(2.4)***
Dec. diary	70.3	-45.5	-83.7	62.0	-44.9	-83.8
	(28.5)**	(6.0)***	(7.5)***	(26.8)**	(5.8)***	(7.5)***
Pseudo R^2	0.03	0.07	0.05	0.03	0.07	0.05

Notes: This table extends table 2 of the main text by reporting the Tobit average partial effects (APE) of the models' control variables; these APE are comparable to OLS estimates. N = 628 diaries. Standard errors are robust to county-level clustering (N = 50). The parental respondent (R) assisted the child in filling out the time-diary. "Baby" indicates the presence of one or more HH children less than 2 years of age. The results are robust to coding the age cutoff at 1 or 3 years of age. No diaries of school-aged children were conducted in March or December. ***, **, and * indicate statistical significance at 1, 5, and 10%, respectively.

Table A.3: National Aggregate Childcare Tobit Time-Use Regressions (ATUS)

Specification:	No S int.	Baseline	Married	Employed
	1	2	3	4
White	omitted			
Black	-11.7	-11.7	-11.4	-9.0
	(1.7)***	(1.7)***	(2.2)***	(1.5)***
Hispanic	-7.3	-7.3	-6.8	-6.5
	(1.4)***	(1.4)***	(1.5)***	(1.0)***
Asian	-5.3	-5.3	-5.3	-6.6
	(3.3)	(3.3)	(3.4)	(2.5)***
Other race	-4.0	-3.9	-7.0	-1.5
	(3.8)	(3.8)	(4.3)	(3.5)
Metropolitan	2.9	2.9	2.9	3.2
	(1.1)***	(1.1)***	(1.1)***	(1.3)**
Household size	1.0	1.0	1.0	0.5
	(0.7)	(0.7)	(1.0)	(0.6)
HH children	5.2	5.1	4.5	5.9
	(1.0)***	(1.0)***	(1.1)***	(0.9)***
Baby in HH	21.4	21.5	21.5	15.1
	(2.4)***	(2.4)***	(2.2)***	(1.9)***
R’s age	-1.7	-1.7	-1.6	-1.4
	(0.1)***	(0.1)***	(0.0)***	(0.1)***
Male R	-39.8	-39.8	-41.2	-38.3
	(2.2)***	(2.2)***	(2.3)***	(2.3)***
R single parent	omitted			
R cohabitating	0.5	0.5	.	0.0
	(3.8)	(3.8)		(3.6)
R married	3.1	3.1	.	3.8
	(1.9)	(1.9)		(1.6)**
R unemployed	-12.2	-12.2	-16.4	.
	(2.6)***	(2.6)***	(3.1)***	
R employed	-25.5	-25.5	-26.6	.
	(1.2)***	(1.2)***	(1.6)***	
R out of labor force	omitted			
Weekday diary	omitted			
Friday diary	-3.4	-3.4	-3.5	-2.0
	(1.9)*	(1.9)*	(1.7)**	(1.5)
Weekend diary	-1.7	-1.7	-0.9	2.7
	(1.4)	(1.4)	(1.4)	(1.2)**
January diary	omitted			
February diary	-5.3	-5.3	-4.4	-5.5
	(1.7)***	(1.7)***	(1.8)**	(1.9)***
March diary	-4.9	-4.9	-5.4	-6.3
	(3.0)	(3.0)	(2.9)*	(2.9)**
April diary	1.3	1.3	1.9	-1.1
	(2.3)	(2.3)	(2.3)	(2.6)
May diary	2.2	2.2	3.0	-0.2
	(2.9)	(2.9)	(3.3)	(2.7)
September diary	-1.0	-0.9	-1.1	-1.8
	(2.1)	(2.1)	(2.2)	(2.1)
October diary	-0.9	-0.9	-0.5	-3.4

	(2.1)	(2.1)	(2.3)	(2.2)
November diary	-3.1	-3.1	-2.2	-8.1
	(2.4)	(2.4)	(2.6)	(2.1)***
December diary	-7.5	-7.6	-7.1	-8.2
	(2.9)***	(2.9)***	(3.2)**	(2.6)***
2002 diary	-0.4	-0.4	-1.3	0.3
	(3.3)	(3.3)	(3.0)	(3.2)
2003 diary	-2.1	-2.1	-3.2	-0.2
	(2.4)	(2.4)	(2.8)	(2.5)
2004 diary	-3.7	-3.6	-5.0	-1.9
	(3.0)	(3.1)	(3.3)	(2.9)
2005 diary	-5.5	-5.5	-5.5	-4.3
	(2.7)**	(2.7)**	(3.1)*	(2.2)*
2006 diary	-2.8	-2.8	-4.1	-1.9
	(3.4)	(3.4)	(3.7)	(2.7)
2007 diary	-3.0	-3.1	-4.2	-2.2
	(2.6)	(2.6)	(3.0)	(2.6)
2008 diary	1.3	1.3	0.4	2.1
	(3.5)	(3.5)	(3.7)	(3.0)
2009 diary	-1.7	-1.7	-1.2	-1.7
	(2.7)	(2.7)	(2.9)	(2.2)
2010 diary	omitted			
Observations	23,348	23,348	18,196	18,231
Pseudo R^2	0.05	0.05	0.05	0.05

Notes: This table extends table 4 of the main text by reporting the Tobit average partial effects (APE) of the models' control variables; these APE are comparable to OLS estimates. Standard errors are robust to state-level clustering. R refers to the time-diary respondent. The sample in column 3 is restricted to married R and the sample in column 4 is restricted to employed R. "Baby" indicates the presence of one or more HH children less than 2 years of age. The results are robust to coding the age cutoff at 1 or 3 years of age. ***, **, and * indicate statistical significance at 1, 5, and 10%.