The Rug Rat Race

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Abstract

After three decades of decline, the amount of time spent by parents on childcare in the U.S. began to rise dramatically in the mid-1990s. Moreover, the rise in childcare time was particularly pronounced among college-educated parents. While less-educated mothers increased their childcare time by over four hours a week, college-educated mothers increased their childcare time by over nine hours per week. Fathers showed the same patterns, but with smaller magnitudes. Why would highly educated parents increase the amount of time they allocate to childcare at the same time that their own market returns have skyrocketed? After finding no empirical support for standard explanations, such as selection or income effects, we offer a new explanation. We argue that increased competition for college admissions may be an important source of these trends. We provide empirical support for our explanation with a comparison of trends between the U.S. and Canada, across ethnic groups in the U.S., and across states in the U.S.

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I. Introduction

As work time increased over the last four decades, time spent on most home production activities trended downward (e.g. Robinson and Godbey (1999), Bianchi, et al. (2006), Aguiar and Hurst (2007)). One notable exception is time spent on childcare. Bianchi (2000) and Sayer, Bianchi, and 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 thirteen time use surveys between 1965 and 2008, we show that after declining for several decades, time spent on childcare started increasing in the early 1990s. The trends follow a pronounced S-shaped pattern, rising markedly from the early 1990s to the early 2000s, and then flattening out. Moreover, the increase in childcare time has been twice as great for college-educated parents. This differential trend between college- and less-educated parents is particularly puzzling in view of the dramatic increases in wages of college-educated individuals. We also show that an important component of the increase in childcare time was time spent on *older* children, and in particularly 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 four-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 it spends on work. The increase in average weekly time spent on childcare during the 10 years from the early 1990s to the early 2000s was equal to 70 percent of the absolute decline in work hours during the current "Great Recession." If the hours

were valued at their market wage rate, the increase in childcare time would amount to over $300 billion per year.

The literature has offered several explanations, both for why childcare time increased and why educated parents spent more time with their children (e.g., Bianchi, et al. (2006, p. 87), Aguiar and Hurst (2007), Guryan, Hurst, and Kearney (2008)). These explanations include selection effects, income effects, safety concerns, enjoyment, and more flexible work schedules. We test each of them 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. We argue that much of the increase in time spent in childcare, particularly among the college educated, may be a response to an increase in the perceived return to attending a good college, coupled with an increase in competition in college admissions. Importantly, the size of college-bound cohorts rose dramatically beginning in the early 1990s, coincident with the increase in time spent on childcare. Bound and Turner (2007) have provided evidence that larger cohorts are associated with increasingly severe cohort crowding at quality schools. Increased scarcity of college slots appears to have induced heightened rivalry among parents, taking 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.

In order to clarify the mechanics of this explanation, we develop a simple theoretical model in which college admission depends on parents' choice of college preparation time. 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 determines the preparation required for admissions. 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 U.S. to those in Canada. The U.S. and Canada are similar along many dimensions, but differ in one respect that is key to our explanation: the Canadian system lacks a steep prestige hierarchy among institutions, so that Canadians do not experience the intense rivalry to gain admission into higher rated colleges. Thus, our theory predicts that we should not see the same increase in time spent in childcare in Canada among the more educated. Employing time-use data from Canada's General Social Survey, we show that time spent in childcare by educated Canadian parents changed very little over this period, corroborating our theory. Second, we show that black and Hispanic parents spend less time in childcare than white parents. Since affirmative action policies may attenuate the rivalry for scarce slots for underrepresented minorities, there would be less pressure for them to spend time on childcare. Third, we use Bound, Hershbein and Long's (2009) measure of college competitiveness to demonstrate a positive correlation between competitiveness and childcare time across U.S. states.

The paper proceeds as follows. Section II documents trends in childcare over the 1965-2008 period. The standard explanations are evaluated in Section III. Section IV presents evidence showing increased competition for college over this period, and develops our new explanation along with the empirical support. Section V concludes.

II. 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 (e.g. Bryant and Zick (1996), Robinson and Godbey (1999), Sayer, Bianchi, and

Robinson (2004)). It has long been noted that college-educated mothers devote more time to child rearing than less educated mothers (e.g. USDA (1944), Leibowitz (1974), Bianchi, et al. (2006), Guryan, et al. (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.

A. Data Description

To document trends, we use information from thirteen nationally representative surveys from 1965, 1975, 1985, 1992-94, 1995, 1998, 2000 and 2003-2008. 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. We use the American Heritage Time Use Study (AHTUS) versions of the 1965, 1975, 1985, and 1992-94 surveys (Fisher, Egerton and Gershuny (2006)), and the original versions of the other surveys.

The key measurement issue is the extent to which the studies give consistent measures over time. The potentially problematic surveys are the 1992-94 survey and the BLS surveys starting in 2003. Many childcare researchers believe that the 1992-94 survey undercounts primary childcare activities (Robinson and Godbey (1999), Bianchi, Cohen, Raley and Nomaguchi (2004), Bianchi et al (2006)). Using results from other time use studies that are not part of the AHTUS, but are considered comparable to the earlier studies, Allard, Bianchi, Stewart and Wight (2007, footnote 19) argue that the 1992-94 study is not comparable. The 1992-94 survey suggests that time spent in childcare was one hour per week lower in the early 1990s (compared to 1985), whereas the 1995 survey suggest that it was one 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 the 1992-94 study is the lack of information on key controls, such as marital status.

Concerns have also been expressed about the comparability of the 2003-2008 BLS surveys with the earlier surveys. Allard, et al. (2007) compare the 2003 BLS survey to the 2000 Survey Research Center survey of parents and find very similar estimates of primary time spent in childcare (though not secondary time spent in childcare). The 2000 survey was designed to be comparable to the earlier 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 in the survey.

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 surveys. Because these studies span the time 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, 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.

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 for person i in year t, X_{it} is a set of controls, and ε_{it} captures omitted other factors affecting childcare time. Our sample consists of parents aged 18 to 64 who are not students, where "parent" is defined as having a child under 18 years in the household.[1] 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 also include dummy variables for the age group of the individual (ages 18-24, 25-34, 35-44, 45-54, and 55-64), whether or not the individual has a four-year college degree, the interaction of the college degree dummy with year, marital status, the number of children, the number of children squared, category variables for the age of the youngest child (age <= 1, age = 2, 3-5, 6-9, 10-13, and 14-17), and the number of children under age 5.

We first consider time spent in childcare for mothers between the ages of 18 to 64. In our benchmark specification we do not condition on any choice variables that may be correlated with educational level; thus, the only control variables used are the five age categories of the

[1] We use this definition because most of the earlier time use studies did not specifically identify parents. In 2003-2008, the difference in average time spent in childcare by actual mothers versus all women who lived in a household with children present was only 27 minutes per week. One of the reasons we omitted students from all of our samples was to avoid recording a college student living at home with younger siblings as a parent.

women, as defined above. The omitted dummy variables are 1975, less-than-college education, and ages 25-34.[2]

Column 1 of Table 1 shows the results from this estimation. The levels effects for the year indicators show that the amount of time spent in childcare decreased from 1965 to 1975, and again in 1985 and 1992-94 ("1993" for short). Recall, though, that many believe that the 1992-94 survey undercounted childcare, so this estimate may not indicate an actual decrease. Childcare time in 1995 was 1.74 hours more per week than in 1975, and by 2000 it had risen to nearly four hours more. From 2003 through 2008, less-educated mothers spent over four hours more per week in childcare activities than they did in 1975.

Of additional interest are the coefficients on the interactions between year and college education. After a trough in the early 1990s, the coefficients on this interaction began to grow in the late 1990s. These estimates 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 three hours more per week in 1998, roughly five hours more in 2000 and 2003, and over six 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.

These trends are depicted graphically in panel A of Figure 1, which is based on the estimates from column 1 of Table 1. The numbers shown indicate the time spent in childcare by mothers in the 25-34 age group; the trends for other age groups follow the same time series pattern, differing only in the time-invariant constant term. For both education groups, time spent

[2] We use 1975 as the omitted year because we will later be comparing 2000 and later studies to 1975 with the more complete set of controls that are available for those studies, but not for other years.

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 1992-1994 study make it likely that the true 1993 value was somewhat higher.

Column 2 of Table 1 compares childcare by mothers in 1975, 2000, and 2003-2008 using the more complete set of controls that are available for these eight years. In addition to the age category of the mother, we also control for marital status, the number of children (using a quadratic), and the five dummy variables for the age category of the youngest discussed above. The full set of controls is useful for controlling for trends in fertility, such as the number of children and the rising maternal age at first birth. In this specification, we are seeking to compare mothers with similar numbers and ages of children across education levels for the seven years. The results are similar to those without the complete controls. The amount of time spent on childcare by less-educated mothers rose by four hours per week from 1975 to the 2000s, and time spent by college-educated mothers rose by more than eight hours per week. Thus, even with the more complete sets of controls, we find that college-educated mothers increased the amount of time spent in childcare by double the amount of less-educated mothers.

Is the same true for men? Column 3 of Table 1 and panel B of Figure 1 show the results of our benchmark specification for fathers. While fathers on average spent much less time on childcare, the time spent on childcare for men also rose sharply in the late 1990s and early 2000s. The final column of Table 1 compares childcare of fathers in 1975 to later years and includes the full set of controls. 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.[3]

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 children. However, corroborating evidence for these trends is provided by time use studies of children. For example, Sandberg and Hofferth (2005) link time diary studies of children in 1981 and 1997 to determine trends in time spent with parents. They find that children between the ages of 3 to 12 spent 18 more hours per week with one or both parents in 1997 as compared to 1981. Thus, children's time diaries corroborate the trends found using parents' time diaries.

C. Trends in Categories of Childcare

We now break down the trends into particular categories of childcare. To produce consistent estimates of trends over time, we limited the sample to 1965, 1975, 1985, 1995, 1998, and 2000 because these six surveys (i) had the same activity codes for subsets of childcare; (ii) distinguished between basic care of young children versus care of older or mixed age children; and (iii) included key variables we could use as controls.[4] The controls included age categories of parents, marital status, a quadratic in the number of children, and the number of young children.[5] We construct five subcategories of childcare: (1) general care of young children; (2) general care of older children or mixed age children; (3) playing with children; (4) teaching

[3] Our results differ from Bianchi, et al. (2004). They 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.

[4] The reason we could not construct these categories for the BLS data is that they do not distinguish between basic care of younger children and older children.

[5] 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."

children, which involves reading, helping with homework, disciplining and conversing; and (5) travel related to childcare, coordinating children's activities, and picking up and dropping off children.[6]

Figure 2 shows the various categories for mothers and Figure 3 shows the various categories for fathers. The estimates have been normalized to be zero in 1975. As the figures reveal, time spent in basic care of younger children fell for all four gender-education groups, although it 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 discussion. However, Sacks and Stevenson also show that the gap in breastfeeding by education level decreased between the early 1990s and 2005-2006. 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 four hours for college-educated mothers and by three hours for college-educated fathers. The second most important category was travel and children's extracurricular activities.

Our discussants compare trends in childcare time from the earlier studies to the BLS studies by looking at childcare time in households in which the youngest child is under five years old versus households in which the youngest child is five 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 educational differential, was due to households with young children. This result is interesting in itself, but it does not imply time spent on young children constitutes the bulk of the increase. Childcare time in families with at least one child

[6] 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.

under the age of five is distributed across all children in the household. Only the surveys through 2000 distinguish childcare by age of child, and those surveys indicate that care of younger children is not the source of the increase.

Although the BLS surveys do not distinguish time spent with younger children versus older children, they contain other detailed categories of interest. We examine the following categories for the pooled sample from 2003-2008: (1) physical care of children and supervision; (2) educating and teaching children, including reading, helping with homework, and meeting with teachers; (3) playing with children, including sports and arts and crafts; (4) health care; (5) organizing activities and attending child's events; and (6) chauffeuring, which includes dropping off/picking up, waiting, and travel associated with childcare.

Figure 4 shows time spent by parents whose youngest child is less than five years old. The bulk of time spent by mothers is physical care and supervision, followed by playing. College-educated mothers spend substantially more time on these two categories than less-educated mothers, 11 hours in physical care and supervision and six hours in playing. The other categories for this age group are much lower, two hours or less per week. The time spent by education level does not differ much for the other categories, with the exception of educational activities where college-educated mothers spend more time. The story is similar for fathers, but at lower levels of hours. College-educated fathers spend more time in both categories than less-educated fathers.

Figure 5 shows time spent by parents whose youngest child is five years or older. Note that the scale is different on this graph: time spent in physical care and supervision has shrunk to 2.5 hours per week for mothers. The most important category for college educated mothers with older children is chauffeuring. Physical care and supervision is the second most important

category, and activities associated with education constitute the third most important category for college-educated mothers. Also important are organizing and attending extracurricular activities. Fathers spend less time than mothers in all categories except playing. The two most important categories for fathers are chauffering and physical care and supervising, followed by attending activities and playing. Overall, college-educated parents spend more time in each category except for health care. The most important sources of the extra time spent by college-educated parents, however, are in chauffeuring, education- and activity-related categories.[7]

The patterns highlighted in Figure 5 mirror the differences highlighted in other research. For example, Mahoney, Harris, and Eccles (2006) used pooled data from the 1997 and 2002 Child Development Survey of the PSID to show that children of college-educated parents spend at least three more hours per week on organized activities than children of less-educated parents. Hofferth (2008) found an increase in time spent in academic activities from 1997 to 2003. Lareau's (2003) ethnographic study, *Unequal Childhoods*, documents the dramatic differences in how educated parents raise their children compared to less educated parents. The children of less-educated parents spend most of their free time playing with friends and relatives in their neighborhood, unsupervised by adults. Lareau calls this the "natural development" approach. On the other hand, more-educated parents take a "concerted cultivation" approach, which requires significant commitments 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. (page 47)

[7] 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 one hour from 1975 to the 2000s.

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

D. Trends in Overall Time Use of Mothers

Figure 6 sheds light on the source of the extra time devoted to children by mothers. We have categorized other time expenditures into "work," "chores," and "free and personal care time." "Chores" include housekeeping, cooking, and shopping. "Free and personal care time" includes any time not included in the other categories, such as sleeping, personal care time, and leisure activities. All time use surveys are used and the only controls are the age category. We have subtracted 65 hours from personal and free care time so that magnitudes are similar.

Work time of less-educated mothers increased until the late 1990s, and then fell somewhat. Work time of college-educated mothers increased between 1985 and the mid-1990s, and then flattened out. Time spent on "Chores" fell steadily over the entire sample for both education levels. "Free time" for both types of mothers fell starting in the mid-1990s. For college-educated mothers, free time in 2008 was 10 hours less per week than in 1975 and 1985. Thus, the decline in free time makes up for all of the increase in childcare time. In their discussion, Dan Sacks and Betsey Stevenson point out that college-educated parents are more likely to do childcare together. This behavior may be the result of having so little free time to spend together.

In sum, the evidence suggests that all time spent in childcare has increased since 1975, but it increased much more for higher educated parents. Moreover, with the caveats about the 1993 study 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 differential

between college- and less-educated parents was due 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.

III. Conventional Explanations

As discussed in the Introduction, Bianchi, et al. (2006, p. 87) and others have offered several potential explanations that could explain a rise in time spent on childcare. We find, however, that none of these explanations is consistent with the evidence.

A. Selection Effects

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

The easiest way to test for selection effects is to see how the results change when the universe of adults is included. To be specific, 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 rise over time. If anything, childcare time should decline over time since the number of children per adult has declined over time. To test this argument, we obtained a new set of estimates using an expanded sample that included all adults aged 18-64 who were not students. Results are presented in Figure 7. 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-education women. Thus, our findings are not an artifact of selection into parenthood.

B. Income Effects

A second possible explanation for the increase in childcare time pertains to 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 wages, the substitution effect works in the opposite direction. The case is analogous to leisure, which has not risen by much over the last century, despite a dramatic rise in real wages, because income and substitution effects cancel each other. Thus, the theoretical prediction for 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 section relationship between time spent on childcare and income and then use the estimates to determine whether they can explain the time series trends. According to our time use surveys, average real household income in households with children rose by $25,902 from about $72,706 in 1975 to $98,608 in 2008 (in $2008). Thus, real income rose by about 36 percent from 1975 to 2008.

We pooled the BLS surveys from 2003-2008 and focused on parents. We used real household income in thousands of 2008 dollars. The online data appendix contains more details on how we constructed income. In the regressions, we controlled for year fixed effects, age category dummy variables, dummy variables for education (high school dropouts, college graduates, and those with a graduate degree), the full set of dummy variables for the age of

youngest child, a quadratic in the number of children, and marital status. It is important to include controls for education 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 children could lead parents to spend less time working and spend more time with children, resulting in a negative correlation between income and time spent with children. Thus, in some specifications we also included controls for usual hours of work of the respondent as well as the spouse. Also, in order to try to estimate the pure income effect of childcare, we show results where the sample is limited to just nonworking mothers.

We consider a quadratic in income. Table 2 shows that while a number of the income coefficients are statistically different from zero, all of them are miniscule in terms of economic impact. The fourth column uses the estimated cross-sectional coefficients combined 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 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. Thus, the cross-sectional evidence implies that income cannot explain the increase in childcare.[8]

The time series behavior of time spent in childcare also contradicts the income hypothesis because the time trends do not match. We demonstrate this by comparing the trends in

[8] We find similarly small coefficient estimates if we instead use earnings as Kimmel and Connelly (2007) did. In his discussion, Hurst shows a positive correlation between childcare time and GDP across countries. We suspect that this correlation is due to educational differences rather than income differences.

household income with childcare time. In order to make comparisons to published tabulations of trends in household income from the Census, we focus on households with married parents. 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 early 1990s, increasing by almost seven hours a 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 one percent per year.[9] If income were the driving force, we would expect childcare time to have risen from 1965 to 1990. In fact, it did not.

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

C. Safety Concerns

Bianchi, et al. (2006) suggest that heightened concerns about safety may induce parents to accompany their children in their activities 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. First, the violent crime rate 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,* HS-23,) reaching 467 in 2007. Thus, the violent crime rate moves *negatively* with time spent in childcare, which is contrary to the hypothesis of a positive crime-childcare link. Second, educated parents tend to live in safer neighborhoods than less educated parents. Thus, if this explanation were important, then we

[9] The data appendix discusses the data sources.

would expect the educated parents to spend *less* time on childcare, which is inconsistent with the evidence.

Of course, what matters is parents' *perceptions* of safety. However, the evidence suggests that parents now worry less about numerous safety issues. Safe Kids USA (2008) reported the results of Harris polls in 1987 and 2007, which asked parents about their major concerns about 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), page 9). Thus, trends in safety perceptions cannot be the source of trends in time spent in childcare.

D. Enjoyment

A fourth possible explanation is that parents now experience greater enjoyment from childcare. However, measures of enjoyment do not indicate rising enjoyment of most types of childcare. Robinson and 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. Krueger, Kahneman, Schkade, Schwarz, and Stone (2007) report measures of enjoyment of various activities by women in 2004 and 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 parents now enjoy childcare much more than in earlier years, one would expect them to choose to have more children.

One caveat is that playing with children has always ranked highly in terms of enjoyment. We have followed the standard practice of including these activities in our measure of childcare because they are often considered to be crucial activities 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 re-estimated the regressions for the subsample of parents, excluding time spent playing with children from our measure of childcare. Only parents' ages are used as controls. The results for mothers are shown in the first two columns of Table 3. Column 1 reproduces the first column of Table 1, while column 2 gives the results using the restricted childcare variable. By comparing the columns, one can see that omitting playing with children reduces the amount of the increase by about one hour for less-educated mothers, and by about three hours for college-educated mothers. Nevertheless, most of the increase over time and across education levels remains even when playing with children is omitted. The results are similar for fathers, as seen in columns 3 and 4.

E. More Flexible Work Schedules

Yet another possible explanation is that parents now have more flexible work schedules, and can thus reallocate their time in a way that allows them to spend more time with their children even when they are working. Unfortunately, we do not have measures of work schedule flexibility, either in our time use data or to gauge aggregate trends. 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 re-ran our basic regressions. The reports are reported in Table 4. The table shows that the increase in childcare from 1975 to 2008 is much greater for those mothers who do *not* work, and that the gap is much greater across educational levels. One might worry about selection effects since the labor force participation rate of mothers has increased since 1975, which is our usual comparison year. However, even when we compare to 1985, a year when the labor force participation rate for college-educated mothers was about the same as in 2008, we find that the increase in childcare time among college-educated nonworking mothers was around 11 hours per week as compared to an increase of 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.

IV. A New Explanation: The Rug Rat Race

We now offer a new explanation for the trends in time spent in childcare, tied to increased competition for college admissions, particularly among the college-educated. Our claim is that increased competition was driven by a steep rise in demand for college admissions together with a relatively constant number of slots at the more attractive colleges. The resulting "cohort crowding" for college admissions gave rise to heightened competition among parents for attractive slots, manifesting itself in greater time spent on college preparation of their children. This expenditure of childcare time in dissipative rivalry may be dubbed the "rug rat race."

A. Shifts in Demand and Supply for College

Empirical trends in demand for college have displayed a remarkable agreement with trends in time spent on childcare. The top panel of Figure 8 shows the number of high school graduates each year since 1965.[10] The initial large hump is due to the large size of the baby boom generation. The number of high school graduates fell to a low around 1990, and has since spiked up as a result of the "baby boomlet." The number of high school graduates is expected to peak in 2009 before decreasing again.

The second panel of Figure 8 indicates the number of recent high school graduates who have enrolled in college. This graph shows a somewhat different pattern 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 and, while fluctuating from year to year, has stayed high through the present. Observe that the path of college enrollment displays the same pronounced S-shaped pattern as does the path of childcare time that we estimated previously, shown in Figure 1, with the increases in college enrollment and childcare time occurring at the same time.

Turning to the supply side, 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 completers increased by 30 percent. In contrast, the number of full-time enrolled freshman increased only 13 percent at the ten elite universities of "The Ivy Plus" and by only 10 percent at the top 25 liberal arts colleges.[11] Bound and Turner (2007) show that this "cohort crowding" phenomenon 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

[10] These data are from the 2007 *Digest of Education Statistics,* Table 191.

[11] These numbers are based on our calculations using data extracted from Integrated Postsecondary Education Data System.

age 18 population is well below unity. According to Table 4 of their paper, two-year community colleges have the highest elasticity of 0.8, followed by non-flagship public universities with 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.

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 the 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 system, average GPAs and test scores of admitted students increased from 1994 to 2007 for seven of the eight campuses.[12] UC Santa Barbara, which ranks 5th among the campuses in selectivity, increased the average GPA of admitted students by 0.3 points on a 4.0 scale. Bound, et al. (2009) document many other facets of the increase in competition. For example, they show that test scores of entering students are higher now, particularly at the top ranked schools. They also show that the percentage of high school graduates applying to a four-year institution has increased over time. Moreover, they show that the probability of acceptance to a four-year college for a student of a given ability has declined significantly since 1982.[13]

[12] Our calculations are based on data available at www.universityofcalifornia.edu .

[13] 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, and rose again in the last couple of decades. She also shows that the colleges with higher 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 in test scores of admitted students. These trends were noted earlier by the various studies surveyed by Davies and Hammack (2005). Based on this evidence, Hoxby argues that overall

Although there are still many colleges that will accept most applicants, there is evidence to suggest that parents and children have increased the attention paid to selective colleges. 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 *International Herald Tribune* (May 16, 2007), "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 Sun Belt, where enrollment in SAT/ACT prep classes has grown more than seven times the overall national growth rate over the last five years (Justin Pope (AP) October 22, 2006). In its annual report, *State of College Admission*, the National Association for College Admission Counseling (2008) documents that the group of 257 four-year colleges that accept fewer than 50 percent of applicants receive 31 percent of all applications (Table 6, page 18).

Numerous other disciplines, such as developmental psychology, pediatrics, and sociology, have drawn an explicit link between competition for college slots and the increase in time devoted to academics and extracurricular activities. For example, Luthar and Becker (2002) and Lareau (2003) argue that many middle- and upper middle-class parents see building up their children's "after-school resumes" as absolutely necessary because of the competition for college admission. The American Academy of Pediatrics (Ginsburg (2007)) cites the increase in

college selectivity has not increased. Moreover, Hoxby bases her argument entirely on standardized test scores, as opposed to the controlled experiment run by Bound, et al (2009). Her analysis further neglects the wide-spread belief that colleges now put greater emphasis on "extra-curricular activities."

competition in college admissions as a key reason for the decrease in free play time and increase in scheduled activities among children nationwide.[14]

Perhaps the most direct evidence for our hypothesis is presented by Levey (2009). Her study asks the question: "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 credentials for their children, in order to gain admittance to "good" colleges which are seen as necessary and sufficient conditions for their 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)

C. Theoretical Model of the Rug Rat Race

The evidence is consistent with the idea that an increase in rivalry for scarce college slots has induced parents to raise 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, can account for the observed behavior of childcare hours based on rivalry for college slots. The model is able to link the coincident S-shaped patterns of childcare hours and college demand, as seen in Figures 1 and 8, 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. Parent's schooling may be

[14] 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, et al. (2006).

either college- or less-educated, represented by *c* and *l*, respectively. The numbers of college- and less-educated parents are denoted by m_c and m_l, respectively, and $m = m_c + m_l$ gives the total number of parents. 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 $k_2 m$ slots available at second-tier colleges, where $k_1 + k_2 m < m$. The demographic shifts of Figure 8 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 simultaneously choose *h*, and colleges observe the values 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 contribute a proportion of their wealth, which increases in h, to their alma maters, and admissions decisions may be made in order 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 $k_2 m$, are accepted to second-tier colleges. Finally, the remaining $m - k_1 - k_2 m$ 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 $q_0 h$, where $q_2 > q_0 > 0$.

Parents choose h 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, while a college-educated parent incurs $wd_c(h)$; note that a rise in w leads to greater disutility for the college-educated. The disutility functions satisfy, for $s = l, c$, $d_s', d_s'' > 0$, $d_s(0) = d_s'(0) = 0$ and $d_s'(\infty) = \infty$. Moreover, we assume that college-educated parents incur lower marginal disutility in the absence of a wage premium, i.e., $d_c'(h) < d_l'(h)$.[15]

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

$$d_l'(h_l^*(q)) = qw.$$

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 parent's schooling on optimal preparation time is considered in Figure 9. For less-educated parents, the optimal decision occurs at point *A*, where the marginal return wq equals the marginal disutility d_l'. A parent's college education shifts the marginal disutility

[15] Instead of assuming differences in marginal disutility across education levels, the model could specify college preparation as an increasing function of childcare hours, $p_s(h)$, $s = c,n$, 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.

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 $h_c^*(q) > h_l^*(q)$ 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 sufficiently many first-tier slots to accommodate the children of college-educated parents. Proposition 1 of the Theoretical Appendix characterizes the outcome for the case of $m_c < k_1$. 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 between first-tier, second-tier and no college. The thresholds are distorted upwards relative to the corresponding unconstrained optimal preparation levels $h_l^*(q_1)$ and $h_l^*(q_2)$, 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 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 less-educated to college-educated parents. The children of the less-educated 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 upwards 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 10 illustrates the time paths of college preparation choices when m_c and m_l 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.[16] Prior to *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 nevertheless increases if the growth of *w* is sufficiently rapid. The preparation choices of college-educated parents also rise if $h_1 > h_c^*(q_1)$. At time *T* the latter parents jump to a discretely higher level of college preparation, while the choices of the less-educated continue to rise with h_2.[17]

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 and college demand seen in the U.S. data.[18]

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[16] 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, for example.

[17] 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 benefits of preparation by college-educated parents. Thus, the wage premium does not affect their preparation incentives.

[18] 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.

D. A Comparison of Trends in the U.S. and Canada

Our theory links changes in childcare hours to rivalry for scare college slots. This rivalry is tied in turn to competitive admissions procedures used at U.S. colleges. The theory would predict a different path of 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 in the U.S. and Canada.

The comparison of these two countries is ideal for our purposes. Because of geographic proximity and similarity of language and culture, we would expect that changes in childcare time caused by such broad factors as knowledge diffusion and social fads to affect both countries similarly. However, these two countries differ significantly in the nature of competition in higher education.

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

However, as Davies and Hammack document, the nature of the competition in the two countries is very different. They argue that while the Canadian system consists of formally equal public universities, the U.S. system is distinguished by a steep prestige hierarchy of higher education, and that this national hierarchy leads to a distinctive form of competition that has increased over the last decade. In contrast, there is no national market 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 extra-curricular activities are irrelevant for admission to Canadian colleges. Instead, competition in Canada occurs *within* the post-secondary system itself 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 desired field.

The lower competition to secure slots within the 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 in Canada.

To this end, we use microdata from the 1986 (cycle 2), 1992 (cycle 7), 1998 (cycle 12) and 2005 (cycle 19) of the Time Use Survey from Canada's General Social Survey (Statistics Canada) to construct trends in childcare time by education level.[19] However, there was a significant break in a definition between the two earlier surveys and the two later surveys. In particular, the two earlier surveys counted as childcare any care of children between the ages of 0 and 18. In the two later surveys, it counted as childcare any care of children between the ages of 0 and 14. Using the standard childcare variables would therefore bias down the trends over time. We use total family care (children and adults) as the most consistent measure. The online data appendix shows that the change implied by this measure lies between the lower bound using the available childcare variable and the upper bound based on some imputations we made.

[19] We used the Statistics Canada microdata file of the 4 cycles, which contain anonymized data. All computations on these microdata were prepared by Nova Scotia Department of Finance and the responsibility for the use and interpretation of these data is entirely that of the authors. We are deeply grateful to Tarek Harchaoui for obtaining access to the data for us.

Otherwise, we analyze the data similarly to the way we analyzed the U.S. data. We estimate the same baseline regressions as before, controlling for the age group of the parent and interacted year and education variables.[20]

Table 5 and Figure 11 show the results. Columns (1) and (3) of Table 5 show the results with baseline controls whereas columns (2) and (4) show the results in which controls for marital status and the age group of the youngest child. Figure 11 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 U.S. and 1986 in Canada.

Figure 12 shows that time spent in childcare by less educated parents increased by about the same amount in both countries, about four to five hours per week for mothers and about three hours per week for fathers since the mid-1980s. The contrast is in time spent by college-educated parents. Whereas time spent by college-educated mothers rose by nine hours per week in the U.S., it rose by only one hour per week in Canada. For college-educated fathers, the increase in the U.S. was six hours per week and the increase in Canada was two hours per week. Thus, as our theory would predict, Canada did not mirror the big increases in time by educated parents. In fact, the educational gap in childcare time grew in the U.S., but shrank in the Canada.

Our findings are broadly consistent with other analyses of trends in the Canadian data. Pronovost (2007) finds that the amount of time that parents spent in the presence of their children fell from 1986 to 2005. Turcotte (2008) similarly finds a decrease in time spent with family members over the period 1986 to 2005.

[20] Because of data limitations in some of the years, the youngest age category includes those ages 20-24 rather than 18-24 as in the U.S. data.

E. Comparisons by Ethnic Groups in the U.S.

As an additional test of our theory, we compare childcare time across ethnic groups. One group in the U.S. that should not have felt as much increased competition to enter college is underrepresented minorities.[21] Despite the overall increase in applicants, most colleges are still eager to admit underrepresented minorities.

Unfortunately, we cannot compare trends over time because the samples before 2003 were too small to allow a meaningful distinction across racial groups, particularly by education level. Instead, we make a cross-section comparison using pooled 2003-2008 data and estimate regressions separately on less-educated and college-educated groups. We include the full set of controls as well as a control for high school dropouts (within the less educated group) and graduate degrees (within the college educated group) because of potential differences across racial groups.

Table 7 shows that among less-educated mothers, black and Hispanic mothers spend about three hours less per week than other mothers. Among college-educated mothers, black mothers spend three hours less and Hispanic mothers spend about two hours less than other mothers. Among less-educated fathers, black and Hispanic fathers spend 1.5 to 1.9 hours less than other fathers. Among college-educated fathers, black fathers spend half an hour less whereas Hispanic fathers spend two hours less. Thus, the results are consistent with our hypothesis that underrepresented minorities feel less pressure to compete for college slots and hence spend less time in childcare.

F. Correlations with Competitiveness Measures across States in the U.S.

[21] We are indebted to Daniel Hamermesh for suggesting this test to us.

While national integration of the U.S. college market has increased, regional factors still play an important role in determining competition for college. Bound, Hershbein, and Long (2009), using their new index of college competition by state, provide evidence that both levels and trends of competition vary across states. As a further test of our theory, we can use this index to test whether greater college competition at the state level is associated with greater hours of childcare among college-educated parents who live in the 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, the time use surveys before 2003 are too small to provide information by state. Thus, we make cross-state comparisons using the later surveys. To construct childcare time by state, we use pooled data from the 2003-2008 surveys to estimate state-level childcare time measures by education and sex, controlling for the full set of parent age, marital status, and child number and age variables. The Bound et al. (2009) index of competitiveness by state is constructed by summing the following variables at the state level: PSAT participation rates, AP participation rates, fraction of students reporting 10+ homework hours per week, the fraction applying to 5 or more colleges, and the fraction using private test preparation in 2004.

Table 8 shows the results of regressing state childcare time on the Bound et al index of competitiveness. 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 12 shows the scatter plot. South Dakota has the lowest index of college competitiveness in 2004 and Connecticut has 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. According to the regression coefficient,

3 hours of the difference may be related to the differential college competitiveness. Thus, for mothers there is evidence that greater college competitiveness at the state level is associated with greater time spent on childcare.

G. Discussion

Our theoretical model and empirical evidence emphasize the role of college preparation as a motive for childcare. According to this view, parents recognize the link between college attendance and the value of human capital, and they exert effort, in the form of childcare time, to influence their children's college outcomes. As we have shown, numerous studies from other disciplines have made this link. Moreover, the additional evidence we have presented is consistent with the idea that greater scarcity of desirable college slots has induced strong increases in childcare effort by parents who possess a comparative advantage in college preparation, i.e., college-educated parents.

One question is whether this factor alone can explain the magnitude of the increase. It is possible that the rise in competition for college slots, triggered by the increase in 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 decide to 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 have an important influence on college preparation incentives. Figure 13 depicts the evolution of the college wage premium, measured as the log difference between wages of college and high school graduates, in the U.S. over the last half century; the data are from Autor, Katz, and Kearney (2008). While 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 from 1980 to 1990 to 0.85 per year from 1990 to 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. Importantly, it seems very difficult to rationalize the sharp upward movements in childcare hours of college-educated parents in the 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. Boudarbat, Lemieux, and Riddell (2006) show that between 1980 and 2000 the wage premium of a college degree relative to a high school degree in Canada rose by about 10 percentage points for men and 5 percentage points for women. This contrasts with an average rise over both sexes of 25 percentage points in the U.S. over the same period (Autor, et al. (2008)). Thus, the returns to college have increased much more in the U.S. However, as seen in Figure 11, childcare hours for less-educated parents display very similar behavior across the two countries over this period. Moreover, these parents ought to be most 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 for explaining 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 that we discuss above may reflect changes in social attitudes that have raised the relative demand for prestigious institutions. This motivation is complementary to our rivalry theory: there are more children chasing a relatively constant supply of desirable college slots, and 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. (i) *Timing*: weekly hours spent in childcare follow a pronounced S-shaped pattern, with almost all of the growth concentrated in a 10-year period. (ii) *Composition*: the increase in hours is much greater for college-educated parents. It is also comprised chiefly of increases in time spent caring for older children, travel and activities, which are the categories that relate most directly to the college application process. (iii) *U.S.-Canada comparison*: the hours increase for college-educated parents is not observed in Canada, despite the similarity of its economic and cultural environment to that of the U.S.[22] Theories that rely on forces that unfold broadly and gradually will not easily explain this evidence.

V. Conclusion

This paper has documented a dramatic increase in time spent in childcare by college-educated parents since the mid-1990s. While time spent in childcare rose for all parents, the rise was far more pronounced for college-educated parents. Since the mid-1990s, less-educated

[22] For example, Stevenson (2010) 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.

mothers have reallocated over four hours per week to childcare. College-educated mothers have reallocated more than nine hours per week from leisure time to childcare time. 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, has 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 upwards.

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 rivalry for college slots implies wasteful overinvestment in preparation. Overinvestment may be mitigated by expanding the number of slots, or by modifying college acceptance rules to place greater emphasis on criteria that cannot be directly influenced by parents. 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. 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 $h_1 = h_1^A > h_l^*(q_0)$ and

$$wq_1 h_1^A - d_l(h_1^A) = h_l^*(q_0) - d_l(h_l^*(q_0)),$$

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

$$wq_2 h_2 - d_l(h_2) = h_l^*(q_0) - d_l(h_l^*(q_0)).$$

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 between $h = h_1^A$, $h = h_2$ and $h = h_l^*(q_0)$, where $h_l^*(q_0)$ is the optimal preparation choice when a child does not attend college.

Proof. Let $G_l(h \mid q) = wqh - d_n(h)$ and $G_c(h \mid q) = wqh - wd_c(h)$ represent the objective functions of less- and college-educated mothers, respectively. Under our assumptions, these functions are strictly concave in *h* and decrease without bound as *h* approaches infinity. Since $G_l(h_l^*(q_1) \mid q_1) > G_l(h_l^*(q_0) \mid q_0 / w)$, there is a unique point $h_1^A > h_l^*(q_1)$ satisfying $G_l(h_1^A \mid q_1) = G_l(h_l^*(q_0) \mid q_0 / w)$. Similarly, $G_l(h_l^*(q_2) \mid q_2) > G_l(h_l^*(q_0) \mid q_0 / w)$ implies that there is a unique point $h_2 > h_l^*(q_2)$ satisfying $G_l(h_2 \mid q_2) = G_l(h_l^*(q_0) \mid q_0 / w)$. Furthermore, $G_l(h_2 \mid q_1) > G_l(h_2 \mid q_2) = G_l(h_l^*(q_0) \mid q_0 / w)$ 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 $h \in [h_2, h_1^A)$, $G_c(h_c^*(q_1) \mid q_1) > G_c(h_c^*(q_2) \mid q_2) \geq$

$G_c(h \mid q_2)$, and for all $h < h_2$, $G_c(h_c^*(q_1) \mid q_1) > G_c(h_c^*(q_0) \mid q_0 / w) \geq G_c(h \mid q_0 / w)$. Thus, $h_c^*(q_1)$ is strictly preferred to any other *h*.

Next suppose $h_1^A > h_c^*(q_1)$. Let $\hat{h} = \max\{h_c^*(q_2), h_2\}$. 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 $G_l(\hat{h} \mid q_2) \leq G_l(h_l^*(q_0) \mid q_0 / w)$. Thus,

$$0 \geq G_l(\hat{h} \mid q_2) - G_n(h_l^*(q_0) \mid q_0 / w) = G_l(\hat{h} \mid q_2) - G_l(p_1^A \mid q_1)$$

$$= wq_2\hat{h} - wq_1h_1^A + \int_{\hat{h}}^{h_1^A} d_l'(h)dh > wq_2\hat{h} - wq_1h_1^A + \int_{\hat{h}}^{h_1^A} wd_c'(h)dh$$

$$= G_c(\hat{h} \mid q_2) - G_c(h_1^A \mid q_1),$$

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

$$0 = G_l(h_l^*(q_0) \mid q_0) - G_l(\hat{h} \mid q_2) > G_l(h_c^*(q_0) \mid q_2) - G_l(\hat{h} \mid q_2)$$

$$= h_c^*(q_0) - wq_2\hat{h} + \int_{h_c^*(q_0)}^{\hat{h}} \psi_l'(h)dh > h_c^*(q_0) - wq_2\hat{h} + \int_{h_c^*(q_0)}^{\hat{h}} wd_c'(h)dh$$

$$= G_c(h_c^*(q_0) \mid q_0 / w) - G_c(\hat{h} \mid q_2),$$

whence $G_c(\hat{h} \mid q_2) > G_c(h \mid q_0 / w)$ for all $h < h_2$

Now consider the *h* choices of the less-educated mothers. Because of strict concavity and $h_1^A > h_l^*(q_1)$, $G_l(h \mid q_1) < G_l(h_1^A \mid q_1)$ for all $q > q_1^A$. Similarly, $G_l(q \mid q_2) < G_n(h_2 \mid q_2)$ for all $h \in [h_2, h_1^A)$. Since $h_l^*(q_0) < h_2$ and $h_l^*(q_0)$ maximizes $G_l(h \mid q_0 / w)$, it follows that

$G_l(h \mid q_0) < G_l(h_l^*(q_0) \mid q_0 / w)$ for all $h < h_2$, $h \neq h_l^*(q_0)$. Thus, the choices h_1^A, h_2 and $h_l^*(q_0)$ 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

$$wq_1 h_1^B - wd_c(h_1^B) = q_0 \hat{h} - wq_0 d_c(\hat{h}), \tag{1}$$

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 $h = \hat{h}$;
- Less-educated parents divide themselves between $h = h_2$ and $h = h_l^*(q_0)$.

Proof. Equation (1) can be expressed as $G_c(h_1^B \mid q_1) = G_c(\hat{h} \mid q_2)$. Moreover, $G_c(h_c^*(q_1) \mid q_1) > G_c(h_c^*(q_2) \mid q_2) \geq G_c(\hat{h} \mid q_2)$. Since $h_1^B > h_c^*(q_1)$, it follows that h_1^B is uniquely defined, and $G_c(\hat{h} \mid q_1) > G_c(\hat{h} \mid q_2)$ implies $h_1^B > \hat{h}$.

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

$$0 = G_c(\hat{h} \mid q_2) - G_c(h_1^B \mid q_1) = wq_2 \hat{h} - wq_1 h_1^B + \int_{\hat{h}}^{h_1^B} wd_c'(h)dh$$

$$< wq_2 \hat{h} - wq_1 h_1^B + \int_{\hat{h}}^{h_1^B} d_l'(h)dh = G_l(\hat{h} \mid q_2) - G_l(h_1^B \mid q_1).$$

This implies $G_l(h_1^B \mid q_1) < G_l(\hat{h} \mid q_2) \leq G_l(h_2 \mid q_2)$, and comparison with (1) and (2) shows that $h_1^B > h_1^A$.

Consider the *h* choices of college-educated mothers. Since $h_1^B > h_c^*(q_1)$, $G_c(h \mid q_1) < G_c(h_1^B \mid q_1)$ 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

$h \in [h_2, h_1^B)$, while if $h_2 > h_c^*(q_2)$, then $G_c(h \mid q_2) < G_c(h_2 \mid, q_2)$ for all $h \in (h_2, h_1^B)$. Thus, $G_c(\hat{h} \mid q_2)$ maximizes $G_c(h \mid q_2)$ over $h \in [h_2, h_1^B)$. The argument from the proof of Proposition 1 shows that $G_c(\hat{h} \mid q_2) > G_c(h \mid q_0 / w)$ 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.

As for the non-college-educated mothers, $h \geq h_1^B$ implies $G_l(h \mid q_1) \leq G_l(h_1^B \mid q_1) < G_l(h_2 \mid q_2)$, so h_2 is strictly preferred to any such *h*. The arguments from the proof of Proposition 1 establish that h_2 and $h_n^*(1)$ are strictly preferred to any other $h < h_1^B$, and they are equally preferred by construction. *Q.E.D.*

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Table 1. Trends in Weekly Hours Spent on Childcare by Parents[a]

	(1)	(2)	(3)	(4)
	Mothers	Mothers	Fathers	Fathers
1965	1.636 (0.613)**		0.290 (0.512)	
1985	-0.369 (0.689)		0.005 (0.583)	
1993	-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)	
(1993)*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)**
(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 (0.524)**	3.565 (0.300)**	-2.655 (0.496)**
Observations	24,342	21,659	17,806	15,829
R-squared	0.09	0.21	0.06	0.10

Source: Authors' regressions based on time use surveys.

a. This table shows the regression of weekly hours spent on total childcare on the variables of interest. Columns (1) and (2) report results for all mothers 18-64 who are not students; columns (3) and (4) report results for fathers 18-64 who are not students. "Mother" and "father" are defined as having a child under the age of 18 in the house. The omitted year is 1975. Controls for parents' ages (dummies for 18-24, 25-34, 35-44, 45-54, 55-64) are included in columns (1) and (3). The omitted category is age 25-34. Columns (2) and (4) also include marital status, a quadratic in the number of children, dummies for the youngest child in each of the following age categories: (i) age $\leq$ 1; (ii) age = 2; (iii) 2 < age < 6; (iv) 6 $\leq$ age < 10; (v) 10 $\leq$ age < 14. Standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 2. The Relationship between Childcare and Income[a]

A. Mothers

Row	Income	Income squared	Income-induced increase in childcare from 1975 to 2008	Sample	Usual hours of work included?
1	0.0105 (0.0050)	-0.000012 (0.000010)	0.22	All	No
2	0.0313 (0.006)**	-0.000057 (0.000013)**	0.56	All	Yes
3	0.0348 (0.010)**	-0.000066 (0.000022)**	0.61	Home-makers	No

B. Fathers

Row	Income	Income squared	Income-induced increase in childcare from 1975 to 2007	Sample	Usual hours of work included?
1	0.023 (0.005)**	-0.000045 (0.000011)**	0.40	All	No
2	0.025 (0.006)**	-0.000049 (0.000012)**	0.44	All	Yes

Source: Regressions on pooled BLS surveys from 2003-2008.
a. The income variable is in thousands of 2008 dollars. The income-induced increase in childcare is calculated by applying the cross-sectional income coefficients to the actual changes in average family income from 1975 to 2008. Quantities are in hours per week. All regressions include controls for year, age categories of parents, full controls for children's ages and numbers, marital status, and dummy variables for high school dropouts, college-educated and post-college degree.

Table 3. Trends in Weekly Hours Spent on Childcare[a]

	(1)	(2)	(3)	(4)
	Mothers		Fathers	
	Total	Excl. play	Total	Excl. play
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)
1993	-1.013 (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)
(1993)*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)
(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)**
Observations	24,342	24,342	17,806	17806
R-squared	0.09	0.07	0.06	0.04

Source: Authors' estimates based on time use surveys.
a. Columns (1) and (2) report results mothers, (3) and (4) for fathers. Columns (1) and (3) reproduce results for all childcare from Tables 1 and 2, column(3). Columns (2) and (4) show the results when playing with children is excluded from the childcare measure. The omitted year is 1975. Dummy variables for parents' age are also included (dummies for 18-24, 25-34, 35-44, 45-54, 55-64). The omitted category is age 25-34. Standard errors in parentheses. * significant at 5%; ** significant at 1%.

Table 4. Change in Childcare Time: 1975 – 2008[a]
Working Mothers vs. Stay-at-Home Mothers

	Less than college	**College Educated**
Working mothers	**4.8**	**7.1**
Stay-at-home mothers	**5.5**	**16.3**

Source: Authors' regressions on time use data.
a. The differences are based on coefficients from regressions that are the same as those reported in column (1) of Table 1, except that they are estimated separately on mothers who report that they are employed. These regressions include controls for mothers' ages (dummies for 18-24, 25-34, 35-44, 45-54, 55-64).

Table 5. Trends in Weekly Hours Spent in Family Care by English-Speaking Parents in Canada[a]

	(1)	(2)	(3)	(4)
	Mothers	**Mothers**	**Fathers**	**Fathers**
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
Observations	6548	6548	4671	4671
R-squared	0.12	0.25	0.06	0.14

Source: Regressions using the GSS of Canada.
a. This table shows the regression of weekly hours spent on family care on the variables of interest. Columns (1) and (2) report results for all mothers ages 20-64; columns (3) and (4) report results for fathers ages 20-64. "Mother" and "father" are defined as having one's own child under the age of 19 in the house. The omitted year is 1986. Controls for parents' ages (dummies for 20-24, 25-34, 35-44, 45-54, 55-64) are included in all columns. The omitted category is age 25-34. Columns (2) and (4) also include marital status and a dummy for (i) the youngest child under the age of 5; (ii) the youngest child between the ages of 5 and 9; and (iii) the youngest child between the ages 10 and 14. Standard errors in parentheses.
* significant at 5%; ** significant at 1%.

Table 7. Childcare by Underrepresented Minorities[a]
Differential Relative to Non-Black, Non-Hispanic Parents with Same Education

	Black, less-educated	Hispanic, less educated	Black, college-educated	Hispanic, college-educated
Mothers				
Difference in hours of childcare	-3.090 (0.375)**	-2.893 (0.328)**	-3.182 (0.705)**	-1.768 (0.716)**
Observations in group	1,409	2,235	341	350
Fathers				
Difference in hours of childcare	-1.404 (0.392)**	-1.890 (0.314)**	-0.478 (0.671)	-2.272 (0.647)**
Observations in group	571	1,409	184	225

Source: Authors' regressions based on pooled BLS time use surveys.
a. Regressions are estimated separately on samples of less-educated and college-educated. All regressions include controls for age categories of parents, full controls for children's ages and numbers, marital status, and dummy variables for high school dropouts and post-college degree.

Table 8. Cross-State Analysis of Time Spent in Childcare
Regression of Childcare time on Bound, Hershbein, Long Index[a]

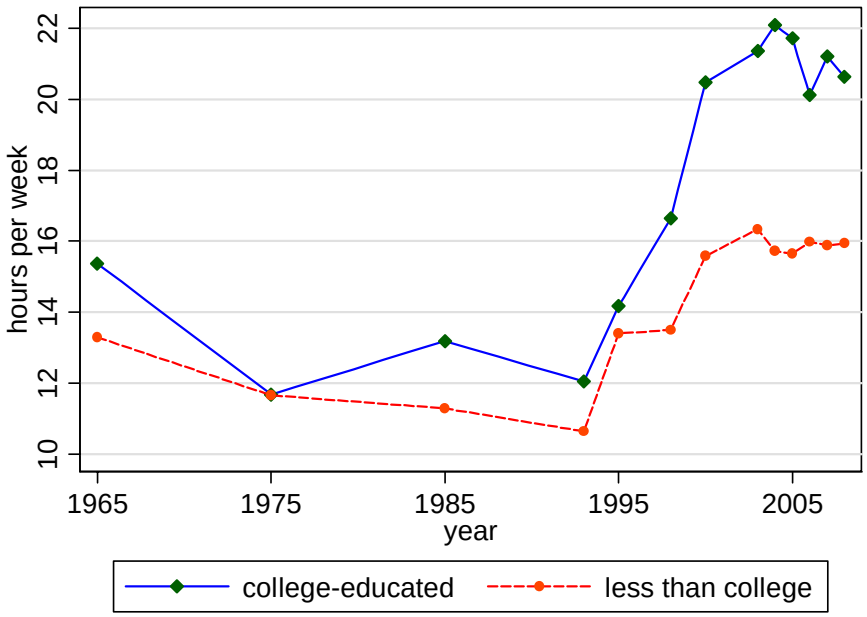
Bound, Hershbein, Long variable	Less educated mothers	College-educated mothers	Less educated fathers	College-educated fathers
Coefficient (S.E)	1.504 (0.747)**	1.987 (0.825)**	-0.658 (0.563)	0.940 (0.682)
R-squared	0.085	0.117	0.030	0.041
Number of observations	46	46	46	46

Source: Authors' regressions based on pooled time use data.
a. The Bound, Hershbein, and Long (2009) Competitiveness index is the sum of PSAT participation rates, AP participation rates, fraction of students reporting 10+ homework hours per week, the fraction applying to 5 or more colleges, and the fraction using private test preparation in 2004. The time spent in childcare by state is estimated by combining the 2003-2008 ATUS surveys. The estimate is the residual after controlling for parents' ages (dummies for 18-24, 25-34, 35-44, 45-54, 55-64), marital status, a quadratic in the number of children, dummies for the youngest child in each of the following age categories: (i) age $\leq$ 1; (ii) age = 2; (iii) 2 < age < 6; (iv) 6 $\leq$ age < 10; (v) 10 $\leq$ age < 14. Standard errors in parentheses.

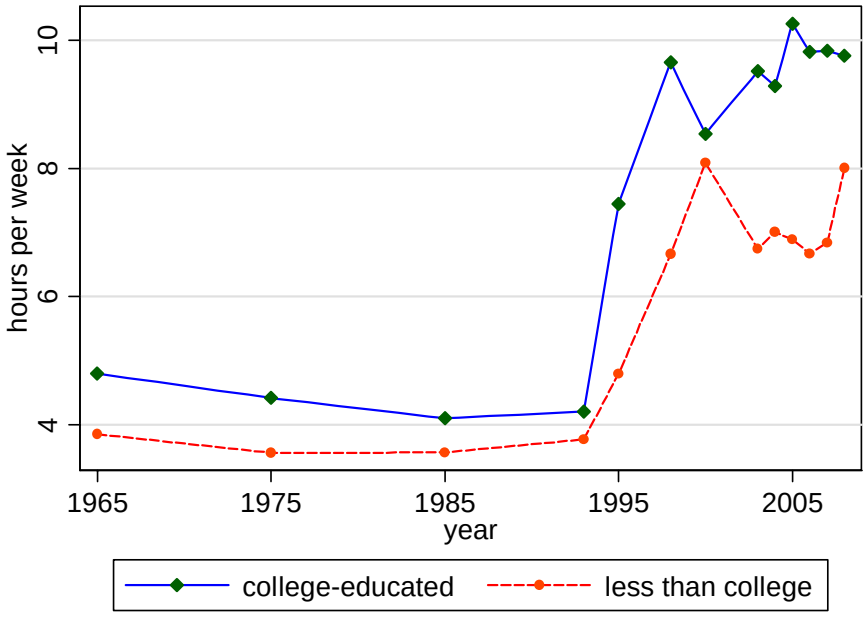
* significant at 5%; ** significant at 1%.

Figure 1. Weekly Hours Spent in Childcare[a]

A. Mothers



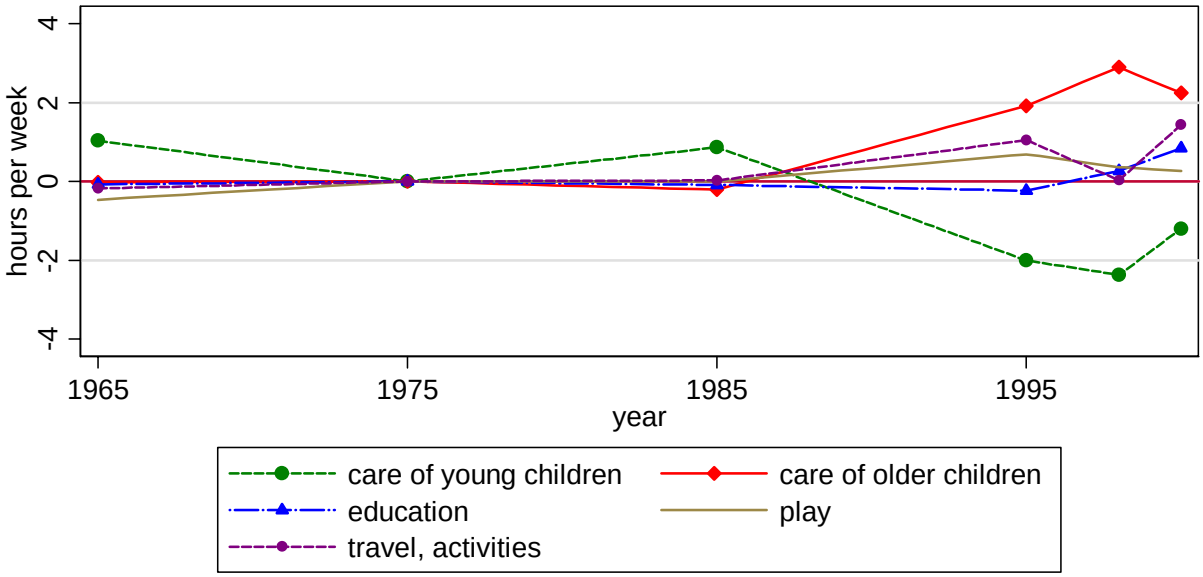
B. Fathers



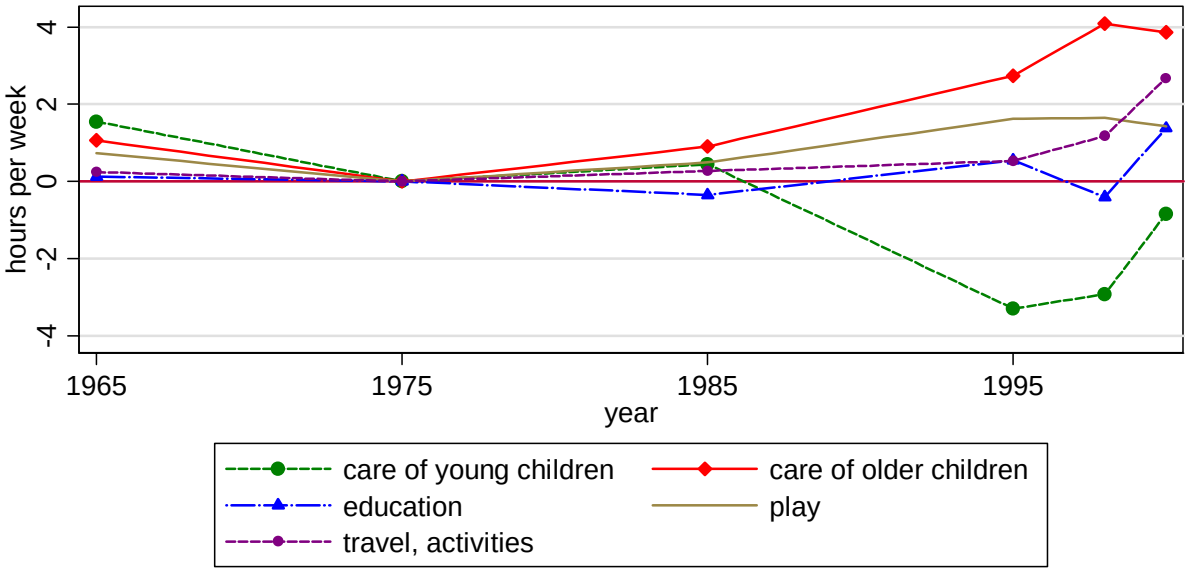
Source: Authors' estimates from Table 1, columns (1) and (3), based on time use surveys.
a. The means shown are for ages 25-34.

Figure 2. Trends in Time Spent by Mothers: Categories of Childcare, 1965-2000[a]

A. Less than College



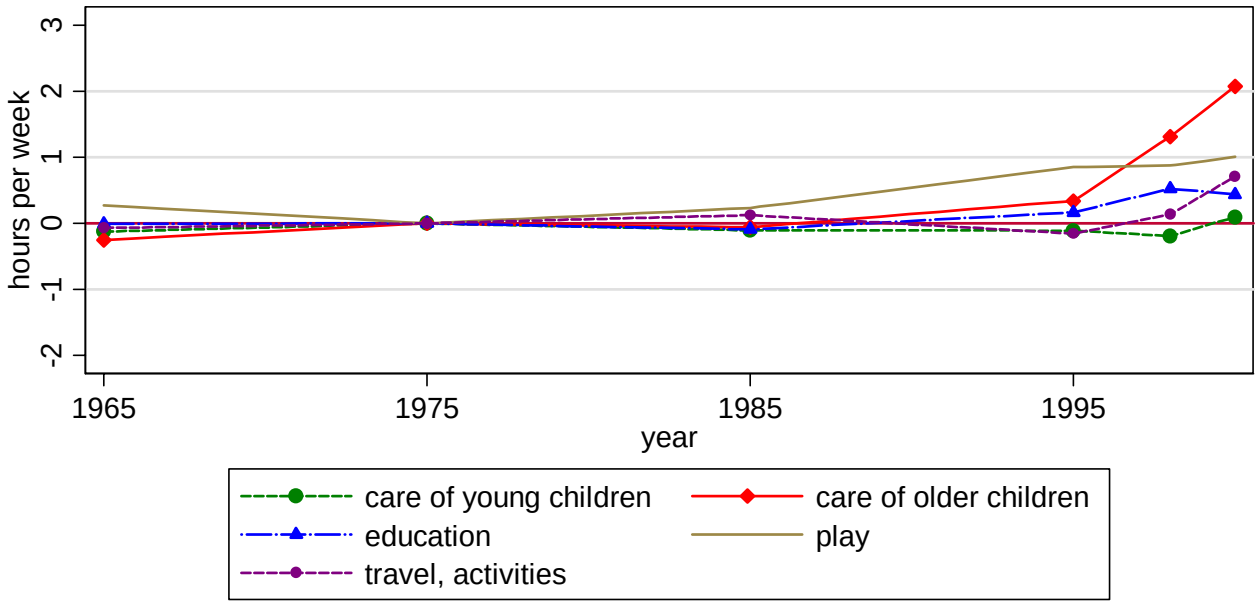
B. College-Educated



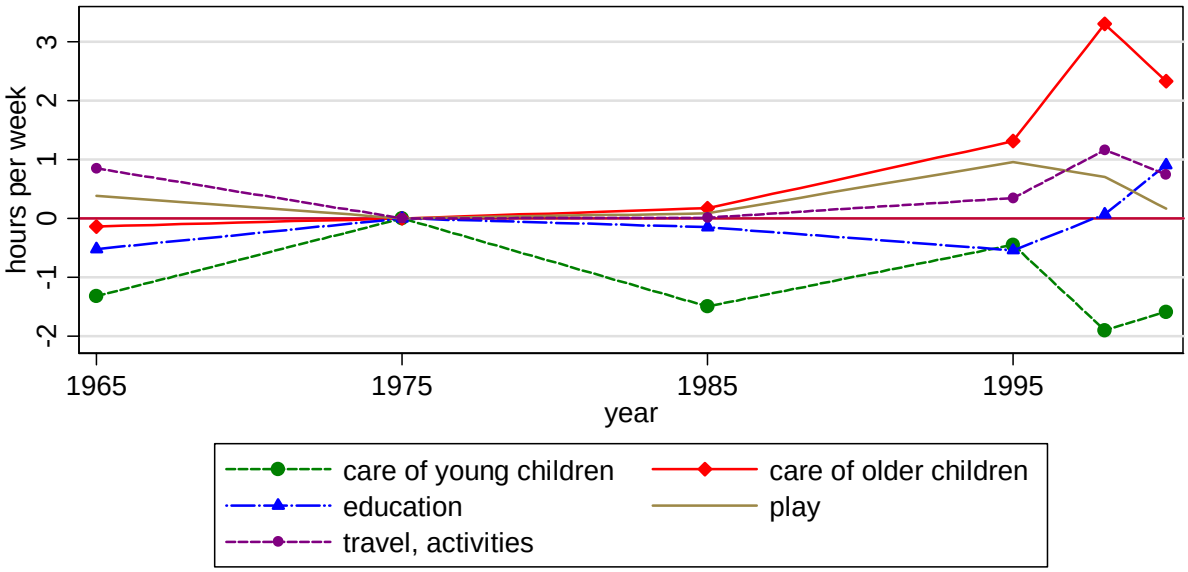
Source: Authors' estimates from time use surveys.
a. Each category normalized to 0 in 1975.

Figure 3. Trends in Time Spent by Fathers: Categories of Childcare, 1965-2000[a]

A. Less than College



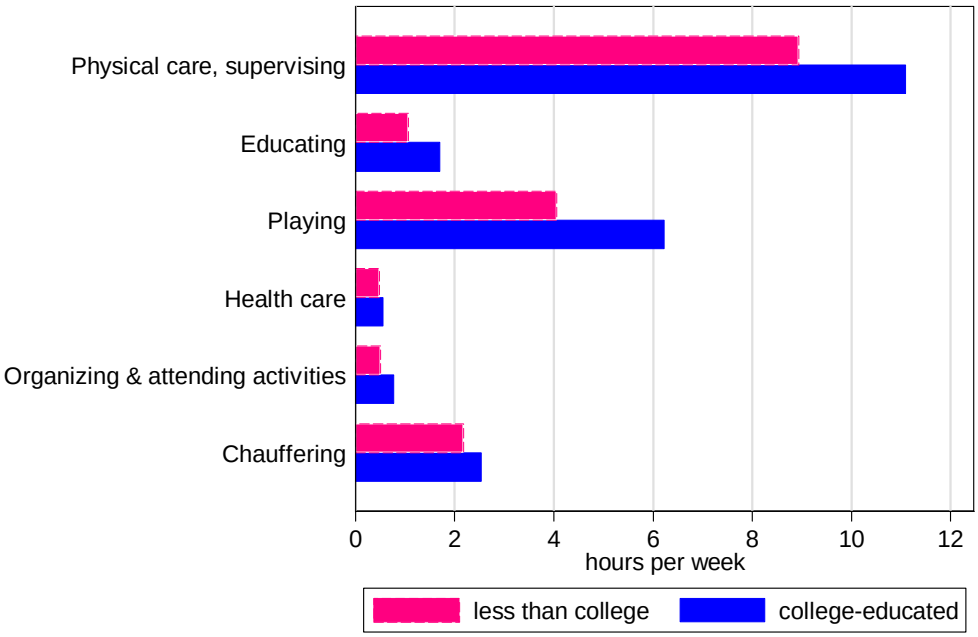
B. College-Educated



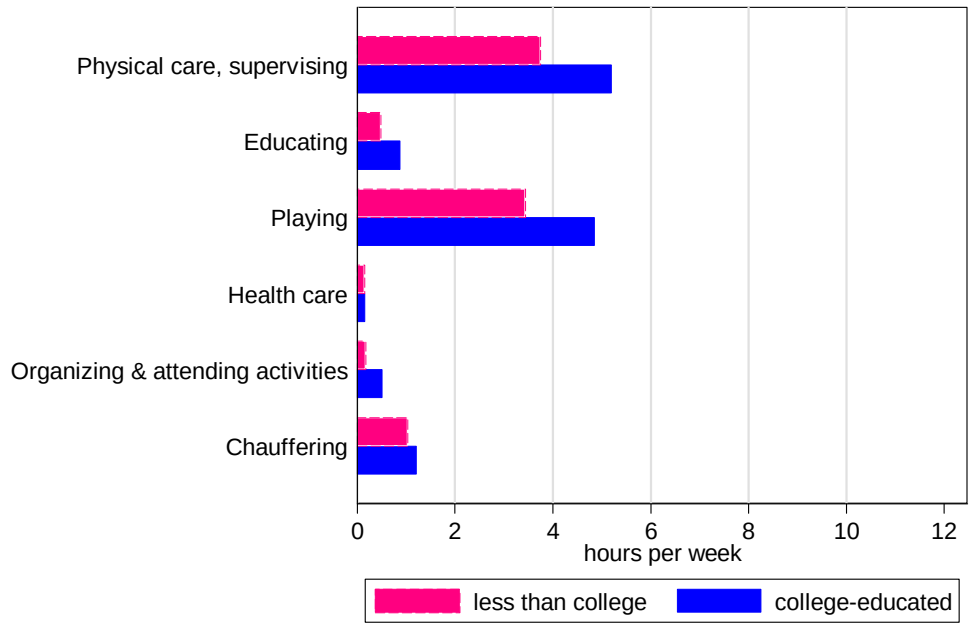
Source: Authors' estimates from time use surveys.
a. Each category normalized to 0 in 1975.

Figure 4. Time Spent Types of Childcare in 2003-2008[a]

A. Mothers with children under 5 years of age



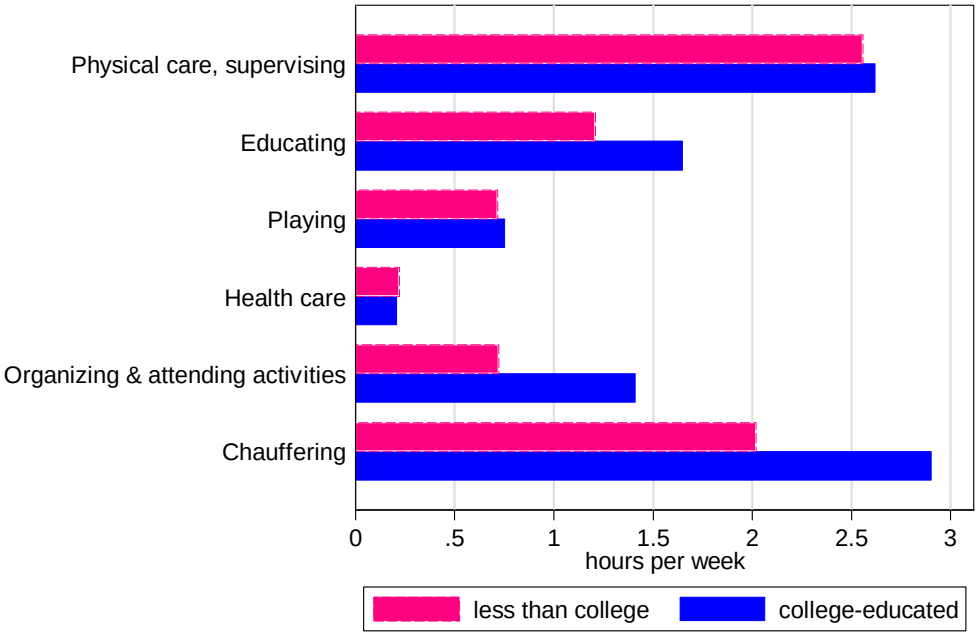
B. Fathers with children under 5 years of age



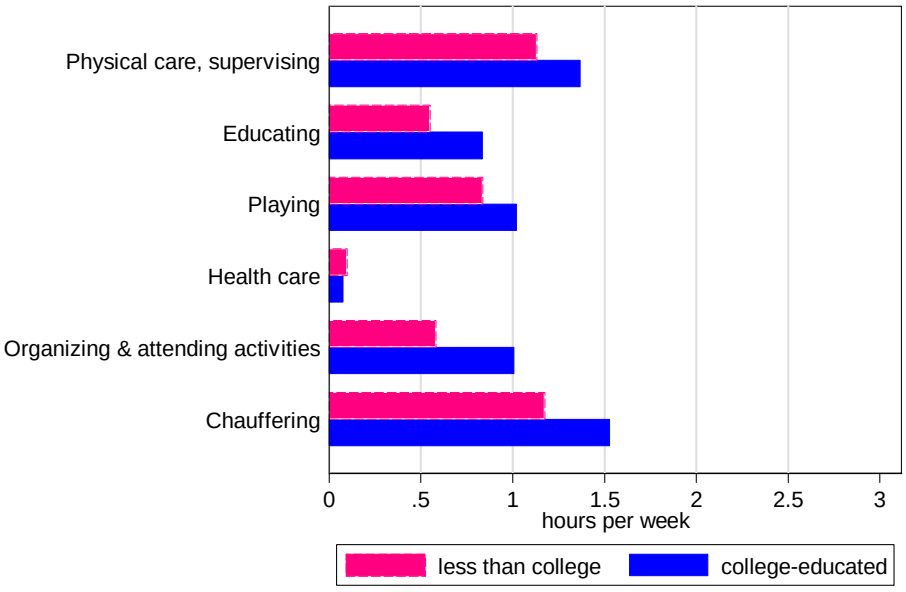
Source: Authors' calculations using time use surveys.
a. Parents with youngest child less than 5 years of age.

Figure 5. Time Spent Types of Childcare in 2003-2008

A. Mothers with children 5 years or older



B. Fathers with children 5 years or older

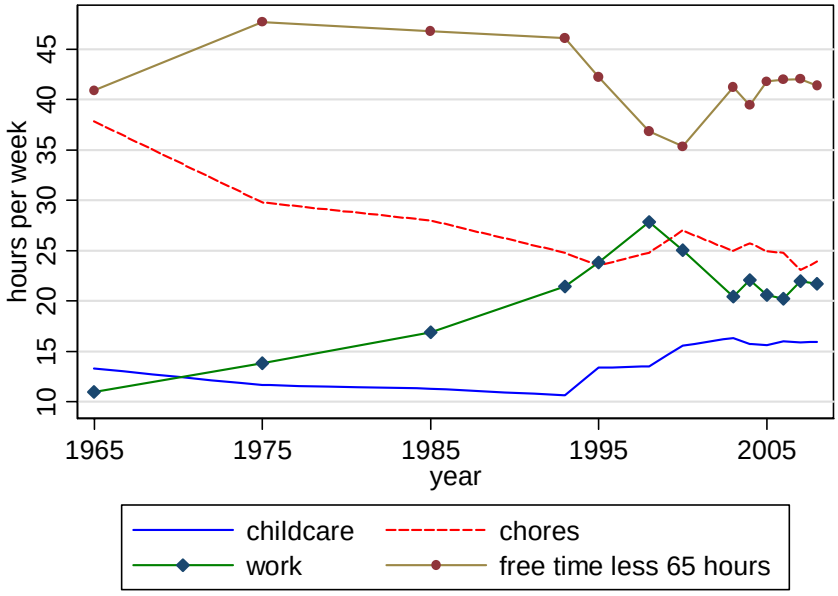


Source: Authors' calculations using time use surveys.

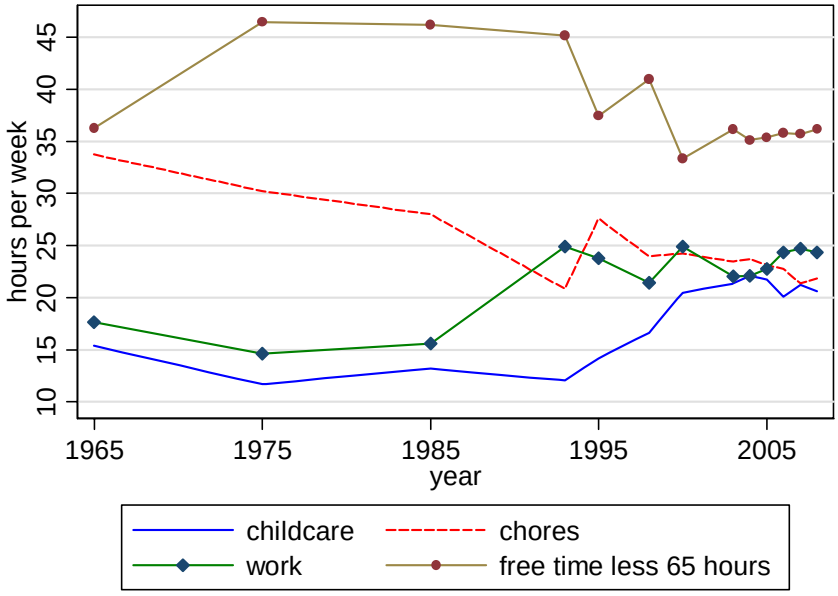
a. Parents with youngest child less than 5 years of age.

Figure 6. Time Use of Mothers[a]

A. Less than College



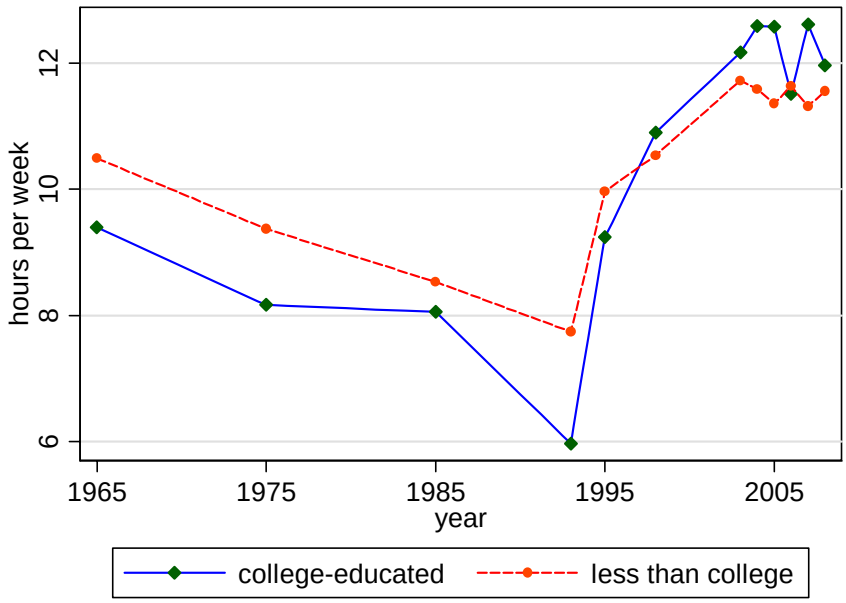
B. College-Educated



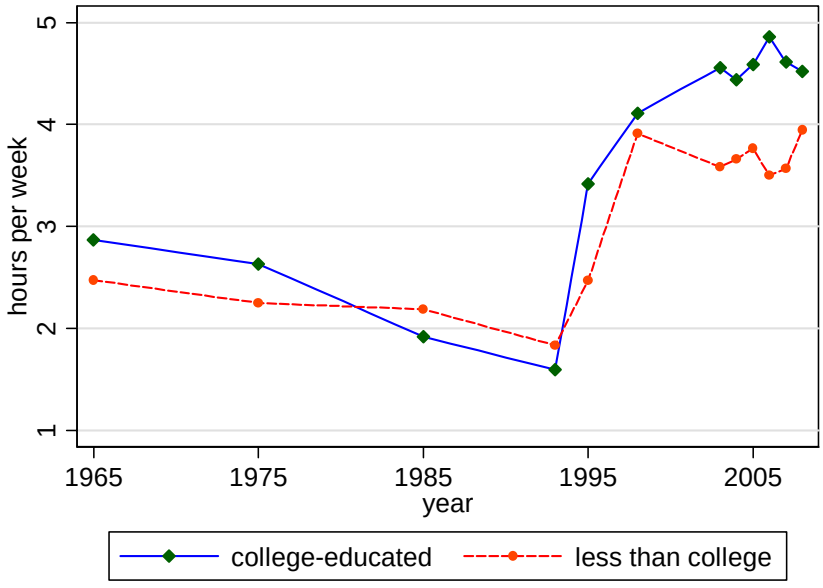
Source: Authors' estimates from time use surveys.
a. The means shown are for ages 25-34.

Figure 7. Weekly Hours Spent in Childcare[a]

A. All Women Ages 18 - 64



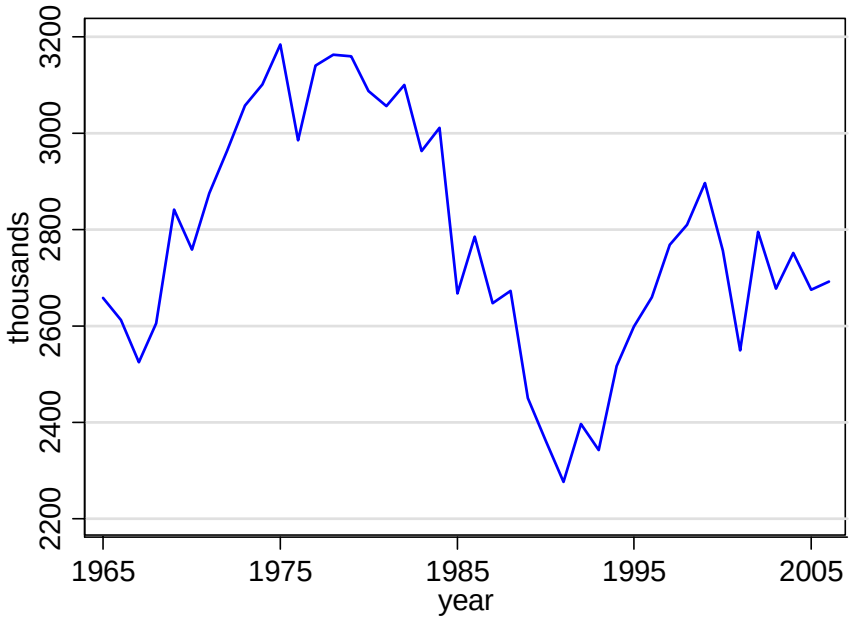
B. All Men Ages 18-64



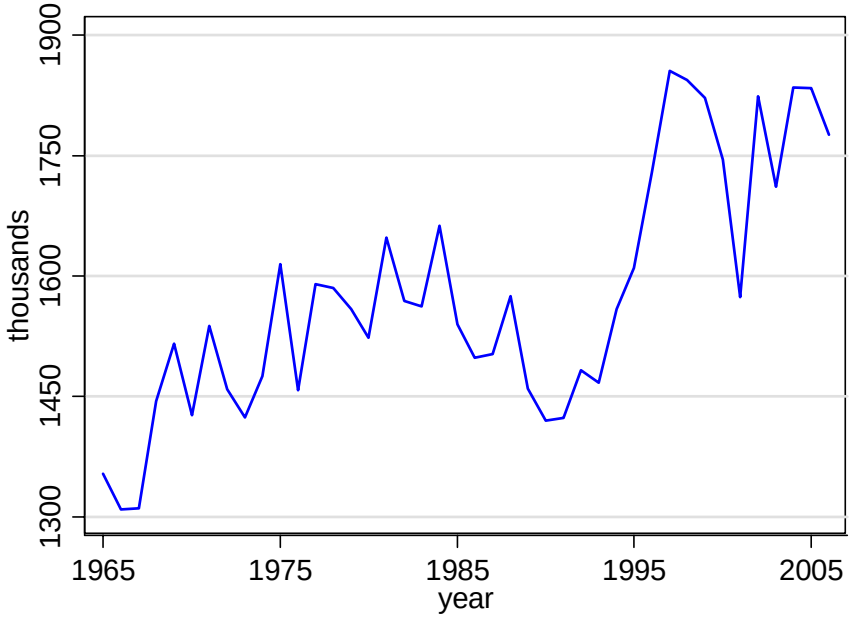
Source: Authors' estimates from Table 2, columns (1) and (3), based on time use surveys.
a. The means shown are for ages 25-34.

Figure 8. High School Graduates and College Enrollment

A. High School Graduates



B. Recent High School Graduates Enrolled in College



Source: 2007 *Digest of Education Statistics,* Table 191.

Figure 9: Choice of College Preparation

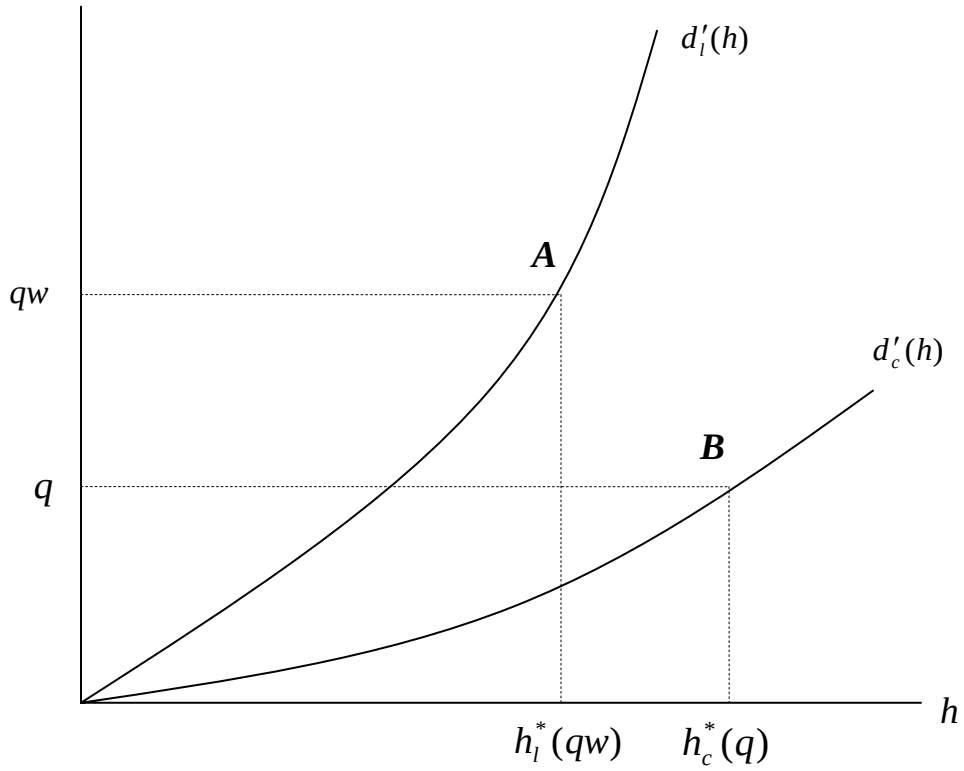


Figure 10: Time Paths of College Preparation

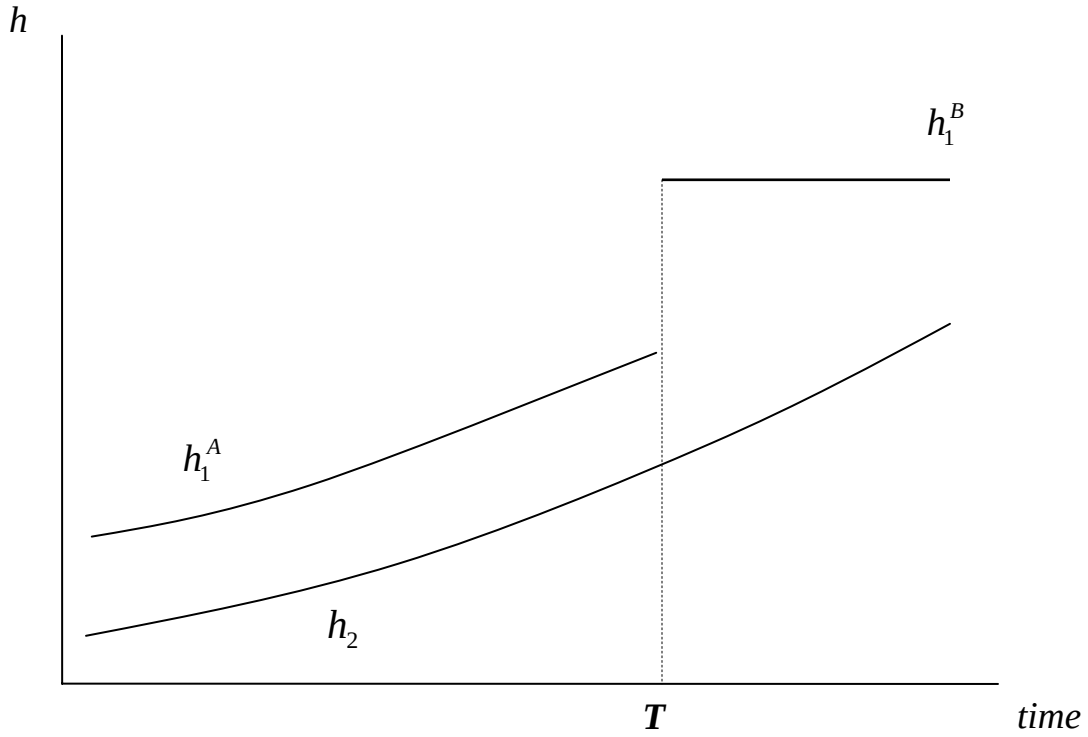
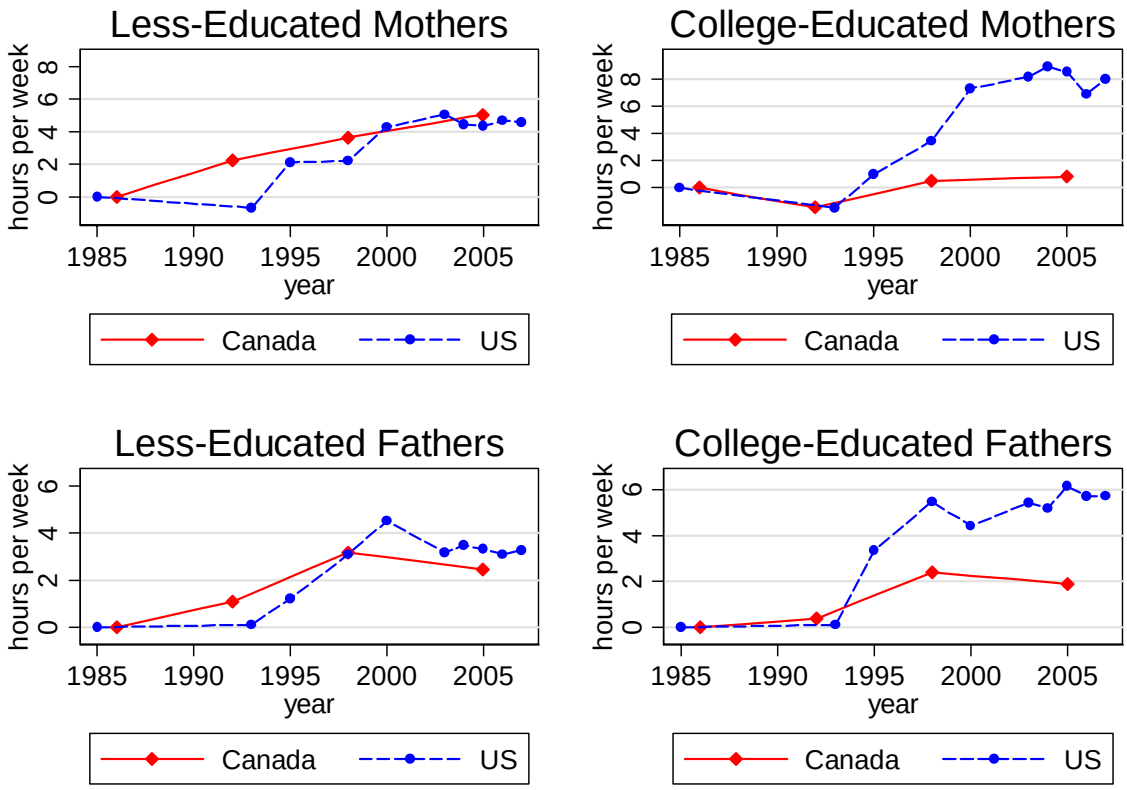
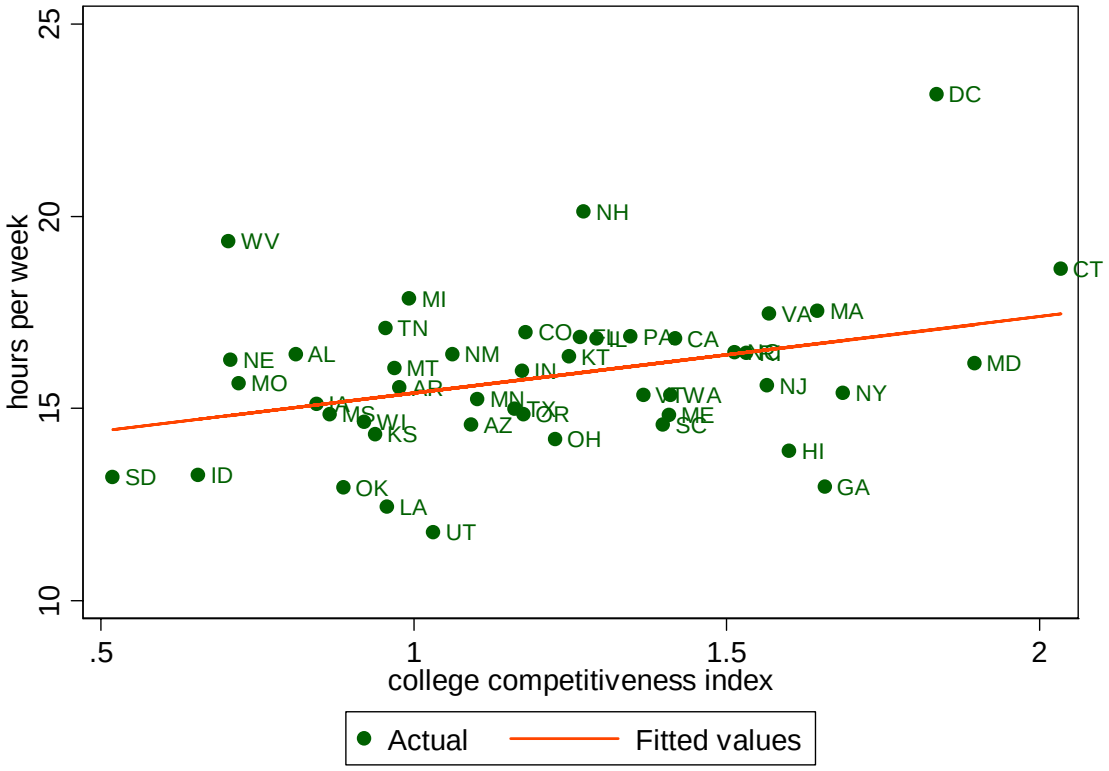


Figure 11. Change in Weekly Hours Spent in Childcare: Canada vs. US[a]



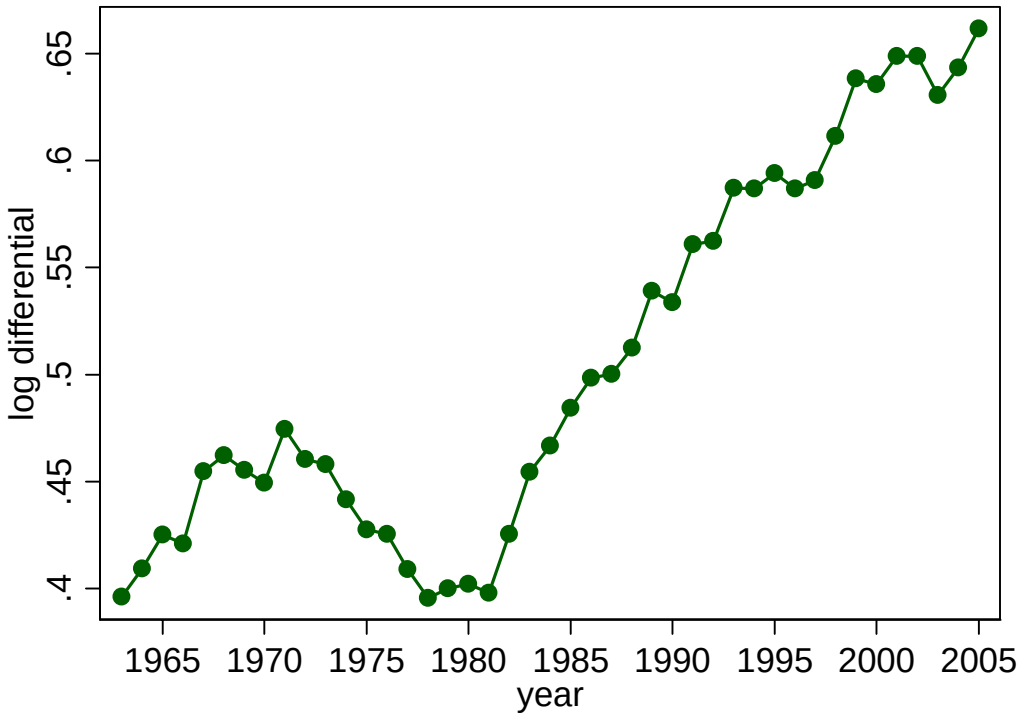
Source: Estimates from Table 1 and Table 5, columns (1) and (3))
a. Hours are normalized to 0 for each group in the initial year.

Figure 12. Cross-State Correlation of Childcare Time and College Competitiveness (College-Educated Mothers)



Source: Estimates based on Table 8.

Figure 13. Log College/High School Wage Gap



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