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The Rug Rat Race

ABSTRACT After three decades of decline, the amount of time spent by parents on childcare in the United States began to rise dramatically in the mid-1990s. This increase was particularly pronounced among college-educated parents. Less educated mothers increased their childcare time by over 4 hours per week, and college-educated mothers increased theirs by over 9 hours per week. Fathers showed the same patterns, but with smaller magnitudes. Why would highly educated parents increase the time they allocate to childcare at the same time that their returns from paid employment have skyrocketed? Finding no empirical support for standard explanations, such as selection or income effects, we argue instead that increased competition for college admissions may be an important factor. We provide empirical support for our explanation with a comparison of trends between the United States and Canada, across ethnic groups in the United States, and across U.S. states.

As time in paid work has increased over the last four decades, time spent on most home production activities has trended downward (see, for example, Robinson and Godbey 1999, Bianchi, Robinson, and Milkie 2006, Aguiar and Hurst 2007). One notable exception, however, is time spent on childcare. Suzanne Bianchi (2000) and Liana Sayer, Bianchi, and John Robinson (2004) show that despite shrinking families, parents in the late 1990s reported spending as much or more time on childcare than parents in earlier decades.

In this paper we show that there has in fact been a dramatic increase in time spent on childcare. Linking 13 time-use surveys between 1965 and 2008, we show that after declining for several decades, time spent per week on childcare started increasing in the mid-1990s. The trends follow a pronounced S-shaped pattern, rising markedly from the mid-1990s to the early 2000s and then flattening out. Moreover, the increase in childcare

time has been twice as great for college-educated as for less educated parents. This differential trend is particularly puzzling in view of the sharp increase in the average wages of college-educated individuals over much the same period. We also show that an important component of the increase in childcare time was time spent on *older* children, and in particular on coordinating and transporting them to their activities.

Our estimates imply increases in average weekly hours of childcare time ranging from 3 hours per week for less educated fathers to more than 9 hours per week for mothers with a 4-year college degree. The implications for the allocation of time are large by any metric. According to our estimates, the time spent on childcare by the entire adult population in 2008 is equal to almost 20 percent of the time spent on paid work. The increase in average weekly time spent on childcare during a 10-year period from the early 1990s to the early 2000s was equal to 70 percent of the absolute decline in work hours during the “Great Recession” that began in late 2007. If those hours are valued at the market wage, the cost of the increase in childcare time amounts to over \$300 billion per year.

The literature has offered several explanations both for why childcare time has increased and for why it is greater among more educated parents (see, for example, Bianchi and others 2006, p. 87; Aguiar and Hurst 2007; Guryan, Hurst, and Kearney 2008). These explanations include selection effects, income effects, safety concerns, greater enjoyment of childcare, and more flexible work schedules. We test each of these and find that they are not consistent with the data.

The inability of existing explanations to account for the evidence leads us to offer a new explanation for the upward trends in childcare time. We argue that much of the increase, particularly among college-educated parents, may be a response to an increase in the perceived return to attending a good college, coupled with an increase in competition for college admissions. The size of college-bound cohorts rose dramatically beginning in the mid-1990s, coincident with the increase in childcare time. John Bound and Sarah Turner (2007) provide evidence that these larger cohorts are associated with increasingly severe cohort crowding at quality schools. The increased scarcity of college slots appears to have heightened rivalry among parents, which takes the form of more hours spent on college preparatory activities. In other words, the rise in childcare time resulted from a “rug rat race” for admission to good colleges.

To clarify the mechanics of this explanation, we develop a simple theoretical model in which college admission depends on parents’ choice of time spent preparing their children for college. College-educated parents

are assumed to have a comparative advantage in preparation time. When slots at good colleges are relatively plentiful, the marginal slots are filled by children of less educated parents. Competition among these parents then determines the preparation required for admission. When good slots become relatively scarce, rivalry for the marginal slots shifts to the college-educated parents, who are better able to compete. A rug rat race emerges among these parents, driving up both admissions requirements and the time spent on childcare.

We provide support for this explanation using three comparisons. First, we compare childcare trends in the United States with those in Canada. The two countries are similar along many dimensions but differ in one respect that is key to our explanation: the Canadian higher education system lacks a steep prestige hierarchy, so that Canadians do not experience the same intense rivalry to gain admission into higher-rated colleges. Thus our theory predicts that time spent in childcare by more educated Canadians should not have increased by as much as it has among their U.S. counterparts. Employing time-use data from Canada's General Social Survey, we show that time spent in childcare by more educated Canadian parents changed very little over this period, corroborating our theory. Second, we show that black and Hispanic parents in the United States spend less time in childcare than white parents. Since affirmative action policies may attenuate the rivalry for scarce slots for underrepresented minorities, there may be less pressure for them to spend time on childcare. Third, we use Bound, Brad Hershbein, and Bridget Long's (2009) measure of competition for college admission to demonstrate a positive correlation between the degree of competition and childcare time across U.S. states.

The paper proceeds as follows. Section I documents trends in childcare over the 1965–2008 period. The standard explanations are evaluated in section II. Section III documents that competition for college increased over this period, develops our new explanation, and reports the empirical evidence in its favor. Section IV concludes.

I. Trends in Time Spent in Childcare

Long-term trends in time spent in care of children have been the subject of many studies in sociology (for example, Bryant and Zick 1996; Robinson and Godbey 1999; Sayer and others 2004). It has long been noted that college-educated mothers devote more time to childrearing than less educated mothers (see, for example, U.S. Department of Agriculture 1944, Leibowitz 1974, Bianchi and others 2006, Guryan and others 2008). Here

we document that since the mid-1990s there has been a substantial increase in childcare time as well as a widening of the gap between college-educated and less educated parents.

I.A. Data Description

To document these trends, we use information from 13 nationally representative time-use surveys from 1965, 1975, 1985, 1992–94, 1995, 1998, 2000, and annually from 2003 through 2008. All of the surveys are based on time diary information, which is considered to be the most reliable measure of how individuals spend their time. Table A1 of the online data appendix provides details about the surveys.¹ We use the American Heritage Time Use Study (AHTUS) versions of the 1965, 1975, 1985, and 1992–94 surveys (Fisher and others 2006) and the original versions of the other surveys (Robinson, Bianchi, and Presser 2001, Bianchi and Robinson 2005, Bureau of Labor Statistics 2010).

The key measurement issue is the extent to which the surveys give consistent measures over time. The potentially problematic surveys are the 1992–94 survey and the Bureau of Labor Statistics (BLS) surveys starting in 2003. Many childcare researchers believe that the 1992–94 survey undercounts primary childcare activities (Robinson and Godbey 1999, Bianchi and others 2004, Bianchi and others 2006). Using results from other time-use studies that are not part of the AHTUS but are considered comparable to the earlier surveys, Allard and others (2007, footnote 19) argue that the 1992–94 survey is not comparable. That survey suggests that time spent in childcare was 1 hour per week lower in the early 1990s than in 1985, whereas the 1995 survey suggests that it was 1 hour per week *higher*. Thus any drops in childcare time between 1985 and 1992–94 may be due to problems with the 1992–94 survey. Another important drawback of that survey is its lack of information on key controls, such as marital status.

Concerns have also been expressed about the comparability of the 2003–08 BLS surveys with the earlier surveys. However, Allard and others (2007) compare the 2003 BLS survey with the 2000 Survey Research Center national survey of parents and find very similar estimates of primary time spent in childcare (but not of secondary time, that is, time when the parent is engaged in another, primary activity while also engaged in childcare). The 2000 survey was designed to be comparable to the earlier

1. Online appendices for all papers in this issue may be found on the *Brookings Papers* webpage (www.brookings.edu/economics/bpea), under “Conferences and Papers.”

surveys, so it appears that the increase in time spent on childcare in the BLS surveys relative to earlier surveys is real rather than due to methodological differences.

Fortunately, the 1965, 1975, 1985, 1995, 1998, and 2000 surveys all involved John Robinson as a principal investigator. As a result, the coding of activities is very similar across these surveys. Because these surveys span the period in which childcare began trending upward, we feel confident that the trends we find in time spent in childcare reflect actual trends rather than changes in activity classification.

We use a comprehensive measure of childcare that includes care of infants, care of older children, medical care of children, playing with children, helping with homework, reading to and talking with children, dealing with childcare providers, and travel related to childcare. The online data appendix gives details of the activity codes used.

1.B. Trends in Total Childcare

To study changes in childcare over time, we regress individual-level time spent on childcare on various sets of controls. Most of our results are based on the following simple descriptive model:

$$CH_{it} = X_{it}\beta + \varepsilon_{it},$$

where CH_{it} is the number of hours per week spent on childcare by person i in year t , X_{it} is a set of controls, and ε_{it} captures other, omitted factors affecting childcare time. Our sample consists of parents aged 18–64 who are not students, where “parent” is defined as anyone having a child under 18 years in the same household.² We use the recommended weights from the various studies, normalized so that a representative individual in 1965 has the same weight as a representative individual in 2008. In addition to the year of the survey, X_{it} may include dummy variables for the age group of the parent (ages 18–24, 25–34, 35–44, 45–54, and 55–64), whether or not the parent has a 4-year college degree, the interaction of the college degree dummy with the survey year, a dummy for the parent’s marital status, the number of children in the household, the number of children squared, dummy variables for the age of the youngest child (1 or less, 2, 3–5, 6–9, 10–13, and 14–17), and the number of children under age 5.

2. We use this definition because most earlier time-use studies did not specifically identify parents. In 2003–08, mothers spent only 27 minutes a week more on childcare on average than the average for all women who lived in a household with children. One of the reasons we omitted students from all of our samples was to avoid misrecording a college student living at home with younger siblings as a parent.

We first consider time spent in childcare by mothers. In our benchmark specification we do not condition on any choice variables that may be correlated with education level; thus the only control variables used are the five age categories of the women, as defined above. The omitted dummy variables are survey year 1975, less than college education, and ages 25–34.³

Column 1-1 of table 1 shows the results of this estimation. The levels effects for the survey year dummies show that the average amount of time spent by mothers on childcare decreased from 1965 to 1975, and again in 1985 and 1992–94. Recall, however, that many analysts believe that the 1992–94 survey undercounted childcare time, so this estimate may not indicate an actual decrease. Mothers' childcare time in 1995 was 1.74 hours more per week than in 1975, and by 2000 it had risen to nearly 4 hours more. From 2003 through 2008, less educated mothers spent about 4 hours more per week in childcare activities than they did in 1975.

Of additional interest are the coefficients on the interactions between survey year and college education. After a trough in the mid-1990s, these coefficients begin to grow in the late 1990s. These estimates, combined with the coefficients on survey year and college education, show that from 1965 to 1995, college-educated mothers spent between 0.03 and 2 more hours per week on childcare than did non-college-educated mothers. Beginning in 1998, however, this differential underwent a dramatic increase: college-educated mothers spent over 3 hours more per week in 1998, roughly 5 hours more in 2000 and 2003, and over 6 hours more in 2004 and 2005. Between 1998 and 2008, the college differential in every year was at least double the highest differential observed between 1965 and 1995.

The top panel of figure 1 depicts these trends graphically for mothers in the 25–34 age group; the trends for other age groups follow the same time pattern, differing only in the time-invariant constant term. For both education groups, time spent in childcare rose beginning in 1995, but after 1998 the upward movement was much sharper among college-educated mothers, following a pronounced S-shaped pattern. As discussed earlier, problems with the 1992–94 study make it likely that the true value for that period was somewhat higher.

3. We use 1975 as the omitted year because we will later be comparing the 2000 and later surveys with the 1975 survey using the more complete set of controls that are available for those surveys, but not for other years.

Table 1. Baseline Regressions Identifying Trends in Childcare Time^a

<i>Independent variable^b</i>	<i>Mothers</i>		<i>Fathers</i>	
	<i>Age controls only 1-1^c</i>	<i>Full set of controls 1-2^d</i>	<i>Age controls only 1-3^c</i>	<i>Full set of controls 1-4^d</i>
1965	1.636 (0.613)**		0.290 (0.512)	
1985	-0.369 (0.689)		0.005 (0.583)	
1992-94	-1.013 (0.552)		0.210 (0.516)	
1995	1.744 (0.883)*		1.232 (0.821)	
1998	1.842 (0.933)*		3.102 (0.856)**	
2000	3.928 (0.640)**	3.936 (0.603)**	4.522 (0.579)**	4.472 (0.587)**
2003	4.676 (0.398)**	4.527 (0.380)**	3.184 (0.340)**	3.446 (0.352)**
2004	4.071 (0.435)**	4.065 (0.413)**	3.444 (0.367)**	3.449 (0.378)**
2005	3.992 (0.436)**	3.628 (0.415)**	3.327 (0.372)**	3.520 (0.383)**
2006	4.324 (0.443)**	4.122 (0.421)**	3.104 (0.375)**	3.286 (0.387)**
2007	4.227 (0.452)**	3.898 (0.430)**	3.277 (0.377)**	3.395 (0.389)**
2008	4.288 (0.450)**	3.983 (0.429)**	4.44 (0.382)**	4.324 (0.393)**
College	0.026 (0.900)	-0.633 (0.851)	0.854 (0.579)	0.873 (0.585)
1965 × college	2.048 (2.174)		0.093 (1.229)	
1985 × college	1.873 (1.671)		-0.321 (1.142)	
1992-94 × college	1.373 (1.264)		-0.422 (0.972)	
1995 × college	0.741 (2.153)		1.799 (1.642)	
1998 × college	3.117 (2.052)		2.134 (1.666)	
2000 × college	4.868 (1.479)**	4.149 (1.389)**	-0.406 (1.098)	-0.496 (1.109)
2003 × college	4.999 (1.015)**	3.948 (0.958)**	1.913 (0.688)**	1.132 (0.696)
2004 × college	6.344 (1.062)**	5.478 (1.002)**	1.425 (0.733)	0.903 (0.741)
2005 × college	6.038 (1.073)**	5.293 (1.012)**	2.514 (0.746)**	2.043 (0.754)**

(continued)

Table 1. Baseline Regressions Identifying Trends in Childcare Time^a (*Continued*)

<i>Independent variable^b</i>	<i>Mothers</i>		<i>Fathers</i>	
	<i>Age controls only 1-1^c</i>	<i>Full set of controls 1-2^d</i>	<i>Age controls only 1-3^c</i>	<i>Full set of controls 1-4^d</i>
2006 × college	4.109 (1.072)**	3.015 (1.011)**	2.296 (0.741)**	1.692 (0.749)*
2007 × college	5.291 (1.073)**	4.456 (1.012)**	2.138 (0.755)**	1.511 (0.764)
2008 × college	4.659 (1.074)**	3.872 (1.013)**	0.900 (0.745)	0.682 (0.753)
Constant	11.656 (0.342)**	-3.251 (0.542)**	3.565 (0.300)**	-2.655 (0.496)**
No. of observations	24,342	21,659	17,806	15,829
Adjusted R ²	0.09	0.21	0.06	0.10

Source: Authors' regressions using data from various time-use surveys.

a. The dependent variable is hours per week spent by parents (all persons aged 18–64, except students, caring for a child under 18 living in the same home) on childcare. Standard errors are in parentheses. Asterisks indicate statistical significance at the *5 percent or the **1 percent level.

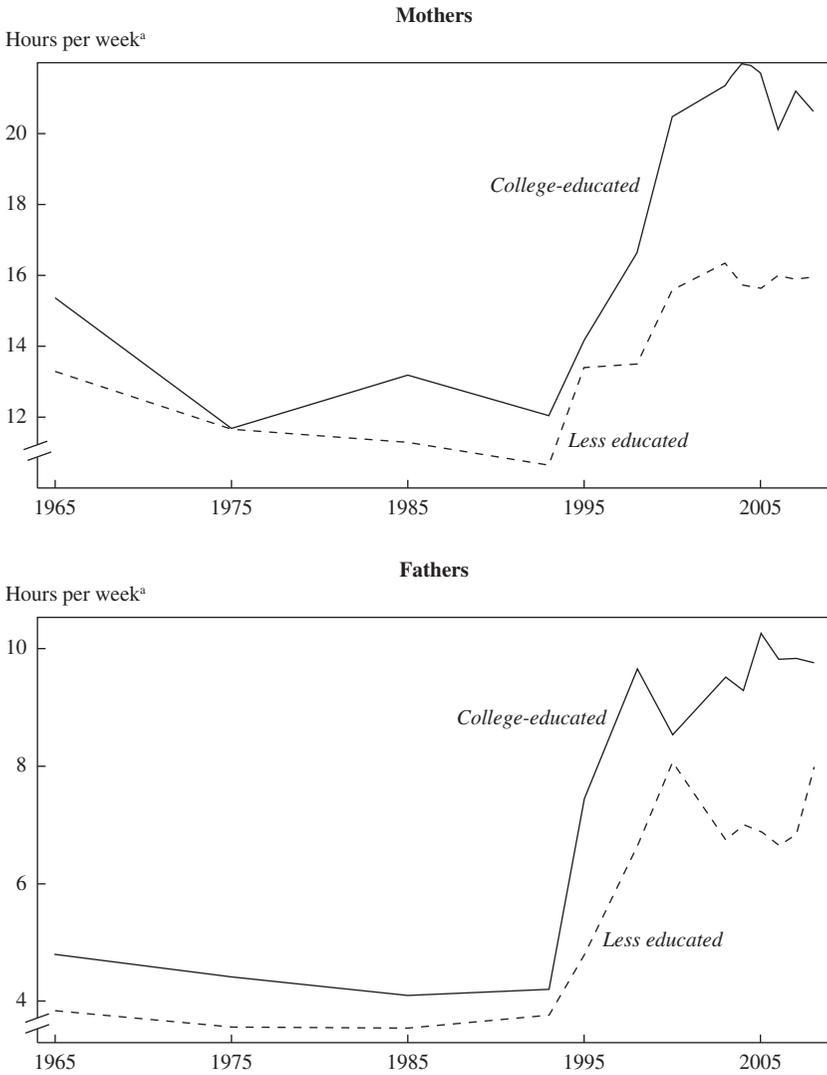
b. Year variables equal 1 when the observation is from a survey in the indicated year (the omitted year is 1975); “college” equals 1 when the parent is a college graduate.

c. Regressions include a dummy variable for the parent’s age (equal to 1 if the parent is aged 18–24, 35–44, 45–54, or 55–64; the omitted category is age 25–34).

d. Regressions include, in addition to the age controls, a dummy for the parent’s marital status, a quadratic in the number of children in the family, and a dummy for the age of the youngest child (1 or younger, 2, 3–5, 6–9, or 10–13; the omitted category is age 14–17).

Column 1-2 of table 1 compares childcare time spent by mothers in 1975, 2000, and 2003–08 using the more complete set of controls available for these 8 years. In addition to the age category of the mother, we control for marital status, the number of children in the household (using a quadratic), and the age category of the youngest child (using the ranges stated above). This full set of controls is useful for controlling for trends in fertility, such as the declining number of children per family and the rising maternal age at birth of the first child. In this specification we are seeking to identify differences across education levels among mothers with similar numbers and ages of children. The results are similar to those without the complete controls. The amount of time spent on childcare by less educated mothers rose by about 4 hours per week from 1975 to the 2000s, and time spent by college-educated mothers rose by about 8 hours per week. Thus even with the more complete set of controls, we find that college-educated mothers increased their amount of time spent in childcare by double the amount that less educated mothers did.

Figure 1. Time Spent on Childcare by Parents, by Educational Attainment, 1965–2008



Source: Authors' estimates based on regression results reported in table 1, columns 1-1 and 1-3.
 a. Particular levels of hours shown are representative of the 25–34 age group.

Is the same true for men? Column 1-3 of table 1 reports the results of our benchmark specification for fathers, and the bottom panel of figure 1 plots the trends for fathers aged 25–34. Although fathers consistently spent much less time on childcare than mothers did, they, too, sharply increased their childcare time in the late 1990s and early 2000s. The final column of table 1 compares childcare time by fathers in 1975 with that in later years and includes the full set of controls. Again the results are similar to those without the additional controls. We conclude that time spent on childcare by both mothers and fathers increased beginning in 1995, and that this increase was significantly steeper among the college-educated.⁴

One might worry that the rise in reported childcare time might be the result of changing social norms causing parents to exaggerate their estimates of time spent with their children. However, corroborating evidence for these trends is provided by time-use studies of children. For example, John Sandberg and Sandra Hofferth (2005) link studies of time diaries kept by children in 1981 and 1997 to determine trends in time spent with parents. They find that children between the ages of 3 and 12 spent 18 more hours per week with one or both parents in 1997 than in 1981, corroborating the trends found using parents' time diaries.

1.C. Trends in Categories of Childcare

We now break down the trends documented above into trends for various categories of childcare. To produce consistent estimates of these trends over time, we limit the sample to the 1965, 1975, 1985, 1995, 1998, and 2000 surveys, because these six surveys used the same activity codes for subsets of childcare, distinguished between basic care of young children and care of older or mixed-age children, and included key variables that we could use as controls.⁵ The controls include the parental age categories defined above, marital status, a quadratic in the number of children, and the number of young children.⁶ We construct five categories of childcare:

4. Our results differ from those of Bianchi and others (2004), who do not find a statistically significant increase in the differential between college-educated parents and less educated parents from 1975 to 2000. On the other hand, a recent paper by Chalasani (2007) that studies married parents finds results similar to ours: a larger increase in childcare time among the college-educated between 1985 and 2003.

5. The reason we could not construct these categories for the BLS data is that they do not distinguish basic care of younger children from that of older children.

6. The definition of "young children" changed slightly across surveys. In 1965 it was "under 4 years of age," in 1998 it was "under 7 years of age," and in the rest it was "under 5 years of age."

general care of young children; general care of older or mixed-age children; playing with children; teaching children, which involves reading, helping with homework, disciplining, and conversing; and travel and activities, which includes travel related to childcare, coordinating children's activities, and picking up and dropping off children at school and other activities.⁷

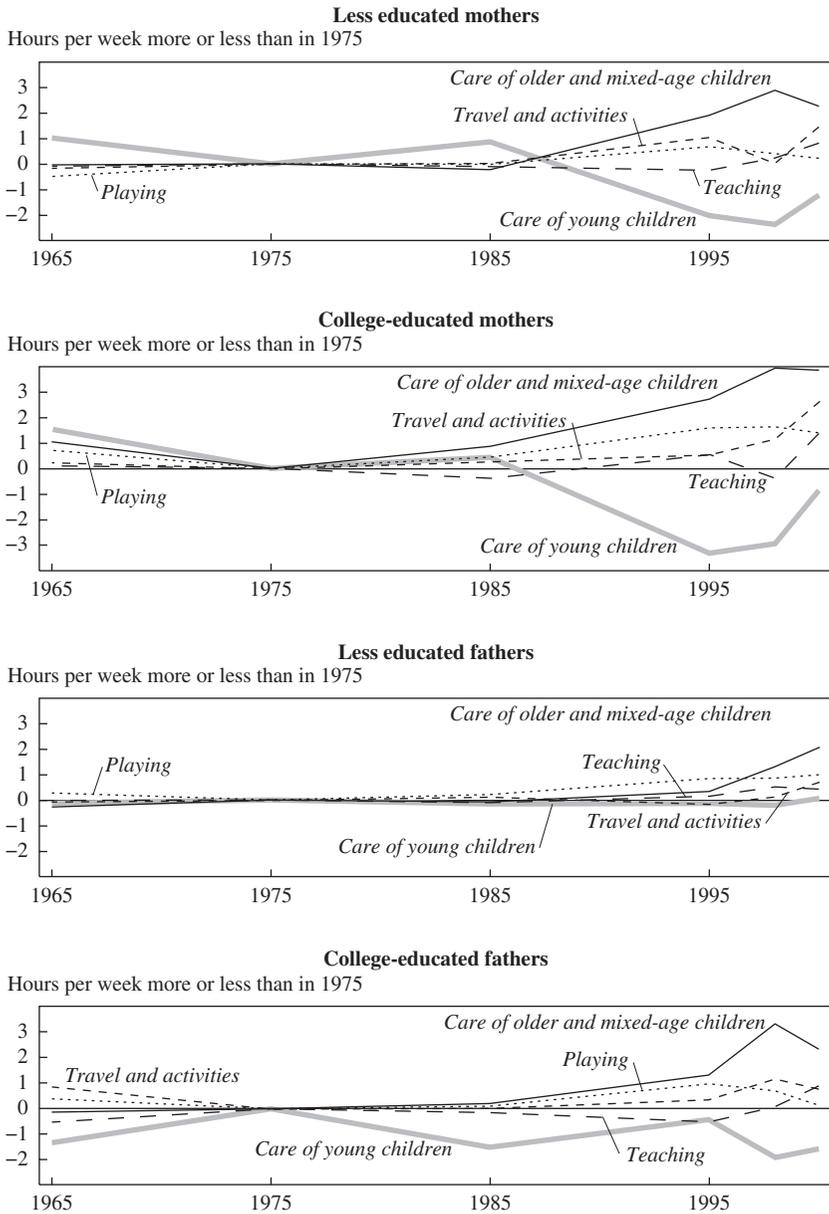
The top two panels of figure 2 show the results for each of the various care categories for mothers, and the bottom two panels for fathers. The estimates have been normalized to be zero in 1975. As the figure reveals, time spent in basic care of young children fell for all four gender-education groups, but it largely recovered after the mid-1990s for college-educated mothers. This recovery could be due in part to the increased propensity to breastfeed, as documented in Daniel Sacks and Betsey Stevenson's comment on this paper. However, Sacks and Stevenson also show that the gap in breastfeeding by education level decreased between the early 1990s and 2005–06. Thus breastfeeding cannot explain the increase in the gap in childcare time across education levels. The childcare category with the greatest increase for all four gender-education groups is general care of older or mixed-age children. Time spent in this category increased by 4 hours per week for college-educated mothers and by 3 hours per week for college-educated fathers. The category with the next-largest increase was travel and activities.

Our discussants compare trends in childcare time from the earlier surveys to the BLS surveys by comparing childcare time in households in which the youngest child is under 5 years old with that in households in which the youngest child is 5 years old or older. Based on the unconditional means from this cut of the data, they argue that much of the childcare time increase, and in particular the increase in the education differential, is attributable to households with young children. This result is interesting in itself, but it does not imply that time spent on care of young children accounts for the bulk of the increase. Childcare time in families with at least one child under 5 is distributed across all children in the household. Only the surveys through 2000 distinguish childcare by age of the child, and those surveys indicate that care of younger children is not what is driving the increase.

Although the BLS surveys do not distinguish time spent with younger children from time spent with older children, they contain other detailed

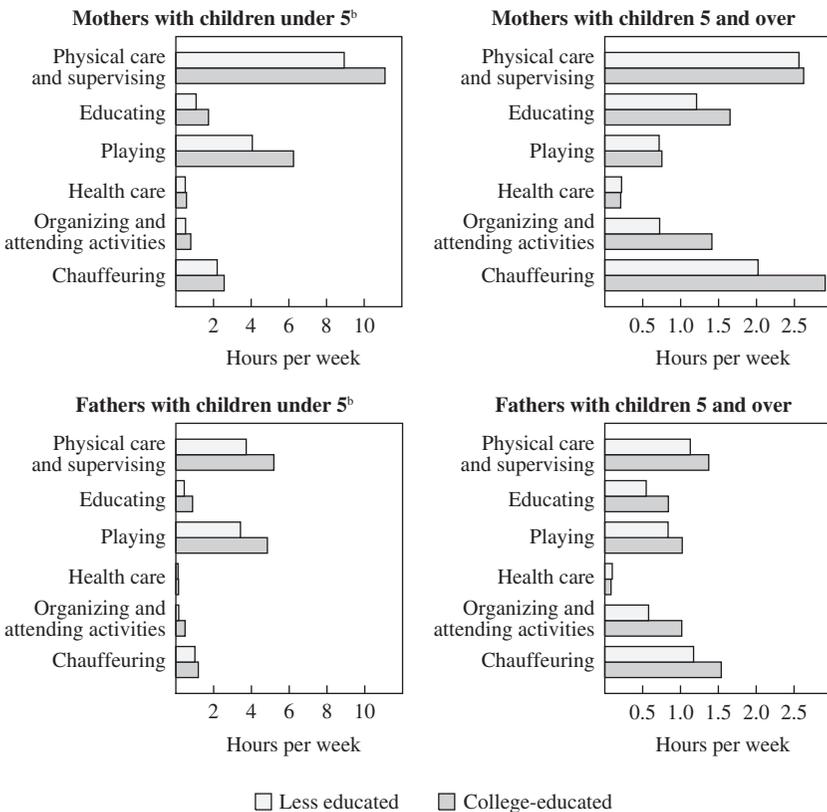
7. We omit medical care in order to make the graph clearer. There was no noticeable trend in time spent in medical care for any group.

Figure 2. Parental Time Spent on Childcare, by Educational Attainment and Type of Care, 1965–2000^a



Source: Authors' estimates using pooled data from various time-use surveys from 1965 through 2000.
 a. Estimates are averages for all parents in the indicated group and are normalized to be zero in 1975.

Figure 3. Parental Time Spent on Childcare, by Age of Child and Type of Care, 2003–08^a



Source: Authors' estimates using data from various time-use surveys.

a. Results are averages for all parents in the indicated group aged 25–34.

b. Parents with children of mixed ages are classified in the “under 5” groups if their youngest child is less than 5 years of age.

categories of interest. We examine the following categories for the pooled sample from 2003 to 2008: physical care of children and supervision; educating and teaching children, including reading, helping with homework, and meeting with teachers; playing with children, including sports and arts and crafts; health care; organizing activities and attending children’s events; and chauffeuring, which includes dropping off and picking up, waiting, and travel associated with childcare.

The two left-hand panels of figure 3 show time spent in each of these categories by parents whose youngest child is less than 5 years old. The bulk of the time spent by mothers is on physical care and supervision, followed by playing. College-educated mothers spend substantially more

time per week on these two categories (11 hours in physical care and supervision and 6 hours in playing) than do less educated mothers (9 and 4 hours, respectively). Time spent on the other categories is much lower, less than 3 hours per week. The time spent by parental education level does not differ much for these other categories, with the exception of educational activities, where college-educated mothers spend noticeably more time. The story is similar for fathers, but at lower levels of hours. College-educated fathers spend more time in all categories than less educated fathers.

The two right-hand panels of figure 3 show time spent by parents whose youngest child is aged 5 or older. Time spent in physical care and supervision shrinks to about 2.5 hours per week for mothers (note the difference in scale between these and the left-hand panels). The most important category for college-educated mothers with older children is chauffeuring; physical care and supervision ranks second, and educational activities third. Also important is organizing and attending extracurricular activities. Fathers, regardless of education level, spend less time than mothers in all categories except playing. The two most important categories for fathers are chauffeuring and physical care and supervising, followed by organizing and attending activities and playing. Overall, college-educated parents of both sexes spend more time than less educated parents in each category except health care, a category in which all parents spend few hours and the difference between education groups is very small. The most important uses of the extra time spent by college-educated parents, however, are in chauffeuring and the educational and activities-related categories.⁸

The patterns revealed in figure 3 mirror the differences highlighted in other research. For example, Joseph Mahoney, Angel Harris, and Jacquelynne Eccles (2006) used pooled data from the 1997 and 2002 Child Development Supplement of the Panel Study of Income Dynamics (PSID) to show that children of white college-educated parents spend about 3 more hours per week on organized activities than children of less educated parents; however, there is no clear pattern for black families. Hofferth (2009) found an increase in time spent in academic activities from 1997 to 2003. Annette Lareau's (2003) ethnographic study, *Unequal Childhoods*, documents the dramatic differences in how educated and less educated parents raise their children. The children of less educated parents spend most of their free time playing with friends and relatives in

8. One should not infer from these results that pure travel time accounts for most of the increase in childcare time. Total travel time associated with childcare increased by approximately 1 hour from 1975 to the 2000s.

their neighborhood, unsupervised by adults. Lareau calls this the “natural growth” approach. More educated parents, she argues, take a “concerted cultivation” approach, which requires a significant commitment of parental time:

Children’s activities create substantial work for their parents. Parents fill out enrollment forms, write checks, call to arrange car pools, wash uniforms, drive children to events, and make refreshments. . . . Simply getting ready for an activity—collecting the equipment, organizing the children, loading the car—can be exhausting . . . in addition to the labor of preparing, there is the labor of watching. (p. 47)

In sum, it appears that college-educated parents with children aged 5 or over spend a good deal of their time on education and on children’s organized activities.

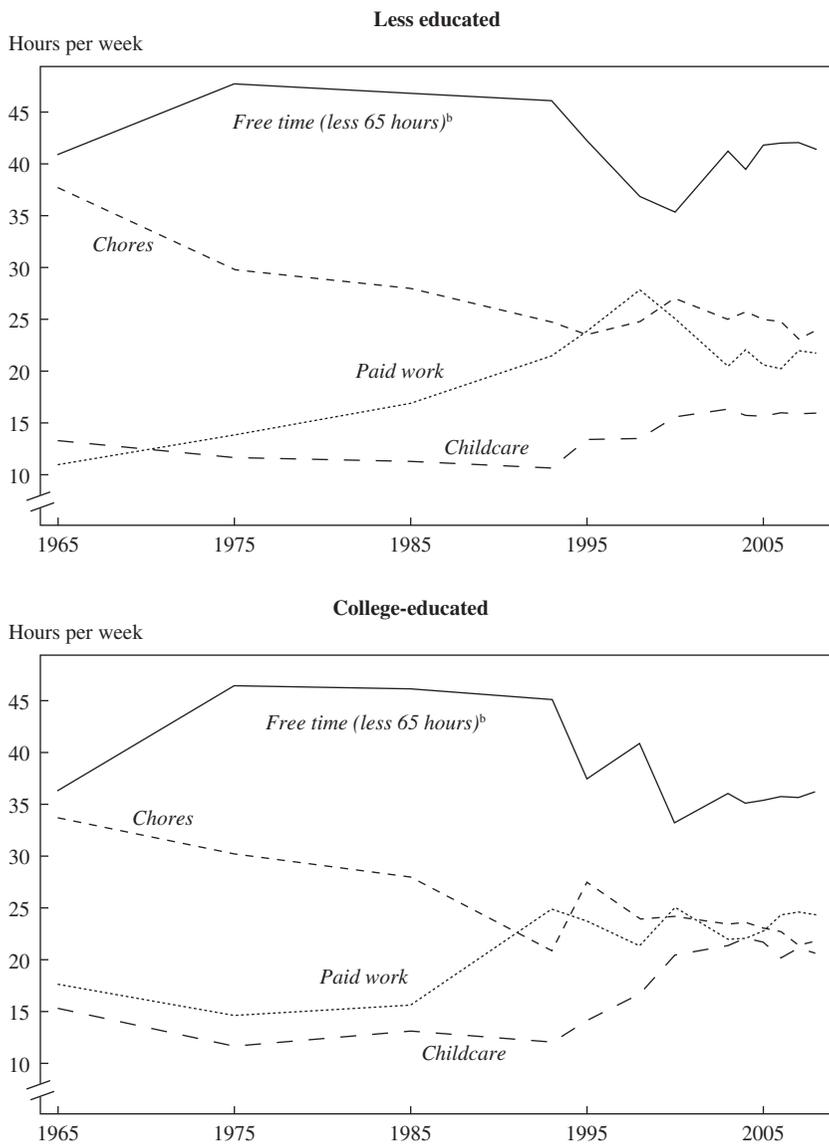
I.D. Trends in Overall Time Use by Mothers

Figure 4 sheds light on the sources of the extra time that mothers devote to their children. Here we categorize time spent other than in childcare into “work for pay,” “chores,” and “free and personal care time.” “Chores” includes housekeeping, cooking, and shopping. “Free and personal care time” (hereafter “free time”) includes any time not included in the other categories, such as sleeping, personal hygiene, and leisure activities. Data from all the time-use surveys are pooled, and the only controls are those for parental age. We report results for mothers aged 25–34. We subtract 65 hours from free time so that the magnitudes for the various categories are similar.

The figure shows that time spent in paid work by less educated mothers increased until the late 1990s and then fell somewhat. Work time for college-educated mothers increased between 1985 and the mid-1990s and then flattened out. Time spent on chores fell more or less steadily over the entire sample period for both education groups. Free time for both groups fell starting in the mid-1990s: for college-educated mothers it was 10 hours less per week in 2008 than in 1975 and 1985. Thus the decline in free time makes up for all of the increase in childcare time. In their comment, Sacks and Stevenson point out that college-educated parents are more likely to engage in childcare together. This behavior may be the result of having so little free time to spend together.

In sum, the evidence suggests that time spent in childcare has increased for all parents since 1975, but much more for more educated parents. Moreover, with the caveats about the 1992–94 survey in mind, it appears that these increases largely occurred within a single 10-year interval beginning in the mid-1990s, and an important part of the rising childcare

Figure 4. Time Spent by Mothers in All Activities, by Educational Attainment, 1965–2008^a



Source: Authors' estimates using pooled data from various time-use surveys.

a. Particular levels of hours shown are representative of the 25–34 age group.

b. Includes personal care time. We subtract 65 hours from total free time to make the magnitudes of the categories similar.

differential between college- and less educated parents is attributable to travel and activities of older children. The trends we highlight are consistent with descriptions from popular publications, such as Judith Warner's book *Perfect Madness: Motherhood in the Age of Anxiety* (2005). The key question is, why have educated parents decided to spend their time in this way? The next section will evaluate various possible explanations.

II. Conventional Explanations

As discussed in the introduction, Bianchi and others (2006, p. 87) and other researchers have offered several possible explanations for the overall increase in time spent on childcare. We find, however, that none of these explanations is consistent with the evidence.

II.A. Selection Effects

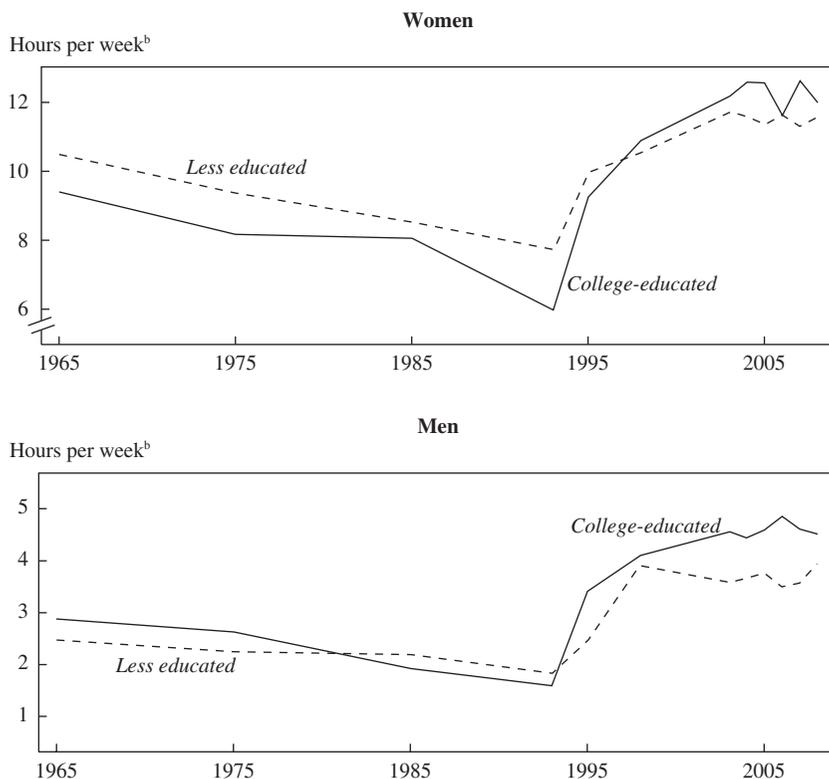
One possible explanation for this reallocation of time involves the declining incidence of parenthood over the same period. Since fewer individuals today choose to be parents, those who do might be those persons who enjoy childcare more. This selection effect could account for the observed trends in childcare time.

The easiest way to test for selection effects is to see how the results change when the universe of adults is included. If selection into parenthood explains the rise in childcare time, then childcare time averaged over both parents and nonparents (who presumably spend close to zero time on childcare) cannot be rising over time. If anything, total childcare time should decline over time, since the number of children per adult has declined. To test this argument, we obtain a new set of estimates using an expanded sample that includes all adults aged 18–64 who were not students. The results are presented in figure 5. The trends in total childcare and the college differential are clearly present among the general population of women; in particular, the rise in childcare beginning in 1995 continues to be much steeper for college-educated women. Thus our findings are not an artifact of selection into parenthood.

II.B. Income Effects

A second possible explanation invokes income effects. If childcare is a normal good, then increases in income should raise the time spent in childcare. However, since most income increases are from increases in wages, a

Figure 5. Average Childcare Time for All Adults,^a by Educational Attainment, 1965–2008



Source: Authors' estimates based on regression results reported in online appendix A2.

a. Except those aged 65 and over and students.

b. Particular levels of hours shown are representative of the 25–34 age group.

substitution effect works in the opposite direction. The case is analogous to that of leisure, which has risen little over the last century, despite a dramatic rise in real wages, because the income and substitution effects largely cancel each other out. Thus the theoretical prediction for the impact of an increase in wages on childcare time is ambiguous.

We offer two types of evidence against income effects as a potential explanation. We first analyze the cross-sectional relationship between time spent on childcare and income and then use the estimates to determine whether they can explain the observed trends. According to our time-use surveys, average real annual household income in households with

children rose from about \$72,706 in 1975 to \$98,608 in 2008, an increase of \$25,902, or about 36 percent (in 2008 dollars).

We pool the BLS survey data from 2003 through 2008 and focus on parents. We use real household income in thousands of 2008 dollars. (The online data appendix contains more details on how we construct income.) Our regressions include dummy variables for survey year, parental age, and parental education (high school dropouts, college graduates, and those with a graduate degree), the full set of dummy variables for the age of the youngest child, a quadratic in the number of children, and a dummy for marital status. It is important to include controls for parents' education level because we do not want to attribute to income effects what are actually the effects of education itself on childcare. Less than 20 percent of the variation in income is explained by the education controls.

An unobserved preference for spending time with one's children could lead parents to spend less time working and more time with their children, resulting in a negative correlation between income and time spent with children. Thus in some specifications we also include controls for usual hours of work of the respondent as well as the respondent's spouse. Also, to try to estimate the pure income effect of childcare, we report results for a sample limited to nonworking mothers.

We consider a quadratic in income. Table 2 shows that although most of the estimated income coefficients are statistically different from zero, all of them are minuscule in their economic impact. The third data column combines the estimated cross-sectional coefficients with the actual change in income from 1975 to 2008 to see how much of the increase in childcare could have been induced by an increase in real income. Every number in the column is a mere fraction of an hour. Particularly damaging to the income hypothesis is the fact that the pure income effects for nonworking mothers (regression 2-3) are very small. Thus, for the set of mothers who decide not to work, household income has a very small effect on time spent in childcare after controlling for the mother's education. The cross-sectional evidence therefore implies that rising incomes cannot explain the increase in childcare time.⁹

Not only are the measured effects of income on childcare time small, but the observed trends in childcare time do not match chronologically

9. We find similarly small coefficient estimates if we use earnings instead of total income, as Kimmel and Connelly (2007) did. In his comment on this paper, Erik Hurst reports a positive correlation between childcare time and GDP across countries. We suspect that this correlation is due to education differences rather than income differences.

Table 2. Regressions Explaining Childcare Time by Parental Income

Regression	Regression coefficient ^a		Income-induced increase in childcare, 1975–2008 (hours per week) ^c	Sample	Usual hours of work included? ^d
	Income ^b	Income squared			
<i>Mothers</i>					
2-1	0.0105 (0.0050)	-0.000012 (0.000010)	0.22	All mothers	No
2-2	0.0313 (0.006)**	-0.000057 (0.000013)**	0.56	All mothers	Yes
2-3	0.0348 (0.010)**	-0.000066 (0.000022)**	0.61	Nonworking mothers only ^e	No
<i>Fathers</i>					
2-4	0.023 (0.005)**	-0.000045 (0.000011)**	0.40	All fathers	No
2-5	0.025 (0.006)**	-0.000049 (0.000012)**	0.44	All fathers	Yes

Source: Authors' regressions using pooled data from Bureau of Labor Statistics (BLS) time-use surveys from 2003 to 2008.

a. The dependent variable is hours per week spent by parents on childcare. All regressions include controls for survey year, parent's age (see table 1 for categories), full controls for children's ages (see table 1), number of children in family, parent's marital status, and parent's educational attainment (high school dropout, college degree, or advanced degree; the omitted category is high school graduate).

b. In thousands of 2008 dollars.

c. Calculated by applying the cross-sectional income coefficients to the actual change in average family income from 1975 to 2008.

d. "Yes" indicates that the regression includes variables for the usual hours worked per week by the respondent and by the spouse.

e. Sample excludes mothers who work for pay outside the home.

with published Census tabulations of trends in household income. We focus here on households with married parents. (The online data appendix discusses the data sources.) According to our time-use data, for both married mothers and fathers (of any education level), time spent on childcare was flat or slightly decreasing through 1985. It began to rise in the mid-1990s, increasing by almost 7 hours per week for mothers and 4.5 hours per week for fathers by the mid-2000s. In contrast, inflation-adjusted median household income for married parents grew at approximately the same annual rate from 1969 to 1990 as it did from 1990 to 2008, just over 1 percent per year. If income were the driving force, one would expect childcare time to have risen from 1965 to 1990. In fact, it did not.

In sum, neither the cross-sectional evidence nor the time-series evidence provides any support for the hypothesis that rising incomes can explain the observed trends in childcare time.

II.C. Safety Concerns

Bianchi and others (2006) suggest that heightened concerns about safety may have induced parents to accompany their children in their activities more often and to substitute structured activities for the free, unaccompanied play on neighborhood streets that was the norm in earlier times. This explanation is problematic for two reasons. The first is that the trends again do not align chronologically. Nationwide, the incidence of violent crime rose from 200 per 100,000 population in 1965 to a peak of 758 in 1991 and then began declining again (U.S. Census, *2010 Statistical Abstract: Historical Statistics*, table HS-23), reaching 467 in 2007. Thus the violent crime rate has moved *inversely* with time spent in childcare, which is contrary to the hypothesis of a positive crime-childcare link.

Of course, what matters is parents' *perceptions* of safety. However, the evidence suggests that today's parents worry less than parents 20 years ago did about numerous safety issues. Safe Kids USA (2008) reported the results of polls in 1987 and 2007 that asked parents about their major concerns in raising kids. Among the categories were concerns about children being involved in accidents, kidnapped by strangers, influenced adversely by friends, and exposed to street drugs. In every case, parents were significantly *less* concerned in 2007 than they were in 1987 (Safe Kids USA 2008, p. 9). Thus, trends in safety perceptions cannot be the source of the observed trends in childcare time.

A second reason that this explanation is problematic is that families of higher socioeconomic status tend to perceive the neighborhoods they live in to be safer (Wildon and others 2004). Thus, if the explanation suggested by Bianchi and others (2006) were important, one would expect educated parents to spend *less* time on childcare than less educated parents, which is inconsistent with the evidence.

II.D. Increasing Enjoyment of Childcare

A fourth possible explanation is that parents now experience greater enjoyment from childcare. However, empirical studies that have measured the enjoyment of various activities do not indicate rising enjoyment of most types of childcare. Robinson and Geoffrey Godbey (1999) report enjoyment ratings for various activities from the 1985 survey. In this survey, which covered both men and women, basic childcare ranked below

work and cooking, but above housework. Alan Krueger and others (2008) report measures of enjoyment of various activities by women in 2005. According to their table 8.3, basic childcare ranked below both cooking and housework. Thus there is no evidence that basic childcare has become more pleasant. Additional evidence against the increased enjoyment hypothesis is the lack of an increase in the fertility rate or in family size: if today's parents enjoyed childcare much more than did parents in earlier years, one would expect them to choose to have more children.

One caveat is that playing with children has always ranked high in terms of enjoyment. We have followed the standard practice of including time spent in play in our measure of childcare time, because play is often considered crucial for investment in children's human capital. However, it might alter the interpretation of the results if one believes that the increase in childcare time is simply a redirection of time from one high-enjoyment activity to another.

To investigate this possibility, we reestimate the regressions for parents, this time excluding time spent playing with children from our measure of childcare time. Only parents' ages are used as controls. The first two columns of table 3 show the results for mothers. Column 3-1 reproduces column 1-1 of table 1, and column 3-2 reports the corresponding results using the restricted childcare variable. Omitting time spent playing with children reduces the increase in total childcare time by about 1 hour for less educated mothers and by about 3 hours for college-educated mothers. Nevertheless, most of the increase over time and across education levels remains. The results for fathers (columns 3-3 and 3-4) are similar.

II.E. More Flexible Work Schedules

Yet another possible explanation is that parents now have more flexible work schedules and can thus reallocate their time so as to spend more time with their children even while working. Unfortunately, we do not have measures of work schedule flexibility, either in our time-use data or in the aggregate. However, one implication of this hypothesis is that the biggest increases in childcare time should be among working mothers rather than stay-at-home mothers.

To test this implication, we split the sample by work status and rerun our basic regressions. We find that the increase in childcare time from 1975 to 2008 was 4.8 hours for less educated working mothers, 5.5 hours for less educated stay-at-home mothers, 7.1 hours for college-educated working mothers, and 16.3 hours for college-educated stay-at-home mothers. Thus the increase in childcare time over this period is greater for those

Table 3. Regressions Identifying Trends in Time Spent on Childcare Excluding Play^a

<i>Independent variable^b</i>	<i>Mothers</i>		<i>Fathers</i>	
	<i>Including play 3-1^c</i>	<i>Excluding play 3-2^d</i>	<i>Including play 3-3^c</i>	<i>Excluding play 3-4^d</i>
1965	1.636 (0.613)**	1.919 (0.538)**	0.290 (0.512)	-0.187 (0.413)
1985	-0.369 (0.689)	-0.443 (0.602)	0.005 (0.583)	-0.144 (0.471)
1992-94	-1.103 (0.552)	-1.247 (0.485)**	0.210 (0.516)	-0.172 (0.417)
1995	1.744 (0.883)*	0.770 (0.775)	1.232 (0.821)	0.441 (0.663)
1998	1.842 (0.933)*	1.182 (0.819)	3.102 (0.856)**	2.143 (0.692)**
2000	3.928 (0.640)**	3.482 (0.562)**	4.522 (0.579)**	3.439 (0.468)**
2003	4.676 (0.398)**	3.584 (0.349)**	3.184 (0.340)**	2.242 (0.274)**
2004	4.071 (0.435)**	3.013 (0.382)**	3.444 (0.367)**	2.307 (0.296)**
2005	3.992 (0.436)**	3.115 (0.382)**	3.327 (0.372)**	2.472 (0.300)**
2006	4.324 (0.443)**	2.879 (0.389)**	3.104 (0.375)**	1.982 (0.303)**
2007	4.227 (0.452)**	2.993 (0.396)**	3.277 (0.377)**	2.165 (0.305)**
2008	4.288 (0.450)**	3.182 (0.395)**	4.44 (0.382)**	2.850 (0.309)**
College	0.026 (0.900)	0.193 (0.790)	0.854 (0.579)	0.718 (0.468)
1965 × college	2.048 (2.174)	1.124 (1.908)	0.093 (1.229)	0.007 (0.993)
1985 × college	1.873 (1.671)	1.488 (1.467)	-0.321 (1.142)	-0.399 (0.923)
1992-94 × college	1.373 (1.264)	0.452 (1.110)	-0.422 (0.972)	-0.434 (0.785)
1995 × college	0.741 (2.153)	-0.021 (1.890)	1.799 (1.642)	1.387 (1.327)
1998 × college	3.117 (2.052)	1.705 (1.801)	2.134 (1.666)	1.978 (1.346)
2000 × college	4.868 (1.479)**	3.840 (1.298)**	-0.406 (1.098)	0.144 (0.887)
2003 × college	4.999 (1.015)**	3.788 (0.890)**	1.913 (0.688)**	1.344 (0.556)*
2004 × college	6.344 (1.062)**	4.110 (0.932)**	1.425 (0.733)	0.803 (0.592)
2005 × college	6.038 (1.073)**	4.183 (0.942)**	2.514 (0.746)**	1.055 (0.603)

(continued)

Table 3. Regressions Identifying Trends in Time Spent on Childcare Excluding Play^a (Continued)

Independent variable ^b	Mothers		Fathers	
	Including play 3-1 ^c	Excluding play 3-2 ^d	Including play 3-3 ^c	Excluding play 3-4 ^d
2006 × college	4.109 (1.072)**	2.968 (0.941)**	2.296 (0.741)**	1.625 (0.599)**
2007 × college	5.291 (1.073)**	3.193 (0.942)**	2.138 (0.755)**	1.032 (0.611)
2008 × college	4.659 (1.074)**	3.487 (0.942)**	0.900 (0.745)	0.846 (0.602)
Constant	11.656 (0.342)**	9.787 (0.300)**	3.565 (0.300)**	2.206 (0.2143)**
No. of observations	24,342	24,342	17,806	17,806
Adjusted R ²	0.09	0.07	0.06	0.04

Source: Authors' regressions using data from various time-use surveys.

a. The dependent variable is hours per week spent by parents (defined as all persons aged 18–64, except students, living in households with a child under the age of 18) on total childcare (columns 3-1 and 3-3) or on childcare excluding time spent playing with children (columns 3-2 and 3-4). Standard errors are in parentheses. Asterisks indicate statistical significance at the *5 percent or the **1 percent level.

b. See table 1 for variable definitions.

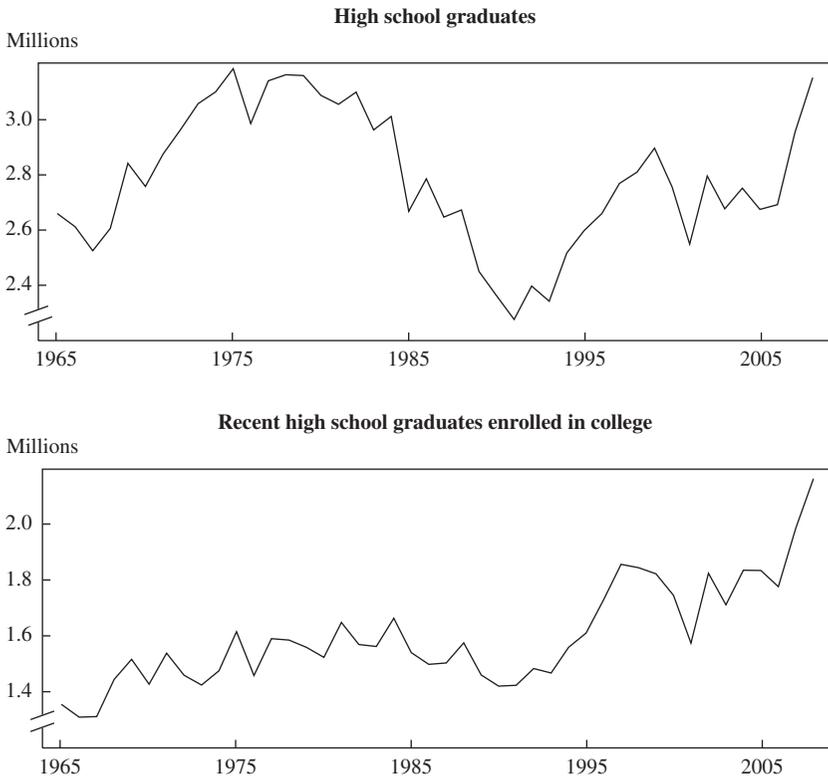
c. Childcare measure includes all time spent on childcare, in hours per week; regression includes dummy variables for parent's age (same regression as reported in column 1-1 or column 1-3 of table 1).

d. Same regression as reported in previous column except that the childcare measure excludes time spent playing with children.

mothers who do *not* work. One might worry about selection effects, since the labor force participation rate of mothers has increased since 1975, our usual comparison year. However, even when we instead compare with 1985, a year when the labor force participation rate for college-educated mothers was higher than in 1975, we find that the increase in childcare time among college-educated nonworking mothers was around 11 hours per week, compared with 6.8 hours per week for college-educated working mothers. Thus some other factor must have been at play to lead even nonworking mothers to increase their childcare time so much.

III. A New Explanation: The Rug Rat Race

We now offer a new explanation for the trends in time spent in childcare, one that is tied to increased competition for college admissions, particularly among the children of college-educated parents. Our claim is that a steep rise in demand for college admissions, together with a relatively con-

Figure 6. High School Graduates and College Enrollments, 1965–2008

Source: National Center for Education Statistics, *2009 Digest of Education Statistics*, table 200.

stant number of slots at the more attractive colleges, has resulted in “cohort crowding” for college admissions, which in turn has spurred competition among parents for attractive slots. This more intense competition manifests itself in parents spending more time preparing their children for college. We dub this expenditure of childcare time in dissipative rivalry the “rug rat race.”

III.A. Shifts in Demand and Supply for College

Empirical trends in demand for college admissions display a remarkable agreement with trends in time spent on childcare. The top panel of figure 6 shows the number of new high school graduates each year since 1965, from the *2009 Digest of Education Statistics*. The initial large hump is due

to the baby-boom generation. The number of graduates fell to a low around 1990 but has since spiked upward as a result of the “baby boom echo.” Projections by the National Center for Education Statistics indicate that the number of high school graduates in the echo boom peaked in 2009.

The bottom panel of figure 6 traces the number of recent high school graduates enrolled in college. The pattern differs somewhat from that in the top panel because of the long-run upward trend in the propensity for high school graduates to go to college. As the figure reveals, after declining from 1980 to 1990, this number increased dramatically during the 1990s, fluctuated around a constant level, and then jumped again in 2007.

Meanwhile the supply of college admissions—the number of slots at the more attractive colleges—has not expanded commensurately with demand. Between 1990 and 2005, total enrollment in college by recent high school graduates increased by 30 percent, but the number of full-time-enrolled freshmen increased by less than 13 percent at the 10 elite universities of the “Ivy Plus” and by only 10 percent at the top 25 liberal arts colleges as ranked by *US News and World Report* in 2006.¹⁰ Bound and Turner (2007) show that this “cohort crowding” extends to public institutions as well. Using variation in cohort size across states, they show that the elasticity of undergraduate enrollment with respect to the age-18 population is well below unity. According to table 4 of their paper, 2-year community colleges have the highest elasticity, 0.82, followed by nonflagship public universities with an elasticity of 0.56, and flagship public universities with an elasticity of only 0.2. This evidence indicates that the number of slots becomes much less responsive to enrollment pressure as the quality of the institution increases.

III.B. Evidence on Competition for College Slots

For the last several years, the popular press has been filled with stories of unprecedented competition for college. Some of the perceived increase in competition is simply a statistical mirage: the average student now applies to more colleges, both because of the increased ease of filling out applications and because of perceived greater uncertainty about getting into a given college. However, there is ample evidence that part of the increase in competition is real. Within the University of California (UC) system, mean grade point averages and standardized test scores of admitted students increased from 1994 to 2007 for seven of the eight campuses

10. These numbers are based on our calculations using data extracted from the Integrated Postsecondary Education Data System.

that admit undergraduates.¹¹ At UC Santa Barbara, which ranks fifth among the campuses in selectivity, the average GPA of admitted students rose by 0.3 point on a 4.0 scale. Bound and others (2009) document many other facets of the increase in competition. For example, they show that the test scores of entering students are higher now on average, particularly at the top-ranked schools. They also show that the percentage of high school graduates applying to a 4-year institution has increased over time, and that the probability of acceptance to a 4-year college for a student of given ability has declined significantly since 1982.¹²

Although many colleges still accept most applicants, there is evidence to suggest that parents and children today pay more attention to selective colleges. Caroline Hoxby (1997) documents that the market for higher education has changed from a collection of local markets to a nationally integrated market. Hoxby (2009) surveys the evidence and concludes that there are higher returns to attending a more selective college. According to the *New York Times*,¹³ “The preoccupation with the top universities, once primarily a phenomenon in the Northeastern United States, has become a more countrywide obsession.” Observers note that college admissions anxiety has spread to the Midwest and the Sun Belt; in the latter, enrollment in SAT/ACT preparation classes has grown more than seven times the overall national growth rate over the last 5 years.¹⁴ The National Association for College Admission Counseling (2008, p. 18) documents that the 257 four-year colleges that accept fewer than 50 percent of applicants account for 18 percent of total full-time enrollment but receive 31 percent of all applications.

Numerous other disciplines, such as developmental psychology, pediatrics, and sociology, have drawn an explicit link between competition for

11. Our calculations are based on data available at www.universityofcalifornia.edu and exclude UC Merced, which opened in 2005.

12. Hoxby (2009) shows that in the aggregate, test scores of students admitted to U.S. colleges fell from the 1960s to the 1970s and 1980s but rose again in the last couple of decades. She also shows that the colleges with higher average test scores in the 1960s experienced an increase in the test scores of admitted students, whereas colleges with lower test scores in the 1960s experienced a decrease. These trends were noted earlier by the various studies surveyed by Davies and Hammack (2005). Based on this evidence, Hoxby argues that overall college selectivity has not increased. However, Hoxby bases her argument entirely on standardized test scores, as opposed to the controlled experiment run by Bound and others (2009). Nor does her analysis take into account the widespread belief that colleges now put greater emphasis on extracurricular activities.

13. Alan Finder, “Ivy League Admissions Crunch Brings New Cachet to Next Tier,” *New York Times*, May 16, 2007, p. A14.

14. Justin Pope, “Admissions Anxiety Reaches New Regions,” Associated Press, October 22, 2006.

college slots and the increase in time devoted to academics and extracurricular activities. For example, Suniya Luthar and Bronwyn Becker (2002) and Lareau (2003) argue that many middle- and upper-middle-class parents see building up their children's "after-school résumés" as absolutely necessary because of the competition for college admission. The American Academy of Pediatrics (Ginsburg 2007) cites the increase in competition in college admissions as a key reason for the decrease in free play time and increase in scheduled activities among children nationwide.¹⁵

Perhaps the most direct evidence in support of our hypothesis is presented by Hilary Levey. Her study asks, "What explains the increase in children's participation in activities outside of the home, structured and monitored by their parents, when family time is so scarce?" (Levey 2009, p. i). After 16 months of fieldwork involving 172 interviews of middle- and upper-middle-class parents, children, coaches, and teachers, Levey concludes that parents believe that extracurricular activities are essential for obtaining the credentials their children need to gain admittance to "good" colleges, which is seen as a necessary and sufficient condition for the children's future economic welfare. She specifically notes parents' perceptions of the increased competition to get into college and the "race towards college admissions" (Levey 2009, p. 11).

III.C. A Theoretical Model of the Rug Rat Race

The evidence presented above is consistent with the idea that an increase in rivalry for scarce college slots has induced parents to increase the time they spend preparing their children for college. In this section we develop a simple theoretical model that shows how shifts in the demand and supply for college, of the sort documented above, might account for the observed behavior of childcare hours through increased rivalry for college slots. The model is able to link the coincident S-shaped patterns of childcare hours and college demand documented in figures 1 and 6, respectively.

Our model posits that parents compete for college slots by investing in their children's college preparation. Each parent is assumed to have a single child. The parent has either a college degree or less education, represented by c and l , respectively. The numbers of college-educated and less educated parents are denoted by m_c and m_l , respectively, and $m = m_c + m_l$ is their total. Children's college attendance is restricted by the availability of slots. We assume that there are k_1 slots available at first-tier colleges, and

15. An ongoing debate among child development experts asks whether the dramatic increase in extracurricular activities helps or hurts children. See, for example, Rosenfeld, Wise, and Coles (2001) and Mahoney and others (2006).

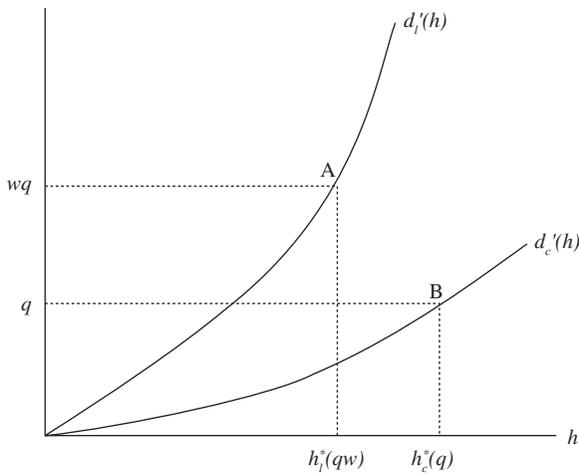
k_2m slots available at second-tier colleges, where $k_1 + k_2m < m$. The demographic shifts depicted in figure 6 are modeled as an increase in the parameters m_c and m_l . When this occurs, college slots become scarcer overall, and the first-tier slots become relatively scarcer, in line with the evidence.

We assume that a child's preparation for college depends on her parent's time spent in childcare, denoted by h . The college admissions process operates as follows. Parents choose h , and colleges at the same time observe the value of h for each child. The colleges then fill their slots in descending order of h . This acceptance rule may be rationalized in a number of ways. For example, children may in later life contribute a proportion of their wealth, which increases in h , to their alma maters, and admissions decisions may be made so as to maximize total contributions. Since first-tier slots are most valuable, they will be filled first. In equilibrium, a threshold h_1 will exist such that children with $h \geq h_1$ are accepted to first-tier colleges, and there are exactly k_1 such children. The second-tier slots are filled next: there is a threshold h_2 such that children with $h \in [h_2, h_1)$, numbering k_2m , are accepted to second-tier colleges. The remaining $m - k_1 - k_2m$ children with $h < h_2$ do not attend college.

If a child goes to college, her ultimate wealth is given by wqh , where $w > 1$ reflects the college wage premium and q reflects the quality of the college attended by the child. The parameter q is meant to capture both pecuniary and psychic benefits from college attendance. For example, parents may value the prestige of sending their children to more elite institutions. Moreover, q may change over time across all quality levels, reflecting generalized changes in the value of a college education. Let q_1 and q_2 denote the quality parameters for first- and second-tier colleges, respectively, where $q_1 > q_2 > 0$. If a child does not attend college, then wealth is assumed to be q_0h , where $q_2 > q_0 > 0$.

Parents choose h so as to maximize their children's wealth net of their own disutility. A less educated parent incurs a disutility of $d_l(h)$ from choosing h , and a college-educated parent incurs $wd_c(h)$; note that a rise in w leads to greater disutility for the college-educated parents. The disutility functions satisfy, for $s = l, c$, $d'_s, d''_s > 0$, $d_s(0) = d'_s(0)$, and $d'_s(\infty) = \infty$. Moreover, we assume that college-educated parents incur lower marginal disutility in the absence of a wage premium, that is, $d'_c(h) < d'_l(h)$.¹⁶

16. Instead of assuming differences in marginal disutility across parental education levels, the model could specify college preparation as an increasing function of childcare hours, $p_s(h)$, $s = c, l$, where an hour spent by a college-educated parent has a higher productivity effect, so that $p_c(h) > p_l(h)$. This would yield the same comparative advantage for college-educated parents in preparing their children for college as in the specification we use.

Figure 7. Choosing Time Spent in College Preparation

Source: Authors' model described in the text.

The objective function of a less educated parent is $wqh - d_i(h)$. For a college of quality q , the unconstrained optimal level of preparation, $h_i^*(q)$, is determined by

$$d'_i[h_i^*(q)] = wq.$$

For a college-educated parent, the objective function is $wqh - wd_c(h)$, and the unconstrained optimal preparation level, $h_c^*(q)$, satisfies

$$d'_c[h_c^*(q)] = q.$$

The effect of a parent's schooling on optimal preparation time is considered in figure 7. For less educated parents the optimal decision occurs at point A, where the marginal return wq equals the marginal disutility d'_i . A parent's college education shifts the marginal disutility locus down to d'_c . This captures a *productivity effect* in preparing children for college. Countering this is an *opportunity cost effect*, whereby a given quantity of time commands a higher market wage. The marginal return to preparation, adjusted for opportunity cost, drops to q , and the optimal decision occurs at point B. We assume that the productivity effect dominates the opportunity cost effect, so that $h_c^*(q) > h_i^*(q)$ holds for every level of q . Thus college-educated parents have a comparative advantage in investing in college preparation.

We first consider the case in which m_c is small, in the sense that there are enough first-tier slots to accommodate all the children of college-educated parents. Proposition 1 of the theoretical appendix characterizes the outcome for the case where $m_c < k_1$. In equilibrium, college-educated parents exploit their comparative advantage in college preparation to get their children into first-tier colleges. The children of less educated parents take up the remaining first-tier slots along with all of the second-tier slots. The acceptance thresholds h_1 and h_2 make the latter parents just indifferent among first-tier, second-tier, and no college. The thresholds are distorted upward relative to the corresponding unconstrained optimal preparation levels $h_1^*(q_1)$ and $h_1^*(q_2)$, reflecting rivalry among these parents for scarce slots.

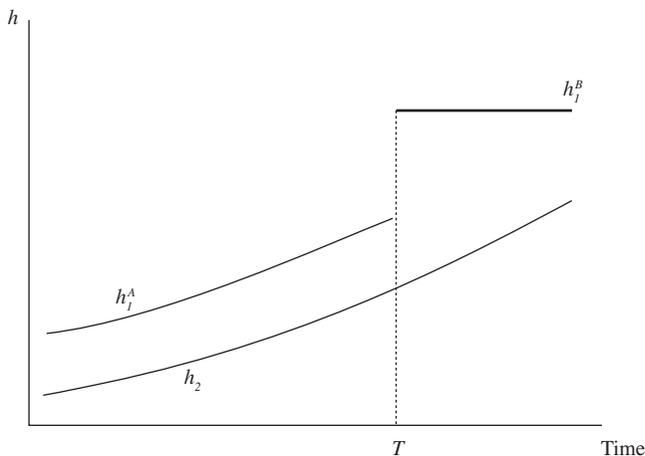
Now suppose that m_c rises to the point where there are too few first-tier slots for all the children of college-educated parents. As shown in proposition 2 of the theoretical appendix, once $m_c > k_1$, the focus of rivalry shifts from the less educated to the college-educated parents. The children of the less educated parents are driven completely from the first tier, as the acceptance threshold h_1 jumps to a level that makes the college-educated parents indifferent between the first and second tiers. This new level is distorted upward relative to unconstrained optimal preparation, $h_c^*(q_1)$. In this way, the change in the competition for college slots is directly linked to the increase in childcare hours among college-educated parents.

Figure 8 illustrates the time paths of college preparation choices when m_c and m_i rise gradually, with $m_c = k_1$ occurring at time T . We interpret T as corresponding to a point of time in the mid-1990s. The wage premium w is also assumed to rise over time, leading to gradually increasing paths of h_1 and h_2 .¹⁷ Up to time T , the growth of m_c gradually squeezes the children of less educated parents out of the first-tier colleges, shifting their parents' preparation choices from h_1 to h_2 . The average level of h nevertheless increases if growth in w is sufficiently rapid. The preparation choices of college-educated parents also rise if $h_1 > h_c^*(q_1)$. At time T these parents jump to a discretely higher level of college preparation, while the choices of the less educated parents continue to rise with h_2 .¹⁸

17. The increasing paths h_1 and h_2 could also be induced by a rise over time in the college quality parameters q_1 and q_2 , due to greater psychic benefits from attending a quality college, for example.

18. The segment of the tier 1 acceptance threshold following time T is flat because we have assumed that changes in the wage premium have exactly offsetting effects on the costs and the benefits of preparation by college-educated parents. Thus the wage premium does not affect their preparation incentives.

Figure 8. College Preparation Choices over Time with Rising Cohort Size and Rising Wages



Source: Authors' model described in the text.

The model shows how rivalry for ever-scarcer slots can fuel a rug rat race among parents, where rivalry is manifested in higher college preparation requirements. Following a sharp increase in demand for college slots, rivalry among the college-educated parents intensifies greatly, driving up their time spent in childcare relative to that of the non-college-educated. This matches the coincident S-shaped patterns of childcare time and college demand seen in the U.S. data.¹⁹

III.D. A Comparison of Trends in the United States and Canada

Our theory links changes in childcare hours to rivalry for scarce college slots. This rivalry is tied in turn to the competitive admissions procedures used at U.S. colleges. The theory would predict a different path of childcare hours in a country such as Canada, where college admissions are determined in a much less rivalrous fashion. Thus, as a test of our theory, we compare trends in childcare time in the United States and Canada.

The comparison of these two countries is ideal for our purposes. Because of their geographic proximity and similarity of language and cul-

19. Akerlof (1976) introduced the first “rat race” model in economics. In his model, imperfect information causes workers to work faster in order to signal their underlying ability. In our model there is perfect information, but the scarcity of college slots causes parents to exert greater preparation effort in order to capture slots for their children. In other words, our model is based on rivalry rather than signaling.

ture, one would expect that changes in childcare time caused by such broad factors as knowledge diffusion and social fads would affect both countries similarly. In fact, the two countries differ significantly in the nature of the competition for admission to their universities and colleges.

Scott Davies and Floyd Hammack (2005) document the similarities and differences in the higher education systems of the United States and Canada. The countries are similar in that just over 60 percent of high school graduates in both countries pursue a postsecondary education. Both systems have decentralized governance, and both have experienced similar patterns of rising enrollment and increased scarcity of college slots.

However, as Davies and Hammack also document, the nature of the competition for college admission in the two countries is very different. They argue that whereas the Canadian system consists of formally equal public universities, the U.S. system is distinguished by a steep prestige hierarchy across colleges nationwide, leading to a distinctive form of competition that has increased over the last decade. In contrast, there is no national market for higher education in Canada; few Canadians go to college outside their home province. Thus it is not surprising that there is no Canadian equivalent to the SAT and that extracurricular activities are irrelevant for admission to Canadian colleges. Instead, competition in Canada occurs within the postsecondary system and takes the form of competition to enter lucrative majors. Davies and Hammack argue, "Where one studies is seen as more important in the U.S., while what one studies dominates in Canada." In fact, many Canadian college students who cannot get into their desired programs at 4-year colleges often transfer to community colleges in order to pursue their chosen field.

The lower competition to secure favored slots within a hierarchy of colleges suggests that there should be less pressure on educated Canadian parents to invest time in preparing their children to get into college as slots become scarcer. We test this prediction by studying trends in childcare time in Canada.

To this end, we use microdata on English-speaking Canadian parents from the 1986 (cycle 2), 1992 (cycle 7), 1998 (cycle 12), and 2005 (cycle 19) cycles of the Time Use Survey from Canada's General Social Survey (conducted by Statistics Canada) to construct trends in childcare time by parental education level.²⁰ However, there was a significant change in a def-

20. We use the Statistics Canada microdata file of the four cycles, which contain anonymized data. All computations on these microdata were prepared by the Nova Scotia Department of Finance; the responsibility for the use and interpretation of these data is entirely that of the authors.

initiation between surveys: the two earlier surveys counted as childcare any care of children 18 years or younger, whereas in the two later surveys the cutoff age was 14. Using the standard childcare variables would therefore bias the trends downward over time. Instead we use the survey's measure of total family care (children and adults), a more consistent measure. The online data appendix shows that the change implied by this measure lies between a lower bound using the available childcare variable and an upper bound based on some imputations we made. Otherwise, our analysis of the data is similar to that for the U.S. data. We estimate the same baseline regressions as before, controlling for the age group of the parent and including interacted year and education variables.²¹

Table 4 and figure 9 show the results. Columns 4-1 and 4-3 of table 4 show the results with baseline controls, and columns 4-2 and 4-4 the results when controls for marital status and the age group of the youngest child are added to the regression. Figure 9 plots the results for the baseline regressions. We have normalized the hours to be zero in the base year in each country, 1985 in the United States and 1986 in Canada.

Figure 9 shows that time spent in care (childcare in the United States, family care in Canada) by less educated parents has increased by about the same amount in both countries since the mid-1980s: about 4 to 5 hours per week for mothers and about 3 hours per week for fathers. But whereas time spent by college-educated mothers rose by almost 9 hours per week in the United States, it rose by only 1 hour per week in Canada. For college-educated fathers, the increases were 6 and 2 hours per week, respectively. Thus, as our theory would predict, Canada did not experience the big increases in time spent on care among college-educated parents. In fact, the educational gap grew in the United States but shrank in Canada.

Our findings are broadly consistent with other analyses of trends in the Canadian data. Gilles Pronovost (2007) finds that the amount of time that parents spent in the presence of their children fell from 1986 to 2005. Similarly, Martin Turcotte (2007) finds a decrease in time spent with family members over the period 1986–2005.

III.E. Comparisons across Ethnic Groups in the United States

As an additional test of our theory, we compare childcare time across ethnic groups within the United States. One group that should not have felt as much increased competition to enter college is minorities who are

21. Because of data limitations in some years, the youngest age category includes those aged 20–24 rather than 18–24 as in the U.S. data.

Table 4. Regressions Identifying Trends in Time Spent on Family Care in Canada^a

<i>Independent variable^b</i>	<i>Mothers</i>		<i>Fathers</i>	
	<i>Age controls only 4-1^c</i>	<i>Full set of controls 4-2^d</i>	<i>Age controls only 4-3^c</i>	<i>Full set of controls 4-4^d</i>
1992	2.235 (0.606)**	1.967 (0.561)**	1.258 (0.509)*	1.020 (0.491)*
1998	3.652 (0.5491)**	3.404 (0.547)**	3.183 (0.508)**	3.134 (0.491)**
2005	5.050 (0.533)**	4.894 (0.501)**	2.453 (0.442)**	2.476 (0.435)**
College	7.307 (1.151)**	3.037 (1.068)**	2.736 (0.841)**	1.758 (0.807)*
1992 × college	-3.669 (1.585)**	-1.346 (1.463)	-0.712 (1.180)	-0.397 (1.130)
1998 × college	-3.141 (1.536)*	-2.099 (1.417)	-0.784 (1.117)	-0.993 (1.070)
2005 × college	-4.229 (1.307)**	-2.091 (1.206)	-0.553 (0.974)	-0.278 (0.933)
Constant	14.209 (0.464)**	-2.836 (1.110)**	6.508 (0.407)**	-4.215 (1.155)**
Controls for marital status and age of youngest child?	No	Yes	No	Yes
No. of observations	6,548	6,548	4,671	4,671
Adjusted R ²	0.12	0.25	0.06	0.14

Source: Authors' regressions using data from the General Social Survey of Canada.

a. The dependent variable is hours per week spent by parents (defined as all persons aged 20–64 living in a home with his or her own child under the age of 19) on family care (care of all family members, children and adults). Standard errors are in parentheses. Asterisks indicate statistical significance at the *5 percent or the **1 percent level.

b. See table 1 for variable definitions. The omitted year is 1986.

c. Regressions include a control for the parent's age range (equals 1 if the parent is aged 20–24, 35–44, 45–54, or 55–64; the omitted category is age 25–34).

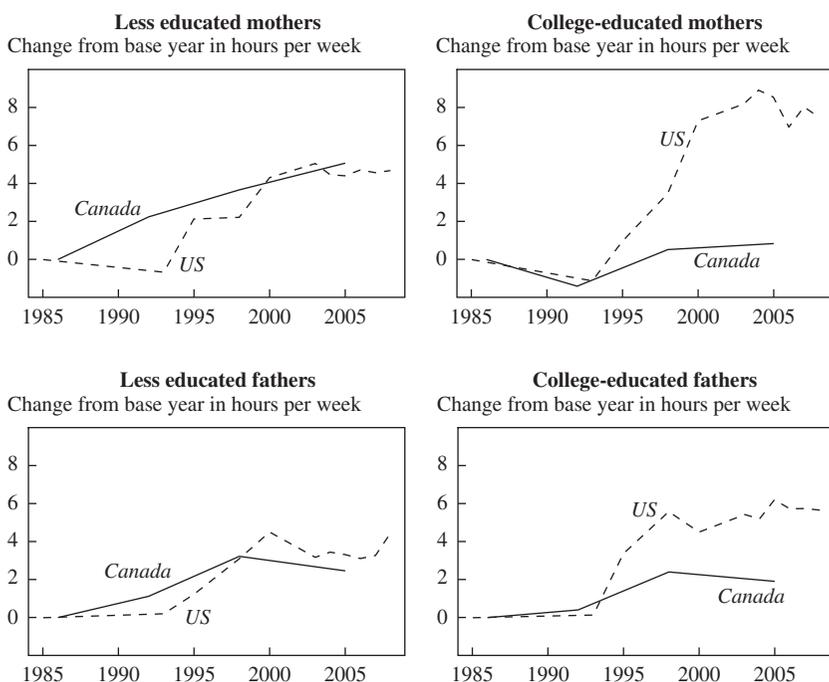
d. Regressions include, in addition to the age controls, a dummy for the parent's marital status and a dummy for the age range of the youngest child (4 or younger, 5–9, or 10–14; the omitted category is age 15–18).

underrepresented in U.S. colleges.²² Despite the overall increase in applicants, most colleges are still eager to admit underrepresented minorities.

Unfortunately, in this comparison we cannot compare trends over time because the samples before 2003 are too small to allow a meaningful distinction across racial groups, particularly by education level. Instead, we make a cross-sectional comparison using pooled 2003–08 data and estimate regressions separately on less educated and college-educated groups.

22. We are indebted to Daniel Hamermesh for suggesting this test to us.

Figure 9. Cumulative Changes in Time Spent on Care in Canada and the United States, 1985–2008^a



Source: Authors' estimates from regression results reported in table 1, columns 1-1 and 1-3, and table 4, columns 4-1 and 4-3.

a. Care is childcare in the United States, total family care (care of children and adults) in Canada. Hours are normalized to zero for each group in the initial year, 1985 for the United States and 1986 for Canada.

We include the full set of controls as well as controls for parents who are high school dropouts (within the less educated group) and parents with graduate degrees (within the college-educated group), because of potential differences across racial groups.

Table 5 shows that among less educated mothers, black and Hispanic mothers spend about 3 hours less per week in childcare than other mothers. Among college-educated mothers, black mothers spend 3 hours less and Hispanic mothers about 2 hours less than other mothers. Among less educated fathers, black and Hispanic fathers spend 1.4 to 1.9 hours less than other fathers. Among college-educated fathers, black fathers spend half an hour less and Hispanic fathers 2 hours less. These results are consistent with our hypothesis that underrepresented minorities feel less pressure to compete for college slots and hence spend less time in childcare.

Table 5. Differences in Childcare Time Spent by Minority and Nonminority Parents^a

	<i>Less educated</i>		<i>College-educated</i>	
	<i>Blacks</i>	<i>Hispanics</i>	<i>Blacks</i>	<i>Hispanics</i>
<i>Mothers</i>				
Difference in hours ^b	-3.090 (0.375)**	-2.893 (0.328)**	-3.182 (0.705)**	-1.768 (0.716)**
No. of observations	1,409	2,235	341	350
<i>Fathers</i>				
Difference in hours ^b	-1.404 (0.392)**	-1.890 (0.314)**	-0.478 (0.671)	-2.272 (0.647)**
No. of observations	571	1,409	184	225

Source: Authors' regressions based on pooled data from BLS time-use surveys from 2003 to 2008.

a. Regressions are estimated separately on samples of less-than-college-educated and college-educated mothers and fathers. All regressions include controls for parent's age category and full controls for children's age category, number of children in family, parent's marital status, whether the parent is a high school dropout, and whether the parent has an advanced degree.

b. Compared with nonblack, non-Hispanic mothers or fathers with the same educational attainment.

III.F. Correlations with Measures of Admissions Competition across U.S. States

Although national integration of the U.S. college market has increased, regional factors still play an important role in determining competition for college. Bound and others (2009), using their new index of college competition by state, provide evidence that both levels of and trends in competition vary across states. As a further test of our theory, we can use this index to test whether greater college competition within a state is associated with more hours of childcare among college-educated parents who live in that state. Here we interpret our theory as applying to state-level college markets.

Ideally, we would compare trends in childcare by state over time to changes in the index over time. Unfortunately, sample sizes in the time-use surveys before 2003 are too small to provide information by state. Instead we make cross-state comparisons using the later surveys. To construct childcare time by state, we use pooled data from the 2003–08 surveys to estimate state-level childcare time measures by education and sex, using the full set of controls: parent's age, parent's marital status, and child number and age variables. The Bound and others (2009) index of competition by state is constructed by summing the following variables at the state level: the PSAT (Preliminary SAT) participation rate, the Advanced Placement examination participation rates, the fraction of students reporting

Table 6. Regressions Explaining Interstate Differences in Childcare Time, by Intensity of Competition for College Admissions^a

	<i>Mothers</i>		<i>Fathers</i>	
	<i>Less than college-educated</i>	<i>College-educated</i>	<i>Less than college-educated</i>	<i>College-educated</i>
Coefficient on college competitiveness index ^b	1.504 (0.747)**	1.987 (0.825)**	-0.658 (0.563)	0.940 (0.682)
Adjusted <i>R</i> ²	0.085	0.117	0.030	0.041

Source: Authors' regressions.

a. Average time spent in childcare is estimated for each state by combining data from the 2003–08 American Time Use Surveys. Each estimate is a residual after controlling for parents' ages (dummies for ages 18–24, 25–34, 35–44, 45–54, and 55–64), parents' marital status, a quadratic in the number of children, and dummies for the age range of the youngest child in the family (age 1 year or less, 2, 3–5, 6–9, and 10–14). All regressions have 46 observations. Standard errors are in parentheses. Asterisks indicate statistical significance at the *5 percent and **1 percent level.

b. The index, from Bound, Hershbein, and Long (2009), is calculated for each state as the sum of the PSAT participation rate, the Advanced Placement participation rate, the fraction of students reporting 10 or more homework hours per week, the fraction applying to five or more colleges, and the fraction using private test preparation in 2004.

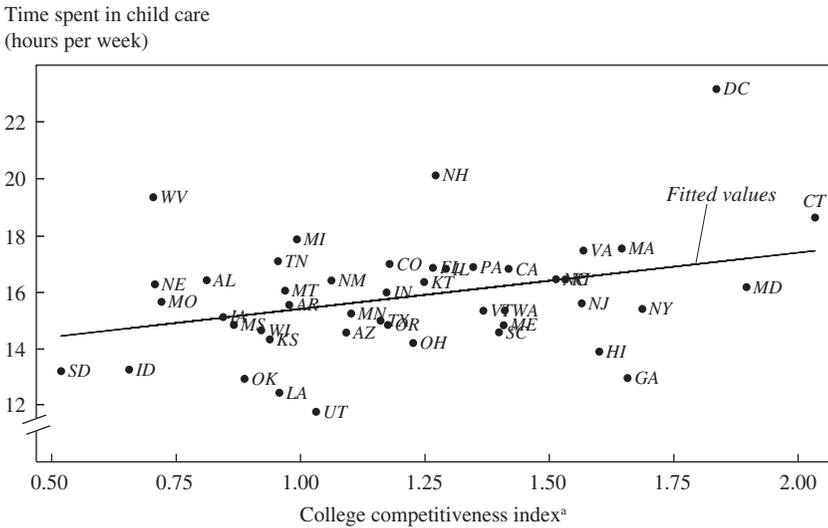
10 or more homework hours per week, the fraction applying to five or more colleges, and the fraction using private test preparation.

Table 6 shows the results of regressing state childcare time on Bound and others' index. Three of the four coefficients suggest a positive correlation, and the coefficients for both less educated and college-educated mothers are significantly positive, consistent with our hypothesis. Figure 10 shows a scatterplot of states on the two measures. South Dakota had the lowest index of competition for college in 2004 and Connecticut the highest. College-educated mothers spend an average of 13.2 hours per week on childcare in South Dakota (after controlling for family size and age characteristics) and 18.6 hours in Connecticut. The regression coefficient on the Bound and others index indicates that 3 hours of this difference may be related to differences in college competition. Thus for mothers there is evidence that greater competition at the state level is associated with greater time spent on childcare.

III.G. Discussion

Our theoretical model emphasizes the role of college preparation as a motive for increased childcare. According to the model, parents perceive a link between attendance at a good college and the accumulation of valuable human capital, and they exert effort, in the form of time spent in childcare, to influence their children's chances of admission to a good

Figure 10. Competition for College Admissions and Childcare Time Spent by College-Educated Mothers, by State

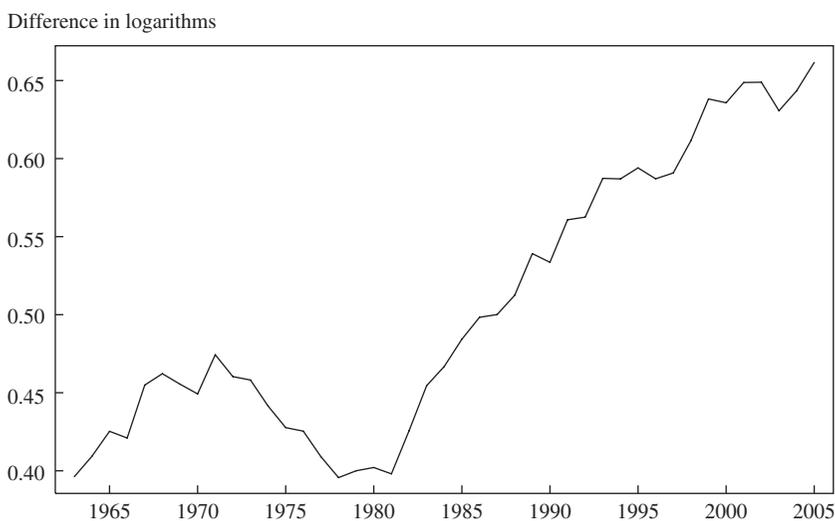


Source: Bound and others (2009), various time-use surveys, and authors' regression.
a. The index is defined in table 6, note b.

college. As we have shown, numerous studies from other disciplines have made the link between increased parental effort and the desire to get one's children into good colleges. The evidence we have presented is consistent with the idea that greater scarcity of desirable college slots has induced increases in childcare effort, especially by college-educated parents, who possess a comparative advantage in college preparation.

One question that arises is whether this factor alone can explain the magnitude of the increase in childcare time. It is possible that the rise in competition for college slots, triggered by the increase in the college-eligible population, provided the underlying impulse, but that other forces worked to amplify it. For example, if a subset of parents in a neighborhood get caught up in the "rug rat race" and enroll their children in multiple organized activities, other families with less concern about college competition might follow suit simply because there are fewer children available for unstructured play in the neighborhood. One could also envision models with "social contagion" that serve to amplify the effects.

From a broader perspective, any factors that alter the returns to college may enter parents' calculations and thus have the potential to affect childcare decisions. Changes in the college wage premium, in particular, may

Figure 11. College–High School Wage Gap, 1963–2005

Source: Data from Autor, Katz, and Kearney (2008).

have an important influence on college preparation incentives. Figure 11 traces the college wage premium, measured as the log difference in wages between college and high school graduates over the last half century (the data are from Autor, Katz, and Kearney 2008). Although the wage premium has risen steadily since the early 1980s, the rate of increase has slowed: the average annual change fell from 1.3 percent (measured in log points) over 1980–90 to 0.85 percent over 1990–2005. The path of the wage premium does not closely fit the S-shaped pattern of childcare hours for any of the four groups depicted in figure 1, even after adjusting for possible downward bias in the 1992–94 time-use survey. It seems very difficult to rationalize the sharp upward movement in the childcare hours of college-educated parents beginning in the mid-1990s as a response to the much smoother secular upward trend of the college wage premium.

The Canadian evidence provides further perspective on the role of the wage premium. Brahim Boudarbat, Thomás Lemieux, and Craig Riddell (2006) show that in Canada between 1980 and 2000 the wage premium of a college graduate relative to that of a high school graduate rose by about 10 percentage points for men and 6 percentage points for women. This contrasts with an average rise over both sexes of 25 percentage points in the United States over the same period (Autor and others 2008). Thus the returns to college have increased much more in the United States. How-

ever, as figure 9 showed, childcare hours for less educated parents display very similar behavior across the two countries over this period. Moreover, these parents ought to be more sensitive to changes in the wage premium, since college-educated parents experience a relatively greater increase in the opportunity cost of childcare time as the wage premium rises. In summary, the evidence does not point to changes in the college wage premium as an important factor in the behavior of childcare hours.

Nonpecuniary benefits of college, such as prestige or general “well-roundedness,” may also have important effects on parents’ calculations. The increased focus on selective colleges may reflect changes in societal attitudes that have raised the relative demand for admission to prestigious institutions. This motivation is complementary to our rivalry theory: not only are more children chasing a relatively constant supply of desirable college slots, but these slots may have themselves become relatively more desirable.

It is possible to imagine a plethora of alternative theories based on various parental motivations for investing time in children in order to increase their general human capital. To be persuasive, such theories must be capable of accounting for the key aspects of the evidence that we highlight. The first is the timing: we have shown that weekly hours spent in childcare in the United States have followed a pronounced S-shaped pattern, with almost all of the growth concentrated in a 10-year period beginning in the mid-1990s. The second is the composition: the increase in hours is much greater for college-educated parents and consists chiefly of increases in time spent caring for older children, and in travel and activities—the categories that relate most directly to the college application process. The third is the difference between the United States and Canada: we do not observe an increase in childcare time among college-educated parents in Canada, despite the similarity of the two countries’ economic and cultural environments. Theories that rely on forces that unfold broadly and gradually will not easily explain this evidence.²³

IV. Conclusion

This paper has documented a dramatic increase in time spent in childcare by college-educated parents since the mid-1990s. Although time spent in

23. For example, Stevenson (forthcoming) shows that participation in sports raises educational attainment and wages, but we are not aware of any evidence suggesting that the return to sports or other organized activities has increased over time.

childcare rose for all parents, the rise was far more pronounced for college-educated parents. Since the mid-1990s, less educated mothers have reallocated over 4 hours per week to childcare, but college-educated mothers have reallocated more than 9 hours per week. This reallocation occurred at the same time that competition to get into college intensified, as demographic forces led to a surge in the demand for college slots. In contrast, time spent in childcare by educated parents in Canada, where college competition is much lower, changed very little over this period.

We have explained these trends using a model in which the rise in time devoted to childcare is the optimal response to the increase in rivalry for scarce college slots. We postulate that college-educated parents have a comparative advantage in preparing their children for college, which they exploit to get their children into the most attractive colleges. When slots are plentiful relative to demand, the required amount of child preparation is relatively low. However, when demand rises, rivalry among the college-educated parents drives the required preparation upward.

In this paper we have focused on explaining observed trends in time use, but our results also have implications for socially efficient time allocation. To the extent that the private costs and benefits of college preparation reflect social costs and benefits, the intense rivalry for college slots in recent years implies wasteful overinvestment in preparation. Such overinvestment might be mitigated by expanding the number of slots at attractive colleges or by modifying their acceptance rules to place greater emphasis on criteria that parents cannot directly influence. In a broader context, however, parents may not fully internalize the social benefits of preparing their children, which raises the possibility that the rug rat race provides a useful stimulus to human capital investment and thus more closely aligns the private and the social benefits. These issues warrant closer investigation in future work.

THEORETICAL APPENDIX

Proposition 1. If $m_c < k_1$, then the equilibrium acceptance threshold h_1 is uniquely determined by $h_1 = h_1^A > h_i^*(q_0)$ and

$$(A1) \quad wq_1 h_1^A - d_i(h_1^A) = h_i^*(q_0) - d_i[h_i^*(q_0)],$$

and the equilibrium threshold h_2 is uniquely determined by $h_2 > h_i^*(q_2)$ and

$$(A2) \quad wq_2 h_2 - d_i(h_2) = h_i^*(q_0) - d_i[h_i^*(q_0)].$$

Moreover, $h_1^A > h_2$, and

—college-educated parents choose $h = \max\{h_c^*(q_1), h_1^A\}$

—less educated parents divide themselves among $h = h_1^A$, $h = h_2$, and $h = h_i^*(q_0)$, where $h_i^*(q_0)$ is the optimal preparation choice when a child does not attend college.

Proof. Let $G_l(h|q) = wqh - d_l(h)$ and $G_c(h|q) = wqh - wd_c(h)$ represent the objective functions of less educated and college-educated mothers, respectively. Under our assumptions, these functions are strictly concave in h and $G_l[h_i^*(q_0)|q_0/w]$, there is a unique point $h_1^A > h_i^*(q_1)$ satisfying $G_l(h_1^A|q_1) = G_l[h_i^*(q_0)|q_0/w]$. Similarly, $G_l[h_i^*(q_2)|q_2] > G_l[h_i^*(q_0)|q_0/w]$ implies that there is a unique point $h_2 > h_i^*(q_2)$ satisfying $G_l(h_2|q_2) = G_l[h_i^*(q_0)|q_0/w]$. Furthermore, $G_c(h_2|q_1) > G_c(h_2|q_2) = G_l[h_i^*(q_0)|q_0/w]$ implies $h_2 < h_1^A$.

Consider the h choices of college-educated mothers when $h_c^*(q_1) \geq h_1^A$. Clearly, $h_c^*(q_1)$ is optimal among $h \geq h_1^A$. Moreover, for all $h \in [h_2, h_1^A]$, $G_c[h_c^*(q_1)|q_1] > G_c[h_c^*(q_2)|q_2] \geq G_c(h|q_2)$, and for all $h < h_2$, $G_c[h_c^*(q_1)|q_1] > G_c[h_c^*(q_0)|q_0/w] \geq G_c(h|q_0/w)$. Thus $h_c^*(q_1)$ is strictly preferred to any other h .

Next suppose $h_1^A > h_c^*(q_1)$. Let $\hat{h} = \max\{h_c^*(q_2), h\}$. Note that $h_c^*(q_2) < h_c^*(q_1)$ and $h_2 < h_1^A$ imply $\hat{h} < h_1^A$. Moreover, $\hat{h} \geq h_2$ implies $G_l(\hat{h}|q_2) \leq G_l[h_i^*(q_0)|q_0/w]$. Thus,

$$\begin{aligned} 0 &\geq G_l(\hat{h}|q_2) - G_l[h_i^*(q_0)|q_0/w] = G_l(\hat{h}|q_2) - G_l(h_1^A|q_1) \\ &= wq_2\hat{h} - wq_1h_1^A + \int_{\hat{h}}^{h_1^A} d'_l(h)dh > wq_2\hat{h} - wq_1h_1^A + \int_{\hat{h}}^{h_1^A} wd'_c(h)dh \\ &= G_c(\hat{h}|q_2) - G_c(h_1^A|q_1), \end{aligned}$$

where the strict inequality comes from the fact that $h_c^*(q) > h_i^*(q)$ for all q implies $wd'_c(q) < d'_l(q)$ for all q . Thus $G_c(h_1^A|q_1) > G_c(\hat{h}|q_2)$, and it follows that $G_c(h_1^A|q_2) > G_c(h|q_2)$ for all $h \in [h_2, h_1^A]$, since \hat{h} maximizes $G_c(h|q_2)$ over this range of h . Finally, consider $h < h_2$. If $\hat{h} = h_c^*(q_2)$, then $G_c(\hat{h}|q_2) > G_c[h_c^*(q_0)|q_0/w] \geq G_c(h|q_0/w)$ for all $h < h_2$, whereas $\hat{h} = h_2$ implies $\hat{h} > h_c^*(q_0)$, and

$$\begin{aligned} 0 &= G_l[h_i^*(q_0)|q_0] - G_l(\hat{h}|q_2) > G_l[h_c^*(q_0)|q_2] - G_l(\hat{h}|q_2) \\ &= h_c^*(q_0) - wq_2\hat{h} + \int_{h_c^*(q_0)}^{\hat{h}} d'_l(h)dh > h_c^*(q_0) - wq_2\hat{h} + \int_{h_c^*(q_0)}^{\hat{h}} wd'_c(h)dh \\ &= G_c[h_c^*(q_0)|q_0/w] - G_c(\hat{h}|q_2), \end{aligned}$$

so that $G_c(\hat{h}|q_2) > G_c(h|q_0/w)$ for all $h < h_2$.

Now consider the h choices of the less educated mothers. Because of strict concavity and because $h_1^A > h_i^*(q_1)$, $G_i(h|q_1) < G_i(h_1^A|q_1)$ for all $h > h_1^A$. Similarly, $G_i(h|q_2) < G_i(h_2|q_2)$ for all $h \in [h_2, h_1^A]$. Since $h_i^*(q_0) < h_2$ and $h_i^*(q_0)$ maximizes $G_i(h|q_0/w)$, it follows that $G_i(h|q_0) < G_i[h_i^*(q_0)|q_0/w]$ for all $h < h_2$, $h \neq h_i^*(q_0)$. Thus, the choices h_1^A , h_2 , and $h_i^*(q_0)$ are strictly preferred to any others, and by construction these three are equally preferred. Q.E.D.

Proposition 2. If $k_1 < m_c$, then the equilibrium acceptance threshold h_1 is uniquely determined by $h_1 = h_1^B > h_c^*(q_1)$ and

$$(A3) \quad wq_1 h_1^B - wd_c(h_1^B) = q_0 \hat{h} - wq_0 d_c(\hat{h}),$$

where $\hat{h} = \max\{h_c^*(q_0), h_2\}$, and h_2 is determined as in proposition 1. Moreover, $h_1^B > h_1^A$, and

—college-educated parents divide themselves between $h = h_1^B$ and $h = \hat{h}$, and

—less educated parents divide themselves between $h = h_2$ and $h = h_i^*(q_0)$.

Proof. Equation A3 can be expressed as $G_c(h_1^B|q_1) = G_c(\hat{h}|q_2)$. Moreover, $G_c[h_c^*(q_1)|q_1] > G_c[h_c^*(q_2)|q_2] \geq G(\hat{h}|q_2)$. Since $h_1^B > h_c^*(q_1)$, it follows that h_1^B is uniquely defined, and $G_c(\hat{h}|q_1) > G_c(\hat{h}|q_2)$ implies $h_1^B > \hat{h}$.

We now verify that $h_1^B > h_1^A$:

$$\begin{aligned} 0 &= G_c(\hat{h}|q_2) - G_c(h_1^B|q_1) = wq_2 \hat{h} - wq_1 h_1^B + \int_{\hat{h}}^{h_1^B} wd'_c(h)dh \\ &< wq_2 \hat{h} - wq_1 h_1^B + \int_{\hat{h}}^{h_1^B} d'_i(h)dh = G_i(\hat{h}|q_2) - G_i(h_1^B|q_1). \end{aligned}$$

This implies $G_c(h_1^B|q_1) < G_i(\hat{h}|q_2) \leq G_i(h_2|q_2)$, and comparison with equations A1 and A2 shows that $h_1^B > h_1^A$.

Consider the h choices of college-educated mothers. Since $h_1^B > h_c^*(q_1)$, $G_c(h|q_1) < G_c(h_1^B|q_1)$ for all $h > h_1^B$. If $h_c^*(q_2) \geq h_2$, then $h_c^*(q_2)$ is strictly preferred to any other $h \in [h_2, h_1^B]$, whereas if $h_2 > h_c^*(q_2)$, then $G_c(h|q_2) < G_c(h_2|q_2)$ for all $h \in (h_2, h_1^B)$. Thus $G_c(\hat{h}|q_2)$ maximizes $G_c(h|q_2)$ over $h \in [h_2, h_1^B]$. The argument from the proof of proposition 1 shows that $G_c(\hat{h}|q_2) > G_c(h|q_0/w)$ for all $h < h_2$. Thus, the choices h_1^B and \hat{h} are strictly preferred to any others, and they are equally preferred by construction.

For the less educated mothers, $h \geq h_1^B$ implies $G_i(h|q_1) \leq G_i(h_1^B|q_1) < G_i(h_2|q_2)$, so h_2 is strictly preferred over any such h . The arguments from the proof of proposition 1 establish that h_2 and $h_i^*(q_0)$ are strictly preferred to any other $h < h_1^B$, and they are equally preferred by construction. Q.E.D.

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Comments and Discussion

COMMENT BY

ERIK HURST The introduction of the American Time Use Survey (ATUS) has led to a resurgence in research by economists interested in understanding how Americans allocate their time. By linking the ATUS with time-use surveys from earlier periods, researchers have also been exploring the changing nature of time use during the last few decades. Given that time is an important input into market work, nonmarket work, child development, and leisure, understanding the changing nature of time use allows researchers to better understand household preferences, home production technologies, and the changing nature of well-being.

This paper by Garey Ramey and Valerie Ramey tackles the important question of how parents have changed the amount of time they spend in childcare activities, with particular attention paid to the changing patterns by level of parental education. The paper has two distinct components. First, it sets out to document a set of facts about changes in time spent in childcare by highly educated and less educated parents over the last 40 years. The key result is that although time spent in childcare has increased for both groups, the increase was much greater for the highly educated parents. Second, the paper sets out to explain the primary mechanism that drives the patterns in the data. Ramey and Ramey propose a new explanation—the “rug rat race”—for the changing trends in time use between education groups. The crux of their argument is that as slots in elite postsecondary institutions have become scarcer, perhaps because demand for college attainment has increased, parents have responded by investing more in their children so that they appear more desirable to college admissions officers. Where before good grades were enough to gain admission, elite colleges are now seeking applicants with outstanding grades or lots of extracurricular activities, or both.

In the first part of the paper, the authors convincingly document that the amount of time spent by parents in childcare has changed, and changed differently in different educational groups, over the last 40 years. These facts stand by themselves and, I expect, will be an important input into future research. I am less convinced about the importance of their preferred explanation for the trends they document. Although I do think that a rug rat race could conceivably exist, very little in the paper directly supports its existence, and nothing in the paper allows one to reject other prominent stories that might explain the divergence in time spent in childcare between highly educated and less educated parents.

Throughout my discussion I will highlight many additional facts that make one think hard about whether or not the rug rat race can be driving the relationships observed in the data. In particular, I will show that nearly all the increase in educational differences in time use documented in recent surveys is driven by households with young children, and not by households with preteen or teenage children. Moreover, I will propose and empirically explore an additional test of the rug rat race hypothesis. As I will show, this test is rejected by the data. I will also show that an educational or income gradient in time spent in childcare is an important feature of the data within and across many different types of countries. Lastly, I will argue that the authors never convincingly reject alternative explanations—such as a pure income effect story—that might explain both the recent patterns in the United States and patterns using a variety of data from other countries. In the end, I am not sure what is driving the facts documented in the first part of the paper. Nothing in the paper tells me anything conclusive one way or another about the cause of the finding.

THE ROBUST RELATIONSHIP BETWEEN INCOME (AND EDUCATION) AND PARENTAL TIME SPENT ON CHILDCARE. The relationship between parental education (or income) and time spent in childcare is found in many datasets and across many time periods. For example, Russell Hill and Frank Stafford (1974) use data from 1965 to show that “high socioeconomic status” mothers spend between two and three times as much time in preschool childcare as do “low socioeconomic status” mothers. Some of these patterns can be seen in Ramey and Ramey’s figure 1. In both 1965 and 1985, highly educated mothers spent between 2 and 4 hours more per week on childcare than less educated mothers (my calculations using similar data by slightly different age groups).

In my work with Jonathan Guryan and Melissa Kearney (Guryan, Hurst, and Kearney 2008), we document two additional facts that suggest that parental education and parental income are strongly associated with time

spent in childcare. First, our analysis of time diaries collected around 2000 for a number of developing and developed economies finds a very strong positive relationship across countries between the average time spent by mothers in childcare and GDP per capita. This relationship became stronger when we controlled for demographic differences across the countries. Mothers in richer countries tend to spend more time in childcare than mothers in poorer countries. Second, within every country we studied, highly educated mothers spend more time with their children than less educated mothers.

These results suggest a persistent relationship between educational attainment and parental time spent with children. What drives this relationship? Many explanations are possible, but two stories immediately come to mind. First, it is possible that parental time spent in childcare has a high income elasticity in the parental utility function. As people get richer, they may take more of their utility in the form of time with their children. In that sense, time spent in childcare is a relative luxury good. Second, it is also possible that in a world where there are large differences in earnings between high- and low-skilled parents, the returns to investing in children are higher. If high-skilled parents are more adept at investing in their children than low-skilled parents, a change in the skill premium could yield greater investments by high-skilled parents relative to low-skilled parents. Note that this argument is similar in spirit to the rug rat race hypothesis. In the former, parents are responding directly to the change in returns from broadly investing in their children, whereas in the latter, parents are responding only to the increased competition to get their children into elite schools. I view the rug rat race as a special case of the broader possibility that high-skilled parents are responding to the increased returns to having children with higher skills, whether cognitive or noncognitive, or both.

If these two hypotheses explain the myriad facts outlined above, then the increase in income inequality between highly educated and less educated households in the United States during the last 25 years should have produced a greater increase in time spent with children among the former. Does the paper rule out these explanations? It attempts to, but not, I think, convincingly, as I will argue below.

FURTHER DECOMPOSING THE EDUCATIONAL TRENDS IN TIME SPENT WITH CHILDREN. Ramey and Ramey cut the data in many interesting ways and show many interesting trends with respect to parental time spent in child care. I want to highlight one additional cut of the data, using data from a short book I wrote with Mark Aguiar (Aguiar and Hurst 2009). As in that book, I restrict attention to mothers aged 25 through 44 where at least one child

Table 1. Mothers' Time Spent in Childcare, by Mother's Education and Age of Youngest Child, 2003–05^a
Hours per week

<i>Age of youngest child</i>	<i>Less educated mothers</i>	<i>College-educated mothers^b</i>	<i>Difference</i>
Less than 5	18.3	27.7	9.4
Between 6 and 12	10.1	12.5	2.4
Between 13 and 17	4.7	5.7	1.0

Source: Author's calculations using data from the 2003–05 ATUS.

a. Data are for mothers aged 25–44 and are the same as those used in Aguiar and Hurst (2009). The definition of time spent in childcare is similar to that in Ramey and Ramey (this volume) and in Aguiar and Hurst (2009). All data are unconditional and weighted using ATUS core sample weights.

b. College degree or more.

under the age of 17 is living in the home. My measure of total time spent on childcare is roughly equivalent to that used by Ramey and Ramey.

I cut the data in two ways. In table 1, I look only at data from the 2003–05 ATUS and compare time spent in childcare across education groups and by age of the youngest child in the household. The table shows that the biggest gap in time spent in childcare by educational attainment is in households where the youngest child is under the age of 5. For households with only teenagers who are on the cusp of college entry, time spent in childcare by highly educated and less educated parents is very similar. If the rug rat race hypothesis is correct, why is the biggest difference found in households with young children, and why is there so little difference between households with children closer to college age?

In table 2, I focus on the change in time spent in childcare between 1985 and 2003–05 for households where the youngest child is less than 5 years of age. Because the 1985 survey has only an indicator variable for whether the youngest child is less than 5, I cannot explore the detailed breakdown by age of youngest child as I did in table 1. The results nonetheless indicate that the *change* in childcare time spent by highly educated parents relative to less educated parents is driven mostly by the changing behavior of highly educated parents with young children in the household.

Ramey and Ramey also explore time spent on primary care activities separately for children under and over the age of 5. This distinction between children of different ages was not made, however, in the 2003–05 ATUS. The results I have presented indicate that the gaps between 1985 and 2003 with respect to increasing childcare time spent by highly educated parents relative to less educated parents are driven primarily by parents with young

Table 2. Change in Mothers' Time Spent in Childcare, by Education and Age of Youngest Child, 1985 to 2003–05^a

Hours per week

<i>Age of youngest child</i>	<i>1985</i>	<i>2003–05</i>	<i>Difference</i>
Less than 5			
Less educated mothers	16.2	18.9	2.7
College-educated mothers ^b	18.0	25.6	7.6
Difference	1.8	6.7	4.9
6 or older			
Less educated mothers	5.6	9.3	3.7
College-educated mothers ^b	6.1	11.9	5.8
Difference	0.5	2.6	2.1

Source: Author's calculations using data from the 1985 and 2003–05 ATUS.

a. Data are for mothers aged 25–44 and are the same as those used in Aguiar and Hurst (2009). The definition of time spent in childcare is similar to that in Ramey and Ramey (this volume) and in Aguiar and Hurst (2009). All data are unconditional and weighted using ATUS core sample weights.

b. College degree or more.

children. Do these results prove the rug rat race does not exist? Not necessarily. They do, however, cast doubt on the hypothesis that it is parents' desire to get their children into elite colleges that is driving the bulk of the differential trends by education in parental time spent in childcare.

ANOTHER DIRECT TEST OF THE RUG RAT RACE HYPOTHESIS. One simple and direct way to test the rug rat race hypothesis is to look at the educational gaps (or the changes in educational gaps) in time spent in childcare across U.S. states, where the pressure of the rug rat race may differ. Ramey and Ramey look at the relationship between the average time spent in childcare by more educated mothers within a state and a measure of competition for college admission in that state (as computed by Bound, Hershbein, and Long 2009).

I propose another test: highly educated individuals who live in states with elite state universities should be less responsive to the pressures of the rug rat race than highly educated individuals who live in states without such universities. The reason is that elite state universities have a preference (some of which is statutory) to admit students from within the state. This gives students who live in a state with an elite state university greater access to an elite school than otherwise similar individuals in other states. Parents in these other states have to work harder to get their children into an elite school as admission to elite schools becomes more competitive.

To test this hypothesis, I divide states into three groups: those with a state university ranked in the top 30 national universities (public and private)

Table 3. Mothers' Time Spent in Childcare, by Mother's Education and Presence or Absence of an Elite State University^a

Hours per week

<i>Mother's educational attainment</i>	<i>States with elite state universities^b</i>	<i>States with near elite state universities^c</i>	<i>All other states</i>
Less educated	14.2	12.8	13.9
College-educated ^d	18.6	18.9	19.3

Source: Author's calculations using data from the 2003 ATUS.

a. Data are for mothers aged 25–44 and are the same as those used in Aguiar and Hurst (2009). The definition of time spent in childcare is the same as that used in Aguiar and Hurst (2007). All data are unconditional and weighted using ATUS core sample weights.

b. California, Michigan, North Carolina, and Virginia.

c. Florida, Georgia, Illinois, Maryland, Minnesota, Ohio, Pennsylvania, Texas, Washington, and Wisconsin.

d. College degree or more.

by *U.S. News and World Report* in 2009, those with a state university ranked between 30th and 61st, and all others. The states in the first group (which I will refer to as those with elite state universities) are California, Michigan, North Carolina, and Virginia. Those in the second group, with what I will call near elite (very good) state universities, are Florida, Georgia, Illinois, Maryland, Minnesota, Ohio, Pennsylvania, Texas, Washington, and Wisconsin. Table 3 summarizes time spent with children by mothers aged 25 through 44 in each of these three tiers of states, using data from the 2003 ATUS.

According to the table, the difference in time spent in childcare between highly educated and less educated parents varies only a little between states with elite state universities and those with state universities outside of the top 60 national universities: the differences are 4.4 hours per week and 5.4 hours per week, respectively. Moreover, even these results are misleading because they do not control for persistent differences within a state across time. Using 1992–94 time-use data (which also include state identifiers), one can explore the change in the educational gap between states with elite state universities and all other states over time. The change between 1992–94 and 2003 was greatest in states with near elite state universities (8.2 hours per week) and lowest in the “other” states (1.7 hours per week). The change in states with elite state universities was 2.8 hours per week. These results are at odds with the implications of the rug rat race being a primary driver of the change in the educational gap in time spent in childcare. If the rug rat race were important, states where households did not have preferred access to elite or near elite state universities would have recorded the greatest increase in childcare time.

ALTERNATIVE STORIES: CAN INCOME EFFECTS BE RULED OUT? As discussed above, my first guess to explain the greater increase in childcare time among highly educated parents would be the widening of the income gap between education groups over the last 25 years. Ramey and Ramey offer two pieces of evidence to support their claim that this is not a primary driver of their results. First, they argue, the timing does not match up exactly. Undermining this claim, however, is the sporadic coverage of the time-use data and the fact that the 1992–94 data have been shown to be of lower quality and less reliable than those from the other time-use surveys. More important, to fully assess the timing issues, one must also consider differences in timing between entry into the labor market (where highly educated workers start to earn the skill premium) and fertility. When one takes into account that peak fertility among high-skilled workers begins 5 to 7 years after entry into the labor market, the timing of wage changes and the timing of the changes in childcare time line up more closely.

Second, Ramey and Ramey try to estimate income effects directly from the cross-sectional data by looking at how time spent in childcare by non-working mothers varies with the income of their husbands. Even in this sample, they do find evidence that income effects are important. Nonworking women with high-income husbands spend more time with their children than nonworking women with lower-income husbands. However, Ramey and Ramey show that the income effects implied from this regression are not large enough to explain the time-series trends in the educational gap in time spent in childcare. This regression, however, is inherently flawed. Women face a time constraint. If they wish to spend more time with their children, they must spend less time on something else. One of the major ways women can allocate more time to their children is by leaving the labor force. By restricting their analysis to those women who have chosen not to work, the authors are missing a major margin available to women who wish to spend more time with their children. The problem is analogous to the well-documented criticisms of estimating female labor supply elasticities on a sample of working women only, which ignores adjustments on the extensive labor supply margin.

Ramey and Ramey do report some evidence that time spent in childcare responds to changes in the skill premium. I particularly liked the comparison with Canada. Canada has seen small changes in the skill premium and no increase in the educational gap in time spent in childcare. The United States, in contrast, has witnessed big changes in the skill premium and big changes in the educational gap. I am curious whether this cross-country pattern would hold up if more countries were analyzed. It would have been

nice to see whether countries with larger increases in the skill premium had growing differences in time spent in childcare by level of parental education. The results contrasting the United States and Canada point in that direction, but it is hard to draw any conclusions from just two countries. I acknowledge that the U.S.-Canada comparison does not provide strong evidence for the story that income constraints are an important explanation for the documented patterns, but neither does it provide strong evidence for the importance of the rug rat race.

CONCLUSIONS There is a lot to like about this paper. The data work compiled by Ramey and Ramey is novel, well done, and interesting, and the paper was stimulating to read and think about. However, I remain unconvinced that the rug rat race is the primary (or even a secondary) explanation for the trend that the authors document. From my reading, nothing in the paper supports the contention that the rug rat race is a first-order explanation of the data, and nothing in their analysis rules out other potential explanations. I am not sure what story would best explain the facts documented in the paper—which means this is definitely a worthwhile area for future research.

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COMMENT BY

DANIEL W. SACKS AND BETSEY STEVENSON Gary Ramey and Valerie Ramey establish the important fact that time spent by parents in childcare, after remaining stable for decades, rose dramatically during the 1990s and reached a plateau in the 2000s. As Ramey and Ramey document,

these changes are large by any metric, comparable to the decline in hours worked during the Great Recession. Moreover, this increase in childcare time was uneven: college-educated mothers' childcare time grew by 9 hours per week, while less educated mothers' time grew by 4 hours per week.

Ramey and Ramey argue that the only viable explanation for this relative growth among well-educated parents is a college rug rat race. Demographic pressures and increasing returns to higher education in the 1990s squeezed college-educated parents, whose children had in the past been virtually guaranteed a seat at selective colleges. Competition for increasingly scarce slots at these colleges drove parents to spend ever more time in childcare as they attempted to separate their own children from the pack.

This is a creative explanation that resonates with many contemporary accounts of parenthood and higher education. If correct, the college rug rat race has stark policy implications: the relative growth in childcare time does nothing to improve well-being; it is the result of parents hoping to transfer "college surplus" from other children to their own. This wasteful activity potentially comes at an enormous cost: Ramey and Ramey estimate that the rise in childcare represents over \$300 billion in forgone wages annually.

To assess the social value of this \$300 billion increase in childcare, it is useful to consider the alternative explanations that might have generated it. We posit three categories of explanations, each with different implications for social welfare: the rug rat race, investment-based explanations, and consumption-based explanations. If the rise in childcare hours is due exclusively to a rug rat race—which need not necessarily derive from college competition—the additional time spent in childcare is wasteful.¹ Investment-based explanations, in contrast, suggest that the increase in childcare is generating valuable returns for the next generation. Parents may be increasingly eager to invest in their children because of perceived increases in labor market returns to cognitive and noncognitive skills. Although socially beneficial, childcare-as-investment also means that college-educated parents' children, advantaged to begin with, will enjoy even greater levels of human capital than their peers, and thus the rising gap in childcare hours by education may portend widening inequality.

1. Ramey and Ramey note that parents may underinvest in children in the absence of a rug rat race if investment in children generates positive externalities. In this case the rug rat race may operate like a Pigouvian tax, correcting the underinvestment, and therefore be socially efficient.

Consumption-based explanations are more benign, suggesting that the relative rise in childcare among the well educated is no more alarming than a relative rise in expenditure on cars or computers would be. Instead, childcare-as-consumption points to other possible causes for the increase in childcare, for example changes in the structure of American families and the rise of hedonic marriages (Stevenson and Wolfers 2007, 2008).

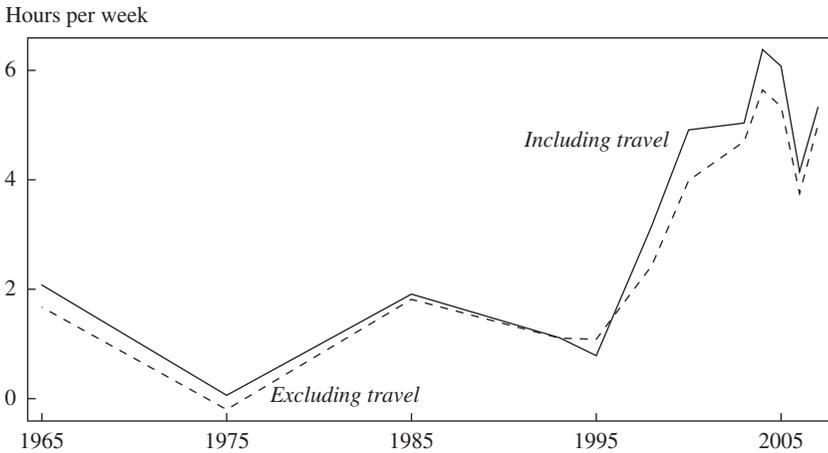
In this discussion we first offer some comments on Ramey and Ramey's evidence for the rug rat race as a driver of the increase in time spent in childcare. We show that, quantitatively, their evidence suggests the rug rat race can account for at most a modest fraction of this rise. We then present evidence on the importance of investment and consumption explanations in the rise of childcare time.

Ramey and Ramey present an impressively broad array of evidence for the rug rat race. First, they show that the trends in high school cohort size and in competition for college match the trends in childcare during the 1990s. Second, they point to the large rise in time spent transporting children and caring for older children. Third, they compare trends in childcare time by race and nationality. Finally, they use cross-sectional evidence on competition for college admission across states to demonstrate that college-educated mothers spend more time on childcare where college competition is greater.

Taken together, this evidence suggests that increases in college competition are playing a role in the rise in childcare, but there are some important caveats. First, although the childcare and cohort crowding time series match nicely in the 1990s, the two series are negatively correlated between 1965 and 1985, a period when childcare time was flat and graduation rates rose and then declined. Overall, the correlation between the size of the graduating cohort and the difference in childcare time between college-educated and less well educated mothers during the period Ramey and Ramey are studying is a negligible -0.06 .

The second piece of evidence concerns relative changes in the components of childcare time and the importance of time spent in transportation. Ramey and Ramey emphasize that the rug rat race explains the rise in the differential trend between college-educated and less educated parents, and that an important component of the increase in the differential is "time spent on *older* children . . . transporting them to their activities" (emphasis in original). We find, however, that the increase in the differential trend was steeper among mothers with young children than among mothers without young children, and that the increase in time spent in transportation occurred nearly equally for college-educated and less educated parents.

Figure 1. Difference in Childcare Time between Well-Educated and Less Educated Parents, Including and Excluding Travel Time, 1965–2008^a



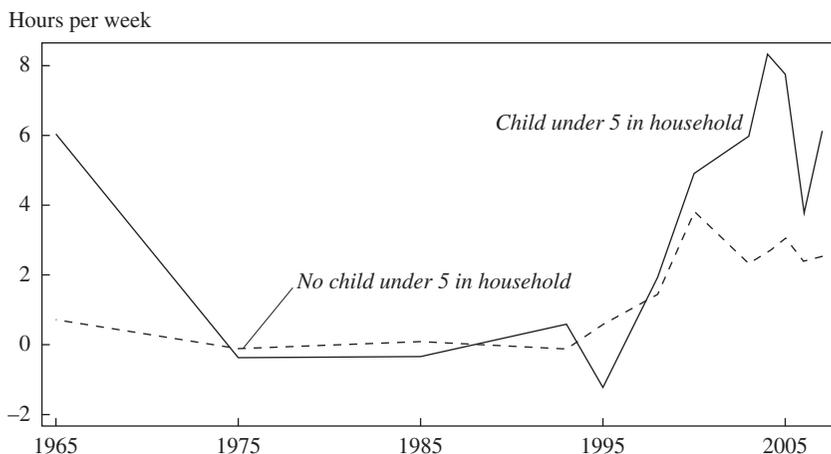
Source: Authors' calculations.

a. Figure plots the coefficients on the interaction between the year dummy and a dummy for whether the parent completed college, using the descriptive model and data in Ramey and Ramey (this volume) and including or excluding travel time in total childcare time.

To assess the role of older children and travel time in the rise in the differential trend, we reestimate Ramey and Ramey's basic regression but exclude time spent on travel. We plot the college \times year interactions estimated from this exercise in figure 1, along with the original coefficients. The two patterns are very similar, and the regression results suggest that travel time may explain around 10 percent of the relative rise. Increases in travel and chauffeuring children constitute about 10 percent of the overall rise in childcare, but this increase in chauffeuring is unlikely to be a direct result of an increase in competition for college. In particular, college admissions offices do not directly observe parents chauffeuring children, and parents with a high value of time could simply make other transportation arrangements—hiring a driver or sending their child by taxi. Yet many parents have stated that such outsourcing would generate disapproval from other parents.² This social pressure for “homemade” transportation may reflect a rat race, but not a college-centric one.

2. Valerie Ramey noted this during the Brookings Panel discussion. Judith Warner (2005) has also pointed to the tendency of mothers to judge and ostracize each other.

Figure 2. Difference in Childcare Time between Well-Educated and Less Educated Parents, by Presence of Young Children, 1965–2008^a



Source: Authors' calculations.

a. Figure plots the coefficients on the interaction between the year dummy and a dummy for whether the parent completed college, using the descriptive model and data in Ramey and Ramey (this volume) and including or excluding travel time in total childcare time.

In figure 2 we reestimate Ramey and Ramey's basic regression separately for mothers with children younger than 5 and mothers whose youngest child is 5 or older. College-educated mothers with young children experienced a much sharper increase in childcare time: the educational differential in childcare time rose by 6.6 hours per week for these mothers compared with 2.6 hours for mothers without young children.³ This comparison suggests that college competition may not be responsible for a large share of the rise in childcare time.

Ramey and Ramey's third line of evidence comes from comparing trends in the United States with those in Canada, and, within the United States, between blacks and whites. They show that despite a similar upward trend in time spent in childcare among Canadian parents without a college degree, there has been no relative increase among college-educated Canadian mothers. The Canadian data illustrate the robustness of the upward trend in childcare documented by Ramey and Ramey. Canadian parents, like U.S. parents, are now spending several more hours a week

3. These differentials are the rise in the difference in childcare time for college-educated versus less educated mothers between the periods 1965–95 and 1998–2007, adjusting for age, for parents with and without young children.

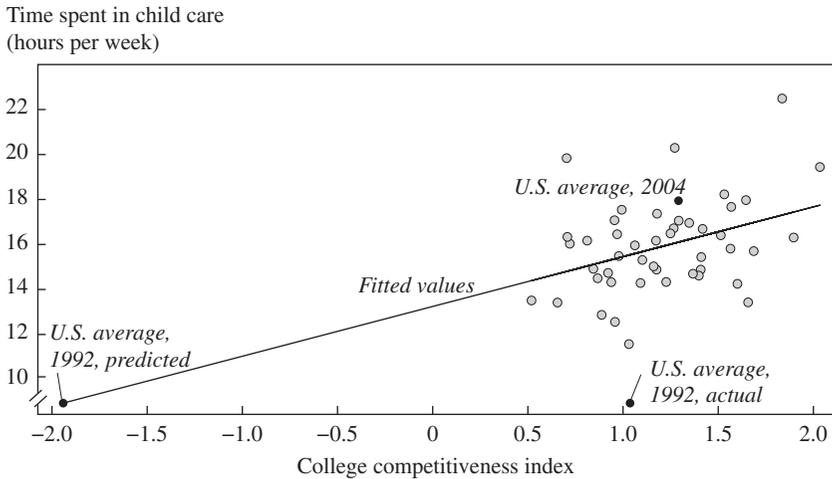
interacting with their children. However, the college gap in childcare is more difficult to interpret. Before the rise in childcare in the 1990s, the gap in hours spent in childcare between college- and non-college-educated mothers was less than an hour in the United States, but over 7 hours in Canada. The gap has since widened in the United States to around 5 hours, while falling in Canada to around 3 hours. Ramey and Ramey point to this fact as evidence of an increase in college competition in the United States. However, this explanation says little about why the educational gap shrank in Canada or why it was so much bigger in Canada to begin with.

Finally, Ramey and Ramey find evidence for the rug rat race in the relationship at the state level between competition for college admission in 2004 and parental childcare time in 2003–07. The results show that well-educated parents provide more childcare in states where college competition is greater, as their model predicts, but so do less well educated parents. The coefficients on childcare time are similar for both groups, as judged by either statistical or economic significance. These findings suggest that competition for college does potentially drive parental time in childcare, but they offer inconclusive evidence as to whether such competition affects college-educated parents' behavior differently.

The authors' cross-state evidence provides a useful benchmark for assessing the magnitude of the relationship between competition for college and time spent in childcare. We extend their results to assess how much of an increase in childcare time is implied, given the increase in competition for college that has occurred nationally. Figure 3 replicates Ramey and Ramey's figure 10, with three additional data points. The first is the national level of college competition in 2004, which we estimate by taking a population-weighted average of competition at the state level. The second is the national level of college competitiveness in 1992, estimated similarly using state-level data from Bound, Hershbein, and Long (2009). The third point shows what the level of competitiveness would have had to be to explain the difference in childcare time between 1992 and 2004 for college-educated mothers. Bound, Hershbein, and Long's index of college competitiveness implies an increase of 0.25 between 1992 and 2004. Applying this increase to Ramey and Ramey's cross-sectional results implies that college-educated mothers' childcare time should have risen by about half an hour per week.

In sum, the college rug rat race is a potential source of the increase in childcare time both relatively and absolutely, but it appears able to explain only a modest share of the rise. We now consider investment- and consumption-based explanations.

Figure 3. College Competitiveness and Childcare Time Spent by College-Educated Mothers, by State, 2004



Source: Figure 10 in Ramey and Ramey (this volume), Bound and others (2009), and authors' regression.

Some of the most productive investments parents make in their children occur at young ages, as parents lay the foundation for future learning by inculcating strong habits and cognitive skills in their children. Since parental time is an essential input to these investments, and since the returns to cognitive skills rose over the 1990s (Cunha and Heckman 2008), increases in parental investment in children could be an important part of the relative and absolute rise in childcare time.

Indeed, most of the relative increase in childcare time has been concentrated among families with young children, as figure 2 shows. To further investigate time spent on young children, we study trends in breastfeeding, which likely represents an investment and certainly does not contribute (directly) to college success.

In its 1988–91, 1991–94, and 2005–06 waves, the National Health and Nutrition Examination Survey (NHANES) asked respondents whether the youngest child in the household was breastfed. We study the percent of children that were ever breastfed and the percent that were breastfed through 6 months of age, by education of the mother. Table 1 shows that between the late 1980s and the early 1990s, college-educated mothers were increasingly likely to breastfeed their children, and that the gap between college- and non-college-educated parents widened and then narrowed

Table 1. Share of Mothers Breastfeeding, by Education of Mother, 1988–2006^a

<i>Mother's education</i>	<i>Percent of mothers who ever breastfed</i>			<i>Percent of mothers breastfeeding at 6 months</i>		
	<i>1988–91</i>	<i>1991–94</i>	<i>2005–06</i>	<i>1988–91</i>	<i>1991–94</i>	<i>2005–06</i>
Completed high school	37	35	61	44	38	44
Completed college	74	86	88	43	64	61
Difference	37	51	27	–1	26	17
Standard error of the difference	5***	4***	4***	7	6***	5***

Source: Authors' calculations.

a. Estimated using the 1988–94 and 2005–06 waves of the NHANES, restricted to female respondents with no missing information. All numbers adjust for differences in the age distribution of college-educated and less educated women. Asterisks indicate statistical significance at the ***1 percent level.

between 1991–94 and 2005–06. The same is true for the percent still breastfeeding at 6 months. At that age, children of college-educated moms born in the early 1990s were 50 percent more likely to be receiving breast milk than children in the previous decade, and more than half of all college-educated mothers were still breastfeeding.

Could the rise in breastfeeding reflect a broader emphasis on childcare? If breastfeeding requires little effort, then trends in breastfeeding might not reveal much about overall attitudes toward childcare, whereas if breastfeeding is time intensive, then an increase in breastfeeding might indeed reflect an increased parental emphasis on childcare. Surprisingly few data exist on the time cost of breastfeeding. To estimate this cost, we conducted a survey and advertised it on the website facebook.com and the *New York Times'* Freakonomics blog.⁴ The survey generated 2,099 responses. In no sense are these data necessarily representative of the general population, but they provide rough evidence on time spent breastfeeding.

We measured breastfeeding rates and intensity over time by asking about the breastfeeding of the latest child and noting when he or she was born. As in the NHANES, breastfeeding rates have increased over time; more interesting, so has breastfeeding intensity, which we report in table 2. Mothers spend a considerable amount of time breastfeeding, well over 2 hours per day on average. Breastfeeding thus requires an enormous time commitment;

4. The survey can be seen (and taken) here: wharton.qualtrics.com/SE?SID=SV_e2NOB SudMtPELFW&SVID=Prod. We used responses collected between March 12 and April 5, 2010.

Table 2. Average Time Spent Breastfeeding during Child's Infancy, by Education of Parent^a

Hours per day

<i>Mother's education</i>	<i>Year of birth of youngest child</i>				
	<i>Before 1980</i>	<i>1980s</i>	<i>1990s</i>	<i>2000–05</i>	<i>2006–10</i>
High school diploma or less	1.3 (0.4)	1.7 (0.5)	2.8 (0.5)	3.0 (0.5)	3.1 (0.3)
Bachelor's degree	2.5 (0.5)	2.5 (0.3)	2.8 (0.2)	2.8 (0.2)	3.0 (0.1)
Master's degree	2.6 (0.5)	2.5 (0.3)	2.5 (0.2)	2.6 (0.2)	2.9 (0.1)
Professional degree or Ph.D.	2.3 (0.4)	2.6 (0.3)	2.2 (0.2)	2.6 (0.2)	3.2 (0.1)

Source: Authors calculations^a based on data obtained via online polling. The survey can be seen (and taken) at wharton.qualtrics.com/SE?SID=SV_e2NOBSudMtPELFW&SVID=Prod. Table is based on responses collected between March 12 and April 5, 2010.

a. Standard errors are in parentheses.

mothers who breastfeed may be more likely to spend a great deal of time on other childcare activities as the child ages. These results hint at the potential for a cohort-based explanation for the rise in childcare time, since college-educated mothers of infants in the early 1990s were the first wave of parents to experience the rise in childcare time, and these mothers may have developed habits from their time-intensive breastfeeding activity. If such a habit formation cohort-based model explains the trends identified by Ramey and Ramey, it offers a clear prediction for the future: the gap in time spent in childcare by parental education should narrow over the next decade, since the breastfeeding differential has narrowed in recent years.

To understand the rise in breastfeeding better, we asked mothers why they breastfed. The most common response, chosen by 96 percent of mothers, was for the health of the baby. Thirty-eight percent said they breastfed to improve their baby's intelligence. (Mothers could give more than one reason.) These answers clearly indicate an investment motive for breastfeeding, but breastfeeding also has a consumption component: two-thirds of mothers breastfed to bond with their infant, and half breastfed for enjoyment.

Even if the absolute and relative rise in childcare time does not represent investment, it need not be wasteful if parents enjoy the time they spend with their children, that is, if the increase in childcare time represents consumption. We present two pieces of evidence that point to the importance

of consumption motives in explaining the absolute and relative rise in childcare time: first, changes in time spent in play account for a nonnegligible fraction of both the absolute and the relative rise; and second, college-educated parents spend relatively more time on childcare with their spouses. The increasing importance of childcare as a source of consumption is consistent with both the rise of hedonic marriage among college-educated couples and the apparent geographic dispersion in children's college attendance.

Ramey and Ramey note that parents enjoy playing with their children and that increases in this activity may be indicative of rising consumption. "Playing with children," they write, "has always ranked high in terms of enjoyment." Their table 3 shows that after excluding play time, the relative differential remains large but has fallen by about a quarter, suggesting that time spent in play accounts for an important fraction of the overall relative rise in childcare time. In fact, play time accounts for about a quarter of the overall rise as well as of the relative rise.

The second piece of evidence supporting a consumption-based explanation is that college-educated parents spend a great deal of childcare time together, relative to less well educated parents.⁵ The 2003–07 ATUS allows researchers to identify with whom the respondent performs a given activity, and we use this information to count up the hours of childcare time. If the rise in childcare time is due to college preparation, then one would not expect well-educated spouses to spend childcare time together, but if the rise in childcare time is about enjoying family time, then one might well expect well-educated parents to engage in childcare time together.

College-educated mothers spend much more time in childcare with their spouse, and college-educated fathers somewhat more, than do less educated mothers and fathers, respectively. We regress childcare time with spouse against a set of parental education indicators and Ramey and Ramey's age dummies; the results (table 3) show that college-educated parents spend 4.6 hours of childcare time per week with their spouse, compared with 2.5 hours for less educated parents. College-educated mothers spend 2.5 more hours in childcare with their spouse, and college-educated fathers spend 1.5 more hours. These differences are large, equal to nearly half the relative rise in childcare time.

5. We look at the difference at a point in time, rather than changes in this difference, because older surveys lack the "with whom" data necessary to see whether parents spend their childcare time together.

Table 3. Regression-Based Estimates of Time Spent in Childcare with Spouse, by Education^a

Hours per week

<i>Group</i>	<i>College-educated parents</i>	<i>Less educated parents</i>	<i>Standard error of the difference</i>
All parents	4.6	2.5	0.1***
Mothers	5.8	3.3	0.1***
Fathers	3.0	1.5	0.1***

Source: Authors' regression using data from the 2003–07 ATUS.

a. Estimates obtained by regressing number of hours of childcare time per week on indicators for age categories as well as for college attainment from Ramey and Ramey (this volume). Sample restricted to nonstudent respondents aged 18–64 with a child younger than 18 present in the household. Asterisks indicate statistical significance at the ***1 percent level.

Adam Isen and Stevenson (2010) discuss the rise of hedonic marriages and the fall of “productive marriages,” particularly among well-educated couples. Whereas a traditional view of marriage emphasizes the gains from specialization in the production of children and household goods (Becker 1981), hedonic marriages generate “marital surplus” in the form of complementarities in consumption: spouses enjoy spending time with each other. To the extent that spouses enjoy spending time in childcare with each other, the rise in hedonic marriage can explain a substantial fraction of the relative rise in childcare time. Since college admissions offices do not observe how many parents engage in these activities with their children, it is unlikely that college competition is driving the increase in joint parenting time. These results are only suggestive, however, because it is not known how time spent in childcare with one’s spouse has trended over time.

An additional potential explanation for why parents, particularly college-educated parents, may be spending more time with their children relates to the increased distance that students now travel to attend college. The children of college-educated parents are more likely to travel long distances to college. Table 4 shows that the distance traveled to college rises steeply with the education of the parents. In response, these parents may spend more time with their children while they are small, either to make up for lost time in the future or to build a relationship with them, to ensure that they come home for visits. Although data on changes in the distance traveled to college over time are unavailable, Caroline Hoxby (2009) has argued that college has become more of a national market, and thus that college entrants, particularly the children of college-educated parents, may be increasingly likely to attend college far from home.

In sum, Ramey and Ramey find an important shift in parents’ time allocation, but their preferred explanation, the college rug rat race, can

Table 4. Distance Traveled to College, by Education of Parents

<i>Parental education</i>	<i>Median distance traveled (miles)</i>
Less than high school	28
Completed high school	68
Completed college	102
Graduate or professional degree	130

Source: Mattern and Wyatt (2009).

explain only part of this shift. We propose two additional categories of explanations—consumption and investment—and find evidence of behavior consistent with both types of explanation that appears to explain some portion of the rise in childcare time. A key priority for future work is to distinguish among these explanations. The difficulty in explaining the rise in childcare time is that it happened so suddenly, whereas the possible driving forces, such as competition for college, the rise of hedonic marriage, and the increasing importance of cognitive and noncognitive skills, have all changed gradually (Hoxby 2009, Cunha and Heckman 2008). The sudden rise in childcare time suggests a tipping dynamic. This might arise because the value of childcare time depends on what other children are doing. If every child can play in the park, then no parent need closely watch her own child, because of safety in numbers.⁶ But if other children are with their parents, then no parent can unilaterally send her child to the park unattended. As parents grow increasingly vigilant, the equilibrium level of childcare could shift rapidly upward. If tipping dynamics are important, then any of the possible driving forces could be important in explaining the growth in childcare time.

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6. Christopher Sims pointed this out at the Brookings Panel discussion.

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GENERAL DISCUSSION Robert Gordon recalled that when he was a child, parents did none of the constant chauffeuring that today's parents do, and he wondered whether that was because it was safer in those days for young children to travel by themselves.

Susan Collins wondered whether the authors had tried to look at differences across regions with diverse characteristics, in particular with respect to traffic and travel times. It might be that much of the increase in chauffeuring is associated with changes in family lifestyles as commuting times have risen in urban and suburban areas. Collins also raised the problem of reporting issues in the measurement of time; perhaps, for example, parents today report dinner as time spent with children but did not do so before. She also raised the question of what increased childcare time was substituting for. If parents, particularly nonworking parents, are spending more time on child care, what are they spending less time on?

Finally, Collins suggested an alternative interpretation of the increase in childcare time. The past decade or so has seen a significant increase in at least some parts of society of angst around "mommy wars"—among women who have made different choices related to work outside the home once they became parents. In the United States, this sociological phenomenon tends to be concentrated among more highly educated women, who are more likely able to make such choices, but her perception was that it is less evident in other cultures—which may help to explain the differences reported by the authors between the United States and Canada. In particular, selection issues may arise among highly educated women who are not working, because these are precisely the women one would most expect to be spending—and to report spending—more time with their children.

Steven Davis found the evidence in the paper on the safety hypothesis completely unpersuasive, for two reasons. First, the concept of safety in the sense of shielding one's children from crime should be broadened to parents' fears of access to drugs, bad influences from peers, corruption by

the media, and so on. Second, and along the lines of what Susan Collins had suggested, the key thing is perceptions. There are many reasons why the fears that parents have might differ quite a bit from the actual danger, at least as measured by crime rate data alone. Davis also found it entirely plausible that investments in noncognitive skills are complementary to intensive investments in the cognitive skills associated with higher education and more highly educated parents. It is also plausible, perhaps because of changes in the nature of the workforce, that the reward to these noncognitive skills has increased over time.

Steven Landefeld, like Collins, wondered about possible reporting biases. In household expenditure surveys, for example, “sin” goods tend to be underreported, and in a lot of time-use surveys there is concern about overreporting of uses of time that might be viewed more favorably by others. As a result, whether childcare is reported as the primary or a secondary activity might vary across parents with different levels of education. TV watching, ironing, or any other activity done while children are present could be reported primarily as time with children, if parents are conscious of wanting to spend more quality time with them. Total time devoted to childcare might not have changed much, but time primary-coded as childcare might have increased as a result of such reporting bias.

Kristin Forbes suggested another alternative explanation for the increase. Highly educated women who are spending more time with their children may fall into two quite different categories: those who are still working, and those—an increasingly large group—who have dropped out of the labor force. The latter, one would expect, are the ones driving the majority of the increase in time spent with their children. If so, the real question then becomes why more women have been dropping out of the labor force, allowing them to spend more time with their children. The answer could be a combination of explanations related to how jobs are changing, especially jobs available to highly educated women. For example, with the proliferation of Blackberrys and the expectation that people are “working” around the clock even when not in the office, it may be harder for highly educated women to balance high-powered jobs with raising a family.

Alan Krueger agreed that the paper overemphasized the competition for selective colleges. The evidence on the payoff of going to an elite school is weaker and more controversial than the paper acknowledged. On the other hand, the perception is there. But it is not necessary to model parents’ behavior as being motivated by a desire to see their children attend a top college. The majority of college-educated parents are thinking about their kids going on to college, but not necessarily an elite college. Nonetheless,

there has been an increase in the payoff from higher education during the period, which may be sufficient to explain these trends, because graduating from college has become more valuable generally.

Krueger suggested that although childcare time is defined somewhat subjectively in the surveys, one might be able to circumvent this problem by looking at it more objectively, that is, by measures of how much of parents' time is spent with their children. Finally, Krueger noted that care of aging parents has risen over the same period that childcare has. No one claims there is a rat race to get one's parents into college, so a broader explanation of both trends would be worthwhile.

Robert Hall, echoing Collins's comment, remarked that the hypervigilance of parents today is absolutely stunning. He was puzzled, however, by the discussion of whether an income effect contributed to the rise in childcare time. There is one primary factor in the U.S. economy that matters, and that is labor. The only reason income rises is because the value of time rises, and there is a strong presumption that the income and substitution effects of spending more time working offset each other. Whether they do or not is not clear, but in any event the income effect should not be invoked without mentioning the substitution effect that presumably offsets it.

Christopher Sims called the Panel's attention to an externality that had thus far been ignored. When he was a child, he played football in the park with other children in the neighborhood. No parent today, however, can simply send her child to the park to play with the other kids, because no one is there—all the other kids are in organized sports teams. Thus any parent who thinks her child should play sports has no option but to spend time getting her child involved in the organized teams.

Matthew Shapiro wondered about the social costs of "bowling alone" with one's family. If people are investing more time with their immediate family, where are they spending less time? Is the time coming out of community work or political activity? It would be worth investigating whether the increased focus on investing in the human capital of one's own children comes at the cost of investments in social capital.

Erik Hurst highlighted the choice between market and nonmarket inputs into child care. If parents feel pressured to spend time chauffeuring their children, there is always the option of paying somebody else to do it. As to where the increased childcare time is coming from, Hurst reported that for highly educated women, time spent on childcare has been found to be coming out of home production and, to some extent, out of market work. Total leisure time has been flat. For less educated women, however, and for both highly educated and less educated men, leisure is also rising. Almost all of

the increase in childcare time is coming from nonworking women, and the gap by education has not increased as much among this group as it has among women generally.

David Cutler noted that women's wages tend to rise until they have children, which carries the implication that once their own occupational upgrading ceases, and with it the growth in their wages, they may decide to substitute time away from work. Activities associated with work become less rewarding, whereas time spent with children becomes relatively more rewarding, causing women to opt out of the labor force and invest more time in their children.]

