PARENTAL EDUCATION AND PARENTAL TIME WITH CHILDREN

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ABSTRACT

Parents invest both their material resources and their time into raising their children. Time investment in children is thought to be critical to the development of "quality" children who will become productive adults. This paper has three goals related to the examination of parental time allocated to the care of their children. First, using data from the recent American Time Use Surveys (ATUS), we highlight what we think are the most interesting, and perhaps surprising, cross sectional patterns in time spent with children by parents within the United States. Second, we interpret our results in a Beckerian framework of time allocation with a view toward establishing whether parental childcare appears to be more akin to leisure or home production. Third, we examine data from a sample of 14 countries to establish whether the patterns we observe in the United States hold across countries and within other countries. We show that both within countries and across countries there is a strong positive relationship between parental education, or earnings, and time spent with children. We then show that time spent with children does not follow patterns typical of leisure or home production, suggesting an important difference. We speculate that one reason for this positive education gradient relates to the investment aspect of time spent with children.

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Parents invest both material resources and their time into raising their children. Time investment in children is important to the development of human capital. It is also one possible mechanism through which economic status is transmitted from generation to generation.

This paper examines parental time allocated to the care of their children. First, using data from the recent American Time Use Surveys, we highlight what we think are the most interesting cross sectional patterns in time spent by American parents as they care for their children.[1] We find that higher-educated parents spend more time with their children; for example, mothers with a college education or greater spend roughly 4.5 hours more per week in child care than mothers with a high school degree or less. This relationship is striking, given that higher-educated parents also spend more time working outside the home. This robust relationship holds across all sub-groups examined, including both non-working and working mothers and working fathers. It also holds across all four sub-categories of child care: basic, educational, recreational, and travel related to child care. From an economics perspective this positive education/income gradient in child care (which also holds for income) can be viewed as surprising given that the opportunity cost of time is higher for higher-educated, high-wage adults.

Second, we interpret our results in a Beckerian framework of time allocation with a view toward establishing whether the allocation of time to child care follows similar patterns to home production or leisure time (Becker 1965). Many of the tasks constituting child care can be purchased in the market, and so economists often include

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[1] Throughout this paper we refer to the concepts of parental child care and parental time spent with their children interchangeably, though in section 2 we explicitly acknowledge that the two measures might capture different things.

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child care as just another form of household production (for example, Burda, Hamermesh, and Weil, 2008). However, parents report spending time with their children, especially in recreation or educational child care, to be among their more enjoyable activities, especially when compared with other standard home production activities (Juster 1985; Robinson and Godbey 1999, Appendix Table 0; Krueger, Kahneman, Schkade, Schwarz, and Stone (2007).). We will point out that in sharp contrast to the positive education and income gradient we observe for child care, the amount of time allocated to home production and to leisure *falls* sharply as education and income rise. Given such patterns in the data, we conclude that child care is best modeled as being distinct from either typical home production or leisure activities, and thinking about it differently suggests important questions that are wide open for economists to explore about parental inputs of time toward their children.

Third, we examine data from a sample of 14 countries to establish whether the patterns we observe in the United States hold across countries and within other countries. The results are strikingly similar. Both within other countries and across countries, higher income is associated with more parental time spent with children. Within all of the 14 countries for which we have data, more-educated parents spend more time with their children than less-educated parents do, all else equal.

Parental Time Use in the United States

Findings from Previous Studies

The vast empirical literature on parental time use in the United States has shown that the age of the parents' youngest child (see e.g. Zick and Bryant (1996) for a

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comprehensive survey), and family structure (see Sayer, Bianchi, and Robinson (2004) for a discussion) are particularly important factors driving time spent by parents with their children. We do not focus on children's ages or on family structure in our discussion below. However, given the documented importance of these variables, we include age of children and marital status as control variables when explaining differences in time use across parents with different education or income.

The literature has also shown that in the United States, at least, mothers spend more time with their children than do fathers, although the gender gap is not nearly as wide as it once was. The ratio of married fathers' to married mothers' hours spent on child care increased from 0.24 in 1965 to 0.55 in 1998 (Bianchi, 2000). Mothers also spend proportionally more time in routine care of children, while fathers spend proportionally more time in teaching or playing activities (Bryant and Zick, 1993; Pleck, 1997).

Numerous examinations of U.S. time use data confirm that employed parents spend less time with their children than non-employed parents. However, given that school-aged children are often not present in the home when the parent is working, the time that non-working parents spend with their children is not that much greater than the time spent with children by working parents—and not nearly as large as the difference in working hours (Bianchi, 2000; Zick and Bryant, 1996; Gauthier, Smeeding, and Furstenberg, 2004; Sayer, Bianchi, and Robinson, 2004). Furthermore, employed parents can maximize their time spent with children by altering work hours to coincide with children's available hours. For example, employment data suggests that around one-third of new mothers remain firmly attached to the labor force while two-thirds follow other

patterns—perhaps working seasonally or part-time—during the years when child care demands are most intense (Bianchi, 2000; see also Klerman and Liebowitz, 1999).

Finally, previous studies have long documented that highly-educated mothers spend more time with children than less-educated mothers. Hill and Stafford (1974), using nationally representative data from the 1965 *Productive Americans Survey* conducted by the Survey Research Center of the University of Michigan, found that high socio-economic status mothers spend two to three times as much time in preschool child care as do low socio-economic status mothers. More recently, Kimmel and Connelly (2007) use data from the 2003-2004 American Time Use Survey to estimate a structural model of the allocation of time for women. As part of their results, they find that a woman's predicted wage is positively correlated to the time women allocate to child care.[2] These latter patterns are most interesting to us from an economic perspective, and we focus on them here. However, instead of estimating a structural model, we show patterns of time use for both men and women by educational attainment. The two methodologies yield similar results, but our approach facilitates our comparison of the U.S. data to the patterns found in other countries which we document later in this paper.

Time Spent in Child care by Subgroups: Evidence from the American Time Use Survey

We begin our data exploration by documenting total hours spent in child care by various subgroups defined by gender, marital status, employment status, and education. We use data from the 2003-2006 waves of the American Time Use Survey conducted by

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[2] Sayer, Gauthier, and Furstenberg (2004) examine the link between education and parental time spent with children in Canada, Germany, Italy, and Norway. Bianchi and Robinson (1997) examine time diary data from a sample of children from California age 3-11 and show that children of higher-educated parents study and read more and watch less television.

the U.S. Bureau of Labor Statistics. This survey uses a 24-hour recall of the previous day's activities to elicit time diary information. Each day of the week is equally represented within the survey. We pool data from survey years 2003 through 2006.[3] Our primary analysis sample includes only those individuals between the ages of 21 and 55 with at least one child under age 18, and who had a complete 24-hour time diary. This nationally representative sample includes 22,693 individuals with children, with 13,434 of them being women.

We define "total child care" as the sum of four primary time use components. "Basic" child care is time spent on the basic needs of children, including breast feeding, rocking a child to sleep, general feeding, changing diapers, providing medical care (either directly or indirectly), grooming, and so on. However, time spent preparing a child's meal is included in general "meal preparation," a component of non-market production. "Educational" child care is time spent reading to children, teaching children, helping children with homework, attending meetings at a child's school, and similar activities. "Recreational" child care involves playing games with children, playing outdoors with children, attending a child's sporting event or dance recital, going to the zoo with children, and taking walks with children. "Travel" child care is any travel related to any of the three other categories of child care. For example, driving a child to school, to a doctor, or to dance practice are all included in "travel" child care. Again, "total child care" is simply the sum of these four measures.[4]

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[3] For more information on the American Time Use Survey, see Aguiar and Hurst (2007). Our creation of variables is essentially identical to that used in their paper, though they only focus on the 2003 data. We have adjusted our classification slightly relative to theirs to account for changes in the survey between 2003 and 2006. All of our data and codes for this paper can be found at <http://www.econ.umd.edu/~freedman-s/jep-timeuse>). A full description of our handling of the data is described in the data appendix.

[4] In our empirical work, we include the total time parents spend with both household and non-household children. As discussed in the data appendix, we do this for comparability with the international time use

Table 1 reports hours spent in child care for women and men by marital and work status. We present total time spent in any child care as well as time broken down into our four child care categories: basic, educational, recreational, and travel. The average time spent in child care for all women with children is 14.0 hours per week. This is dominated by time spent in basic child care (7.7 hours). The time input associated with having a young child in the household is expectedly larger. Women with at least one child under the age of five spend an average of 21.0 hours per week in child care, with 12.6 of those hours devoted to basic child care.

Women spend roughly twice as much time in child care as do men, a pattern which holds true for all subgroups. Among all men with children, average child care is 6.8 hours per week, compared to 14.0 hours for women. For both men and women, basic child care activities consume the largest amount of time spent in child care. But men do spend proportionately more of their child care time in recreational activities.[5]

These patterns cannot be fully explained with the belief that men tend to specialize in market production and women tend to specialize in home production, because the gender gap persists within groups of working parents. Working women devote an average of 11.6 hours per week to child care, compared to 6.5 hours among working men. This data does not, however, show whether working women with children have selected into occupations or positions that have more flexibility of hours or even lower total hours.

data presented later in this paper. This distinction, however, is not important empirically given that parents between the ages of 21 and 55 (our analysis sample) spend very little time with other households' children when their own children are not present. The 75th percentile of the time spent with non-household children distribution for our analysis sample is zero. All of the U.S. results presented in this paper were redone excluding time spent with non-household children from our measure of child care, but this does not change any of our results in any significant way.

[5] A basic examination of the data revealed no obvious differences in child care time for either mothers or fathers based on the gender of the child.

Non-working women with children spend on average seven more hours in child care per week than their working counterparts. This difference is spread across the four categories of child care, with the largest differences being in basic and recreational child care activities. As shown by others in the literature, married women and women with young children spend more time in child care than single women or women with older children.

Patterns by Education and Income

Parents with different education levels spend substantially different amounts of time in child care. Table 2 reports that women with less education than a high school degree spend an average of 12.1 hours per week in child care, while college-educated women and women with education beyond a college degree spend 16.5 and 17.0 hours in child care, respectively.

These differences do not appear to be driven by differences in employment rates. Higher-educated women with children are much more likely to be working (79 percent for women with more than a college degree compared to 42 percent for women with less than a high school degree). In addition, higher-educated women tend to have fewer children—1.8 children per household for women with more than a college degree compared to 2.2 children per household for women with less than a high school degree— making the pattern of child care across education groups even more surprising. Higher-educated women are also much more likely to be married; the fraction of women with a high-school degree or less who are married is around 60 percent, compared to more than 85 percent among college educated women.

The education gradient is also not driven by a woman's age, number of children, marital status, or age of youngest child. We estimate ordinary least squares regressions with time spent with children as the dependent variable: for the explanatory variables, we include the three factors just mentioned along with dummy variables for the differing levels of completed education. Women with less than 12 years of education is the omitted group, so the coefficients on the other levels of education can be interpreted as additional hours spent with children relative to that group. Adjusting for these other factors makes the education gradient even steeper. These results are shown separately for working and non-working women under the "conditional" columns in Table 2. Specifically, non-working women with a college degree or more than a college degree spend, respectively, 6.4 and 9.7 hours per week more on child care than non-working women with less than a high school degree. The corresponding conditional educational differences for working women are 6.1 and 6.4 hours per week.

Tables 3 and 4 show that a rising education gradient holds within all four types of care (basic, educational, recreational, and travel) and for all four groups we analyzed (non-working and working women and men). These tables report conditional ratios of time spent in childcare, for each education group relative to those with less than a high school degree. The conditioning set of variables includes a cubic in age, number of children indicators, a married indicator, and age of youngest child indicators. As shown in the table, for nonworking women, the education gradient is apparent in all four child care categories, but is largest with respect to educational and recreational child care. For working women, the gradient is steeper, so that working women with a college degree spend 70 percent more time in child care than their counterparts with less than a high

school degree, and the education gradient is even stronger in recreational child care. Working college-educated men spend about 105 percent more time in child care than working men with less than a high school degree, and this gradient is fairly consistent across child care categories. For non-working men, the gradient is less clear, but this is not surprising given that so few men, particularly college-educated men, are not working.

An important caveat to interpretation is that up to this point we have followed the bulk of the previous literature and focused exclusively on child care coded as a "primary" activity. However, child care is often an individual's "secondary" activity. For example, individuals who report going grocery shopping, preparing a meal or watching television as their primary activity may have a child in their care at the time. Furthermore, many child care scholars have noted that child care sometimes extends to a supervisory role, which may take place when a child is not even present in the same room. For example, a parent must stay in the house while a child naps or sleeps. We made the choice to focus on primary activities in part because by categorizing the activity this way parents are indicating something about the quality of the interaction, or about the amount invested by the parent. Using this narrow definition of child care is potentially problematic, though. Parental time spent on secondary child care or in the presence of a child almost necessarily involves less active interactions than primary child care, but this time might still be quite important for a child's well-being or development.[6]

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[6] The importance of distinguishing between time spent on "primary" and "secondary" child care activities has been discussed by Folbre, Yoon, Finnoff, and Fuligni (2005), Folbre and Yoon (2007) and Zick and Bryant (1996). Zick and Bryant note that studies utilizing time use surveys have been criticized for undercounting parents' time in child care due to the exclusion of secondary activities. They examine data from the 1977-78 Eleven State Time Use Survey, which has a sample of 2,100 families, all with two minor children in the home. They find that secondary child care time by both parents is a sizable fraction of all child care, making up between 30 and 34 percent of the total time spent in child care.

The American Time Use Survey only records an individual's primary allocation of their time for almost all activities. However, there are two other ways to measure child care in the survey. As pointed out by Folbre and Yoon (2007), for each activity, the respondent is asked a special question about having a child "in your care". Respondents are also asked whom was "in the same room" (for activities at home) or "accompanying you" if not at home. Multiple individuals could be listed. Note that it is not clear which measure provides a broader measure. If a child is playing in the backyard or in a different room, the parent's supervisory role would be captured by the "in your care" measure, but not by the "with whom" measure. On the other hand, it is not clear that caring for a child when he is sleeping is what one would want to capture with a measure of child care. Because the "in care of" question is only asked of parents with children less than 13, we focus on the "with whom" question to create an alternative measure of time spent with children.

Using the "with whom" data, we find that mothers spend roughly 45 hours per week in the presence of their children. The comparable number for fathers was roughly 30 hours per week. These numbers are much higher than the roughly 14 and 7 hours per week of primary child care reported by mothers and fathers, respectively (documented in Table 1). In other words, parents spend a good deal more time around their children even if they are not engaging in tasks where "child care" is the primary activity. In terms of the education gradient, high educated parents and low educated parents spend nearly identical amounts of total time in the presence of their children. These results are shown in Table 5. As with the results in Table 4, all differences are relative to individuals with less than a high school degree and are conditioned on demographics. As

seen in Table 5, there is no education gradient with respect to spending time in the presence of one's children for either working women, non working women, working men and non working men.

At a minimum, the analysis above shows that even though parents of differing education spend similar total time around their children, the nature of the interactions is very different.   The point that should be taken away from the analysis above is that high educated parents spend much more time in activities where child care is listed as the primary activity. Additional work is warranted to assess the extent to which parental investments in children occur along other margins (secondary child care activities, parental investments during meal time, etc.). As the discussion of the economic model of time-use will highlight below, this pair of patterns may shed light on the reason why more-educated parents spend more time in which they are focused primarily on child care.

Understanding Time Spent With Children

Many economic models categorize child care as a form of home production. Can we infer something from the patterns in the time use data about the appropriateness of this assumption? Though economists tend to be skeptical about inferring too much from what people say, as opposed to what they do, it is perhaps instructive that individuals often report spending recreational or educational time with their children as being among their most enjoyable activities – particularly when compared with home production activities (for example, Juster, 1985; Robinson and Godbey, 1999; Krueger, 2007).[7] Do

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[7] A recent book on family patterns by Bianchi, Robinson, and Milkie (2006) includes some survey data about how parents feel about their time allocation. Among a national sample of 1,200 parents surveyed in

the data presented here suggest whether parents treat time with their children as home production (akin to preparing meals) or leisure (akin to going to the movies)?

It might seem foolhardy to try to classify such an activity as multifaceted as child care as being either leisure or home production, but economic principles can shed some light on the question. Below, we describe the basic elements of an economic model of time use that can help us to think about how we should expect the time spent in different types of activities to vary across people with different wages, which economists tend to consider the opportunity cost of one's time.

An Overview of an Economic Model of Time Allocation

Consider a model in which individuals derive utility from three commodities: a home-produced good, a leisure good, and well-cared-for children. The utility derived from children may take several forms. Having well-cared for children may contribute directly to a parent's utility; for example, parents may enjoy spending time with their children. Parents may also altruistically care about their children's future happiness and well-being and consider time with their children as an investment in their children's human capital. Or parents may care selfishly about their children's future earnings potential, knowing that high resource children may be better able to offset negative income or health shocks experienced by the parent in old age.

Each commodity is produced using a combination of market expenditures and time (as in Becker, 1965). One way to classify goods as either "home production" or

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2000 and 2001, 47.6 percent of parents report spending "too little time" with their youngest (or only) child, 57.7 percent report spending too little time with their oldest child, and 42.1 percent report too little time with both. In contrast, only about five percent of parents reported too much time with their children. Of course, these data do not give us insight into whether parents feel this way because of a sense of obligation, or whether these responses are a window into parents' marginal utility of time with their children.

"leisure" is based on the elasticity of substitution between time and goods in their production (Aguiar and Hurst, 2007). Most home production shows a fair degree of substitutability between time and goods. For example, one can order take-out or purchase pre-processed foods to reduce the time input associated with cooking, and similar substitutability exists for cleaning the house, tending to the yard, and doing laundry. However, in the case of leisure, time and goods are far less substitutable. To watch a movie, it is necessary to allocate a fixed amount of time; you cannot pay someone to watch a movie for you and expect to have a comparable experience. Other time-intensive activities include socializing with friends, playing golf, reading, and watching television.

In this framework, how might we expect time spent in home production, leisure or child care to vary with the opportunity cost of time – that is, with a higher wage? In a traditional economics model of the choice between income (that is, wages from labor) and leisure, a higher wage has an ambiguous effect on the number of hours worked, because of offsetting substitution and income effects. A similar analysis applies here. A higher wage will lead to substitution toward more hours worked, and less time in home production, leisure, or child care activities. For goods that have a relatively high degree of substitutability between time and expenditures in the production of the commodity (e.g., home-produced goods) an increase in wages will result in a greater decline in the time allocated to that good, all else equal. A higher wage also brings a positive income effect, which will lead people to desire more of all goods. The income effect will be larger for goods where the elasticity of demand for the good with respect to additional income is relatively high. In this model, there is also an interaction between the income and substitution effects, because when an income effect leads to demanding more of a

consumable good for which time is an input, the degree to which individuals will choose to produce the good with time rather than market expenditures will vary. The substitution and income effects push in opposite directions. As the opportunity cost of time (the wage) increases, the time allocated to the production a home-produced good, a leisure good, or child care can increase (if the income effect dominates) or decrease (if the substitution effect dominates).

This discussion suggests that – all else equal – the relationship between the time allocated to home production and a higher wage should be more negative than the relationship between the time allocated to leisure and the wage. This outcome arises because of a higher degree of substitutability between time and goods in the production of home-produced goods, on average, than of leisure. To the extent that home-produced goods have a higher income elasticity than leisure goods, this prediction would be mitigated.

The model as presented to this point could also be expanded to allow both productivity of time and tastes for goods to vary according to a person's earning capacity. For example, suppose that high-wage individuals are more efficient in the production of one of the commodities. On the one hand, the marginal return to spending another hour in home production is higher for individuals with higher non-market productivity. On the other hand, the more efficient worker can produce any given amount of the consumable output in less time. These effects go in opposite directions, and so the existence of such productivity differences would again have an ambiguous effect on how time spent in that activity would differ between high and low wage individuals (all else equal) and either could dominate.

In a related vein, tastes may differ across households in a way that is correlated with the household's opportunity cost of time. For example, lower-educated households may have a greater taste for leisure goods—for example, relatively time-intensive goods like television watching and socializing with friends—than higher-educated households.[8]

Thinking about child care in this framework will point to ways in which parents view time spent with their children as similar or different from either home production or from leisure.

Patterns of Time Spent in Leisure and Home Production

Before interpreting the trends in child care in terms of our theoretical discussion, it is useful to document the educational gradient in time spent on activities other than child care. If time spent with children follows patterns across parents with different opportunity costs of time similar to leisure, we might conclude that parents treat time spent with their children as a form of leisure. Alternatively, if time spent with children correlates in ways similar to time in home production, we might conclude that parents treat time spent with their children as a form of work.

For our empirical work here, we divide household time into five categories: market work, total non-market work, leisure, child care, and all other uses of time. The "market work" category is straightforward. "Total non-market work" includes time spent in core household chores, time spent obtaining goods and services, plus time spent on

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[8] Allowing different time use to have different disutilities would be a potential extension of the Beckerian model, as Krueger et al. (2007) discuss. For example, if lower wage households derive a greater disutility from allocating time to a certain activity, they will spend less time in that activity, all else equal. The implications for the cross-sectional interpretation of the relationship between time allocated to a good and the wage would be similar if low-educated individuals simply liked the good less or if they liked like the time they allocated to production of the good less.

other home production such as home maintenance, outdoor cleaning, vehicle repair, gardening, pet care, and others. In turn, core household chores includes meal preparation and cleanup, doing laundry, ironing, dusting, vacuuming, indoor household cleaning, indoor design and maintenance. Examples of time spent "obtaining goods and services" include grocery shopping, shopping for other household items, comparison shopping, coupon clipping, going to the bank, going to a barber, going to the post office, and buying goods on-line; time spent acquiring medical care, education, and restaurant meals are explicitly excluded from this category. The definition of home production that we use here is the same as used by Aguiar and Hurst (2007), which in turn is very similar to the definition used by other time researchers like Robinson and Godbey (1999), with the key exception that neither we nor Aguiar and Hurst include child care as a component of home production.

Leisure activities are harder to define. We follow the "leisure measure 2" definition used by Aguiar and Hurst (2007). It includes activities such as time spent watching television, socializing (relaxing with friends and family, playing games with friends and family, talking on the telephone, attending/hosting social events, etc.), in exercise/sports (playing sports, attending sporting events, exercising, and running), reading (books and magazines, personal mail, and personal email), entertainment/hobbies (going to the movies or theatre, listening to music, using the computer for leisure, doing arts and crafts, playing a musical instrument), and other similar activities. We also include in our measure of leisure activities that provide direct utility but may also be viewed as intermediate inputs, such as sleeping, eating, and personal care. We exclude own medical care, but include such activities as grooming, having sex, sleeping or

napping, and eating at home or in restaurants.   All other uses of time are in the residual category, which we will not discuss further here.

Panel A of Table 6 reports the differences for time spent in home production and leisure for both non working and working women across education groups. The approach here uses an ordinary least squares regression in which the dependent variable is time spent on a certain activity. One set of independent variables are dummy variables for level of education; the education level of less than 12 years is the omitted category, so the coefficients on the other variables can be interpreted as the difference in hours relative to that group. The regression also includes control variables for age (expressed as a cubic), and dummy variables for number of children, married or not, and age of youngest child. Different regressions were run for each activity, as well as for nonworking women (columns I) and working women (columns II).

For women, this analysis reveals a steep negative education gradient for both leisure and home production activities. These results are similar to those documented in Aguiar and Hurst (2007), who examined leisure and home production differences across education groups for women and men, but did not condition on work status. Non-working women with more than a college degree spend 6.1 fewer hours per week in home production and 7.3 fewer hours per week in leisure activities relative to women with less than a high school degree.[9] Working women with more than a college degree spend 4.4 fewer hours per week in home production and 4.8 fewer hours per week in leisure compared to the lowest educated group in the sample.

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[9] In results not reported here, we find that there is a negative education gradient for both men and women in total sleep hours.

Panel B of Table 6 shows the analogous results for non-working and working men. The education gradient in home production for non-working men appears positive, but the sample of non-working men is too small to warrant any strong conclusions. For working men, there does not appear to be a strong education gradient in home production. But, there is a large negative education gradient for leisure time among men that stands in contrast to the positive education gradient.

An examination of time-use patterns by earnings for those currently working – another proxy for the opportunity cost of time – reveals the same underlying trends.   In particular, we rank working married women by their age-adjusted weekly earnings. To get a measure of age-adjusted weekly earnings, we run a regression of log weekly earnings on a cubic in age on a sample that only includes married working women. The married working women are then placed into age-adjusted weekly earnings quintiles based on the residuals from this regression. Table 7 reports the coefficients on earnings quintiles indicators from a regression of time spent in child care on the earnings indicators and demographic controls. Consistent with the results for education, higher earning married working women and higher earning married working men spend more time with their children than do their lower income counterparts.

Interpreting the Data

Given the higher substitutability between expenditures and time in production, one may have predicted that individuals with a high opportunity cost of time, all else equal, would be more willing to purchase market substitutes for their home production time and thereby reduce their time input into home production tasks, as compared with

leisure. As seen in Tables 6 and 7, however, the education and earnings gradients for leisure are actually more negative than the gradient for home production. Apparently, all is not equal when making such cross-sectional comparisons. According to the theoretical discussion above, this implies that either: 1) home production goods have higher income elasticities; 2) the relative productivity within the home production sector differs by educational attainment; or 3) individuals with a lower opportunity cost of time have a stronger relative preference for leisure goods.

But from the perspective of this article, the key question is what do these patterns suggest about how individuals view time spent in child care relative to alternate uses of their time? The education/earnings gradient is negative for both leisure and home production activities. However, the education/earnings gradient is strikingly positive for child care time. Time spent caring for one's children appears to be fundamentally different from these other two categories of time use.

Given our discussion above, at least four potential reasons could explain why child care patterns relative to education and income differ from the leisure and home production patterns. First, parents may simply view the output of investing in children as being more of a luxury good than either traditional home production or leisure goods. If this reason holds true, then as income increases, the marginal utility from time invested into children must be higher than the marginal utility of an additional unit of time invested in either preparing meals (the dominant home production activity) or watching television (the dominant leisure activity). Additional support for this possibility comes from the evidence, recounted above, that adults often state that spending time with their

children in recreational activities is among their most enjoyable activities (especially when compared to other home production activities).

Second, the child care patterns in the data documented above are consistent with parents viewing market-purchased child care options as poor substitutes for parental time, relative to the degree of substitutability between expenditures and time in the production of typical home produced goods. Highly-educated parents may be more likely to feel that market alternatives are not good substitutes for their own time spent with their children. They may not think it is possible to monitor child care providers well enough to ensure their children spend time in the activities of their choosing, such as doing art projects or reading books, rather than watching television. Or high-education parents may believe that spending time with adults with less human capital is an imperfect substitute for spending time with themselves.

Similarly, if the demand for well-cared-for children increases in income/education, then even if parents viewed the degree of substitutability in child care to be comparable to the degree of substitutability in traditional home production activities, we would expect highly-educated parents to substitute more toward market alternatives – to pay nannies and schools to care for their children and to purchase educational aids like computers and enriching toys. Of course, many highly educated parents do some of these things, but even net of this substitution, they still spend more of their own time with their children.

Third, higher-wage parents might have a greater preference for the output generated by time spent with their children, at least relative to their preferences for home produced and leisure goods. Or, conversely, lower-educated parents may have a greater

relative preference for their own leisure. Allowing preferences for the consumption goods to differ by education can tautologically explain all the patterns in the data. The fact that preferences for leisure differs by education is not implausible given the fact that differences in preferences are a common explanation for differences in educational attainment across households.

A fourth explanation is that perhaps the return to investment in children from higher-income/higher-education parents is higher. If the children of higher-educated parents have greater potential or greater opportunities, the marginal return on time invested in such children could be higher. (Alternatively, the marginal return to time investment in children with lower innate ability could be higher. There appears to be remarkably little evidence informing this issue.) Importantly, this explanation requires that parents do not consider market alternatives to be highly effective substitutes for their own time spent in child care. One recent phenomenon that may have increased the return on investment in children, particularly for highly-educated parents, is the large size of the cohort comprised of the children of the baby boom. Ramey and Ramey (2007) argue that the competition by this cohort for inelastically supplied slots at top-tier college led to a rat race.

Another reason why higher-educated parents may have a higher return to investing in their children is that the value or quality of their time investment may be higher. However, recall from the theoretical discussion above that such productivity differences have ambiguous effects on time spent in child care. A higher return might induce parents to spend more time with their children, but on the other hand, these more productive parents can produce the same amount of human capital in their children in less

time. Future research might investigate this possibility by focusing on types of child care for which productivity might be assumed to be related directly to education, such as reading to one's child.

This final possible explanation for the educational gradient in child care points to the question of whether parental time investments in children are correlated with increased child human capital, and whether this relationship is stronger for more-educated parents. Economists have been considering this question at least since the seminal work of Leibowitz (1972, 1974, and 1977). Haveman and Wolfe (1995) provide an extensive review of the literature on the determinants of children's attainments with an emphasis on family characteristics other than parental time use, including poverty, family structure, mother's education. In sociology, Coleman's (1988) classic work argues that if parents are absent or not involved with their children, then social capital is lacking, and as a consequence the level of human capital that parents possess is an irrelevant resource for the child because the mechanism of transferring human capital does not function. Cooksey and Fondell (1996) examine data from the 1987-88 *National Survey of Families and Households* and find a strong positive relationship between fathers' time spent with children and academic grades, which they interpret as supportive of Coleman's view.

The empirical evidence on the relationship between parental time investment and children's outcomes is only moderately convincing. Empirical papers on this issue have tended to focus on educational achievement, which is only one potential measure of child outcomes. The consensus of these studies is not clear (for example, Leibowitz, 1974; Etaugh, 1984; Steelman and Mercy, 1980; Datcher-Loury, 1988; Blau and Grossberg, 1990). Moreover, such studies are plagued with identification problems; for example,

perhaps parents spend more time working on homework with children who are having trouble with their homework, so parental time will appear to be correlated with lower educational performance. Furthermore, some of the studies do not have direct measures of maternal child care time and rely on proxy measures. As we have documented above, maternal time spent in child care often follows surprising patterns, in the sense that mothers with a higher opportunity cost of time tend to spend more time on child care. Further empirical work on this issue is warranted.[10]

More empirical work is also needed to disentangle why the educational gradient with child care is positive while the educational gradients of home production and leisure are negative. The fact that there is a positive wage elasticity for time spent on child care and a negative wage elasticity for time spent on leisure and home production was also noted by Kimmel and Connelly (2007). The negative educational gradient for home production and leisure was also noted by Aguiar and Hurst (2007). Both of these papers also caution readers to treat child care time as distinct from either home production or leisure. Given these differences, researchers measuring the allocation of time or modeling parental inputs into children should proceed by treating child care as being distinct from other leisure or home production activities.

Trends in Parental Child Care over Time

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[10] There is a related literature in child development on the impacts of maternal employment in early childhood on a child's subsequent cognitive outcomes. The presumption of this literature is that maternal employment in the early years of a child's life translates into less parental investment during that time. Han, Waldfogel, and Brooks-Gunn (2001) and Brooks-Gunn, Han, Waldfogel (2002) find that maternal employment during a child's first year of life is negatively associated with cognitive outcomes in later childhood.

We have presented a snapshot picture of parental time use in the United States, with an emphasis on documenting current differences across various subgroups. An in-depth consideration of how these differences have evolved over time is beyond the scope of this article. But we would be remiss to not at least raise the issue of time trends in parental time use, given widespread interest in the issue. For example, if child care increases with individual income, it would not be surprising to find child care increase substantially within the United States over the last 40 years, given the large increases in income experienced by the average household.

Bianchi (2000), Sayer, Bianchi, and Robinson (2004), Aguiar and Hurst (2007) and Ramey and Ramey (2007) all report that adults in the United States today are spending more time with their children than in the past. This pattern holds true for parents as a group, as well as within subgroups – both working and non-working parents and both mothers and fathers. Bianchi documents that from 1965 to 1998, the average amount of time spent providing "child care" has increased from 0.4 hours per day to 1.0 hour per day among married fathers and from 1.7 to 1.8 hours per day among married mothers. Aguiar and Hurst show that adjusting for changing demographics (including the aging of the population and declining fertility rates) the average time spent in child care for men and women in the U.S. increased by roughly 2.0 hours per week between 1965 and 2003. The cross sectional trends documented above are consistent with the time series trends. Furthermore, Ramey and Ramey (2007) show that the increase in time spent with children was larger for more educated individuals relative to less educated individuals.

Gauthier, Smeeding, and Furstenberg (2004) provide evidence that the trend toward greater parental child care time was not exclusive to the U.S. experience. The

authors examine trends in child care from 1960 to 2000 using data from 16 countries included in the Multinational Time Use Study. This study administers a common 24-hour diary instrument in all sample countries. The authors include data from Australia, Belgium, Bulgaria, Canada, Czechoslovakia, Finland, France, Germany, Hungary, Italy, Norway, Poland, Sweden, United Kingdom, United States, and the former Yugoslavia. Examining parental time spent in child care for married/cohabiting parents with at least one child under the age of five, the authors document a notable increase in time spent in child care for all sub-samples considered: working mothers, working fathers, non-working mothers, and non-working fathers. They further document that fathers have increased time spent in housework and reduced time spent in paid work and personal activities (including sleep), while mothers' increased time spent in child care is coterminous with decreases in time spent on paid work, personal activities (including sleep), and housework.

An International Perspective on Parental Child Care Time

Do the positive education and income gradients that we have documented above for parental child care time in the United States hold across countries and within other countries? We examine data from the following countries, with the corresponding sample years in parentheses: Austria (1992), Canada (1998-1999), Chile (1999), Estonia (1999-2000), Italy, (2002-2003), France (1998-1999), Germany (1991-1992), Netherlands (2000), Norway (1990-1991), Palestine (1999-2000), Slovenia (2000-2001), South Africa (2000), and the United Kingdom (2000-2001). Our choice of countries and time periods

is limited to places and times in which the time use data is based on 24-hour time diaries, a restriction that facilitates the comparison of time use patterns across countries.[11]

We acknowledge that the time use surveys were conducted in a variety of different manners across the different countries and that one should proceed cautiously when comparing the exact amount of time spent in different activities across the countries. Our goals in this section are twofold. First, we wish to show that the time spent in child care within these countries correlates with per capita income. Second, we wish to show that within a diverse set of countries, we see the same educational gradient for time spent in child care. This latter approach, given its reliance on within survey variation, is not subject to the concern that these surveys are not literally comparable across countries.

For the different countries, our measure of time spent in child care includes all time the individual spends in basic, educational, and recreational child care (as described above). Again, these surveys only focus on primary child care activities. This harmonization of the data across countries was facilitated by the fact that activities included in the basic, educational and recreational child care measures were similarly categorized across the countries. The one exception is that some countries included travel time associated with child care (like taking your children to school) in a general travel

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[11] Tables in the data appendix provide detailed information about this data including information about each survey's sample methodology and coverage as well as the actual sample sizes used in our analysis. In the appendix, we also note how we defined child care within each of the surveys. There are three important notes about the international time use data which we want to emphasize. First, some of these datasets were accessed through the Multinational Time Use Survey (MTUS) which harmonized the time use classification and sample demographics for the participating surveys. The participating time use surveys included in the MTUS that met our inclusion criteria include the surveys from Austria, France, Germany, Norway, Slovenia, and South Africa. The remaining data were accessed directly through the organization which collected the data. Second, the Chilean data had respondents choose from a pre-determined set of activity codes when filling out their time diaries. The respondents from all other countries reported their activities in their own words. Their description was then converted into time use categories by the staff of the respective surveys. Third, all the surveys provide weights designed to ensure that the surveys are nationally representative. We use these weights when describing the country means below.

time category. For these countries, we cannot separately identify child care travel from other types of travel. For that reason, travel time associated with children was excluded from all our measures of total time spent in child care for all countries.

Table 8 reports the average hours per week spent in child care for men and women, respectively, for the countries we analyzed. We restrict the sample to include only individuals between the ages of 21 and 55 (inclusive) with at least one child under the age of 18 in the household. To facilitate comparisons, in this section we report U.S. numbers according to this sample restriction, as opposed to restricting the sample to parents, as we do above. We also restrict the analysis to individuals with a complete time diary (the sum of time across all activities totaled 1440 minutes). We further weight all country data to ensure that each day of the week (within each sub sample) is equally represented. For the reasons given above, Table 8 redisplays the U.S. child care numbers excluding travel-related child care. The countries are listed in order of GDP per capita (measured in 2000 U.S. dollars), from the United Nation's Statistics Division National Accounts Main Aggregates Database.

The patterns of Table 8 are broadly consistent with the cross-sectional patterns found within the United States. Countries with higher GDP per capita, on average, spend more time on child care. The table shows that parents in the United States, Canada, and Norway spend the most amount of time caring for their children. Parents in South Africa, France, and Slovenia spend the least amount of time in child care. The gender gap in time spent with children varies widely across countries. The ratio of time spent by mothers to time spent by fathers is the lowest in Canada, Netherlands, Norway and the United States, with ratios of child care hours that are approximately two to one. The ratio of time

exceeds three to one in Estonia, Austria, France, Palestine, and most notably in South Africa, where the ratio of mother-to-father time in child care pushes ten to one.

Of course, there are dramatic differences in the demographics of parents across the countries we examine. Maternal labor force participation ranges from a low of 12 percent in Palestine to over 65 percent in Canada, Norway, Slovenia, United Kingdom, and United States. Countries also differ with regard to the age distribution of parents as well as number of children. To adjust for such differences across countries, time spent with children is regressed, separately for men and for women, on country indicator variables (with the United States as the excluded country), five year age category indicators, number of children indicators, whether the household includes a child under the age of five, marital status indicators for the parent, an indicator for employment, and a full set of interactions between marital status and employment status indicators. This adjustment makes the relationship between per capita GDP and time spent with children even more positive.

These coefficients on the country dummies are shown in Table 9. As before, we rank the countries in the table by GDP per capita. Because of insufficient demographic data in the surveys to make demographic adjustments, we exclude Austria and Estonia from Table 9. Specifically, across the countries, higher GDP per capita is related to more time spent on child care for both men and women.

Table 10 confirms the U.S. patterns of the educational gradient of time spent with children *within* each country in our sample. We restrict this analysis to women with children. As we did with the U.S. data, we report conditional differences in time spent in child care between educational groups. The method we used to compute the conditional

educational differences in time spent with children within all other countries was identical to the procedure we used to compute the conditional educational differences in the United States. Within the non-U.S. countries, however, we only segmented the population into two educational categories (high and low) as opposed to four. We chose the educational cutoff within each country such that the high educated group comprised roughly 30 percent of the women with children sample.

Table 10 shows the educational difference of high-educated women relative to low educated women, conditional on demographics, for both working women with children and non-working women with children. In every country, high-educated women spend more time on child care than low-educated women. The only exception is non-working women in Chile, where the difference is essentially zero. Furthermore, even though the sample sizes are small in many of these surveys, the differences are usually statistically significant at standard levels.

In short, higher-educated (and presumably higher-income) individuals spend more time in child care than their lower-educated (and presumably lower-income) counterparts in all countries that we analyzed. Furthermore, the absolute level of time spent in child care across countries is positively correlated with cross country differences in GDP per capita.[12] These results are consistent with the patterns found in the United States and are

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[12] Sayer, Gauthier, and Furstenberg (2004) examine the link between education and time spent with children among married parents in Canada, Germany, Italy, and Norway using MTUS data. They hypothesize that the educational differential in parental child care would be less pronounced in states with more generous welfare states. They do not support this prediction. Joesch and Spiess (2006) use data from the 1996 waive of the European Community Household Panel (ECHP) to compare the time mothers spend with children across nine European countries. ECHP is based on a retrospective survey that asks each sample household member age 16 years or older about their normal daily activities. Given differences in time measurement within retrospective surveys compared to time measurement via time diaries, it is hard to compare their results directly with those we present here.

consistent with the interpretation that child care is valued more by individuals with higher earnings potential.

Conclusion

We draw three major empirical conclusions about parental child care time: (1) higher earnings or earnings potential is associated with more time spent with children; (2) this relationship appears to hold within the United States, across other countries, and within other countries examined; and (3) this positive education/income gradient in time spent in child care is the opposite of the education/income gradient observed for typical leisure and home production activities. Collectively, our results show that time spent with one's children seems to be valued more by individuals with a higher opportunity cost of time. This result could arise if child care is more of a luxury good than other consumption commodities; if higher-educated parents have a lower elasticity of substitution between own and market-based child care or just a higher relative preference for time spent with their children; or if the returns to investing in the children of higher educated parents are higher than the returns to investing in the children of lower educated parents. The fact that we see the education gradient in child care as a primary activity but not in total time spent with children may suggest that highly-educated parents view child care as an investment in which it is important to devote their active attention. Future research should seek to differentiate between these hypotheses.

Regardless of why parents with higher levels of education and income spend more time on child care, the fact that they do so may have important implications for the intergenerational transmission of human capital. Whether it is because higher-educated

30

parents demand more cared-for children, or because higher-educated parents are more effective at enriching their children through face to face interaction, the fact that the children of higher-educated parents enjoy more time being cared for directly by their parents may have important effects on their development, both economic and otherwise.

Child care is productive, like home production. Child care is also enjoyable, like leisure. But we infer from the patterns in the data that parents view time spent with their children as fundamentally different from either home production or leisure. Further studies of what makes time spent caring for and investing in children unique could prove both informative and important.

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Table 1
Hours Per Week Spent in Child Care by Various Subgroups within the United States: 2003-2006

	All Child Care	"Basic" Child Care	"Educational" Child Care	"Recreational" Child Care	"Travel" Child Care
All Mothers (n = 13,434)	13.96	7.69	2.10	2.27	1.90
All Fathers (n = 9,259)	6.81	3.17	0.88	1.83	0.93
Working Mothers (n = 9,372)	11.64	6.40	1.72	1.66	1.86
Working Fathers (n = 8,553)	6.53	3.05	0.82	1.76	0.91
Non-Working Mothers (n = 4,062)	18.68	10.32	2.89	3.50	1.97
Non-Working Fathers (n = 706)	9.90	4.65	1.55	2.54	1.15
Married Working Mothers (n = 6,323)	12.00	6.64	1.74	1.78	1.84
Married Working Fathers (n = 7,559)	6.74	3.17	0.82	1.85	0.90
Married Non-Working Mothers (n = 3,065)	19.56	10.73	2.97	3.75	2.11
Married Non-Working Fathers (n = 529)	10.59	5.27	1.64	2.46	1.22
Unmarried Working Mothers (n = 3,049)	10.76	5.80	1.66	1.39	1.91
Unmarried Working Fathers (n = 994)	4.91	2.10	0.75	1.04	1.02
Unmarried Non-Working Mothers (n = 997)	15.72	8.87	2.72	2.58	1.56
Unmarried Non-Working Fathers (n = 177)	8.03	3.09	1.50	2.51	0.93
Mothers with Children under 5 (n = 5,220)	21.03	12.62	1.73	4.75	1.93
Fathers with Children under 5 (n = 3,900)	9.69	4.77	0.75	3.31	0.85

Notes: This table presents means of time spent in child care activities by different demographic subgroups in the 2003-2006 waves of the American Time Use Survey. All time use measures are expressed in units of "hours per week". Samples include all individuals between the ages of 21 and 55 (inclusive) who had time diaries summing to a complete day and at least one child under the age of 18. The final two rows refer to individuals with at least one child under the age of 5. See Appendix Table A2 and the text for time use category definitions and use of demographic weights to represent each day of the week equally within subgroups.

Table 2
Hours Per Week Spent in Total Child Care for Women in the United States by Educational Attainment

| | | | | | Hours Per Week Spent in Total Child Care | | | | |
| | | | | | I. All | II. Non Working | | III. Working | |
Years of Schooling	Fraction Married	Fraction Working	Total Market Work	Number of Children	Unconditional	Unconditional	Conditional (Relative To Ed < 12)	Unconditional	Conditional (Relative to Ed < 12)
< 12	0.63	0.42	14.6	2.2	12.1	14.9	-	8.3	-
12	0.69	0.65	22.3	1.9	12.6	17.6	2.9	9.8	3.1
13-15	0.69	0.74	25.3	1.9	13.3	18.9	3.9	11.4	4.2
16	0.87	0.72	23.7	1.9	16.5	22.6	6.4	14.2	6.1
16+	0.89	0.79	27.4	1.8	17.0	25.9	9.7	14.4	6.4

Notes: This table presents means of demographic characteristics, total time in market work, and total time spent caring for children by educational attainment in the 2003-2006 waves of the American Time Use Survey. All time use measures are expressed in units of "hours per week". Samples include all women between the ages of 21 and 55 (inclusive) that have at least one child of their own under the age of 18. Samples are restricted to respondents who had time diaries summing to a complete day (i.e, 1440 minutes). Conditional differences report the coefficients from a regression of total time spent in child care on education dummies (with less than 12 being omitted), a cubic in age, number of children dummies, a married dummy, and age of youngest child dummies. All means and regression coefficients are calculated using fixed demographic weights adjusted to equally represent each day of the week within subgroups. Total market work includes all time spent at work, in work related activities, traveling to work, and looking for work.

Table 3

Ratios of Residual Time Spent in Child Care Categories by Education for U.S. Mothers Relative to High School Dropouts

Years of Schooling	I. Non Working Mothers (n = 4,062)					II. Working Mothers (n = 9,372)				
	Total Child Care	Basic Child Care	Educational Child Care	Recreational Child Care	Travel Child Care	Total Child Care	Basic Child Care	Educational Child Care	Recreational Child Care	Travel Child Care
< 12	-	-	-	-	-	-	-	-	-	-
12	1.17	1.13	1.37	1.30	0.97	1.37	1.45	1.04	1.78	1.22
13-15	1.23	1.20	1.54	1.24	1.04	1.51	1.57	1.20	1.88	1.43
16	1.34	1.24	1.54	1.71	1.10	1.70	1.73	1.41	2.17	1.62
16+	1.55	1.50	1.72	1.90	1.14	1.72	1.75	1.36	2.45	1.54

Notes: This table presents conditional ratios of each type of child care time use by educational attainment in the 2003-2006 waves of the American Time Use Survey for working and non-working women. Samples includes all women between the ages of 21 and 55 (inclusive) with at least one child of their own under the age of 18. Samples are restricted to respondents who had time diaries summing to a complete day (i.e, 1440 minutes). See Table A2 and the text for time use category definitions. To compute the conditional ratio, we first estimate a regression of time spent in childcare on a cubic in age, number of children dummies, a married dummy, and age of youngest child dummies. For each observation we take the residual from that regression and add it to the sample mean, and then average by education level. All regression coefficients are estimated using fixed demographic weights adjusted to equally represent each day of the week within subgroups as described in the Appendix.

Table 4
Ratios of Residual Time Spent in Child Care Categories By Education for U.S. Fathers Relative to High School Dropouts

Years of Schooling	I. Non Working Fathers (n = 706)					II. Working Fathers (n = 8,553)				
	Total Child Care	Basic Child Care	Educational Child Care	Recreational Child Care	Travel Child Care	Total Child Care	Basic Child Care	Educational Child Care	Recreational Child Care	Travel Child Care
< 12	-	-	-	-	-	-	-	-	-	-
12	0.76	0.86	0.85	0.62	0.60	1.62	1.65	1.48	1.76	1.41
13-15	0.98	1.01	0.95	0.89	1.09	1.84	1.92	1.93	1.85	1.55
16	1.31	1.09	1.26	1.63	1.45	2.05	2.09	1.93	2.18	1.80
16+	0.86	0.81	1.29	0.51	1.34	2.16	2.12	2.53	2.20	1.93

Notes: This table presents conditional ratios of each type of child care time use by educational attainment in the 2003-2006 waves of the American Time Use Survey for working and non-working men. Samples includes all men between the ages of 21 and 55 (inclusive) with at least one child of their own under the age of 18. Samples are restricted to respondents who had time diaries summing to a complete day (i.e, 1440 minutes). See Table A2 and the text for time use category definitions. To compute the conditional ratio, we first estimate a regression of time spent in childcare on a cubic in age, number of own children dummies, a married dummy, and age of youngest own child dummies. For each observation we take the residual from that regression and add it to the sample mean, and then average by education level. All regression coefficients are estimated using fixed demographic weights adjusted to equally represent each day of the week within subgroups as described in the Appendix.

Table 5
Ratios of Residual of Total Time Spent By Parents in the Presence of Their Children (Using "With Whom" Identifiers)
for Working and Non-Working U.S. Mothers and Fathers By Education Relative to High School Dropouts

Years of Schooling	Non Working Women	Working Women	Non Working Men	Working Men
< 12	-	-	-	-
12	1.00	0.99	0.92	1.01
13-15	0.99	0.96	1.07	1.06
16	0.99	0.99	1.02	1.03
16+	1.00	0.99	0.91	1.04

Notes: This table presents conditional ratios of time spent by parents in the presence of their children using data from the 2003-2006 waves of the American Time Use Survey separately for non-working women, working women, non-working men, and working men. Samples are identical to the corresponding samples discussed in Tables 2-4. To compute the conditional ratio, we first estimate a regression of total time spent in the presence of children on a cubic in age, number of own children dummies, a married dummy, and age of youngest own child dummies. For each observation we take the residual from that regression and add it to the sample mean, and then average by education level. All regression coefficients are estimated using fixed demographic weights adjusted to equally represent each day of the week within subgroups as described in the Appendix.

Table 6
Conditional Differences in Hours Per Week Spent in Different Time Use Categories
By Education: Relative to High School Drop Outs

Years of Schooling	I. Non Working			II. Working			
	Total Child Care	Total Non-Market Work	Leisure	Total Child Care	Total Market Work	Total Non-Market Work	Leisure
Panel A: Women (Relative to High School Drop Outs)							
12	2.85	-1.35	-3.71	3.09	-0.51	-2.19	-0.71
	(0.88)	(1.15)	(1.39)	(0.62)	(1.83)	(1.01)	(1.44)
13-15	3.88	-1.65	-7.30	4.24	0.35	-2.45	-3.49
	(0.87)	(1.16)	(1.42)	(0.61)	(1.81)	(1.00)	(1.41)
16	6.33	-3.08	-8.05	6.07	-0.27	-2.94	-4.39
	(1.08)	(1.28)	(1.54)	(0.64)	(1.89)	(1.06)	(1.45)
16+	9.70	-6.08	-7.29	6.36	1.67	-4.41	-4.75
	(1.64)	(1.63)	(1.88)	(0.73)	(2.04)	(1.13)	(1.53)
Panel B: Men (Relative to High School Drop Outs)							
12	-2.57	-1.88	6.33	2.38	0.70	-0.53	-3.61
	(1.67)	(3.03)	(3.57)	(0.42)	(1.64)	(0.79)	(1.40)
13-15	-0.13	2.37	-8.94	3.32	-0.16	1.09	-6.41
	(1.77)	(2.98)	(3.83)	(0.46)	(1.66)	(0.81)	(1.38)
16	3.89	5.48	-10.38	4.27	0.81	0.36	-7.82
	(4.48)	(3.96)	(4.75)	(0.43)	(1.68)	(0.83)	(1.37)
16+	-1.24	5.48	-10.37	4.76	2.16	-1.11	-7.96
	(2.57)	(3.96)	(5.64)	(0.47)	(1.81)	(0.85)	(1.49)

Notes: This table presents conditional differences in time spent in total child care, market work, non-market work and leisure by educational attainment in the 2003-2006 waves of the American Time Use Survey for working and non-working women and men. The conditional differences in time use are expressed in units of "hours per week". Samples include all men and women between the ages of 21 and 55 (inclusive) that have at least one child under the age of 18. See text for additional sample restrictions and time use definitions. Conditional differences report the coefficients from regressions of time spent in each time use category on education dummies (with less than 12 being omitted), a cubic in age, number of children dummies, a married dummy, and age of youngest child dummies. Robust standard errors are in parentheses.

Table 7
Time Spent in Child Care, Total Market Work and Leisure by Own Earning Quintiles in the U.S.

Adjusted Own Earning Quintiles	I. Employed Married Mothers (n = 3,785)				II. Employed Married Fathers (n = 4,829)			
	Total Child Care	Total Market Work	Total Non-Market Work	Leisure	Total Child Care	Total Market Work	Total Non-Market Work	Leisure
2	1.07	1.91	0.42	-3.59	0.92	2.53	0.35	-3.18
	(0.64)	(1.90)	(1.12)	(1.46)	(0.56)	(1.97)	(0.99)	(1.62)
3	1.63	4.36	-2.70	-3.21	0.44	1.86	0.18	-2.52
	(0.62)	(1.88)	(1.02)	(1.47)	(0.54)	(2.12)	(0.98)	(1.86)
4	1.66	2.14	-0.22	-4.09	1.19	3.63	0.44	-4.96
	(0.63)	(1.99)	(1.11)	(1.56)	(0.53)	(1.96)	(0.96)	(1.63)
5	3.58	5.00	-2.04	-6.47	1.64	6.14	-1.58	-5.48
	(0.66)	(1.89)	(1.03)	(1.38)	(0.51)	(1.78)	(0.87)	(1.48)

Notes: This table presents conditional differences in time spent in total child care, market work, non-market work and leisure by adjusted earnings quintiles in the 2003-2006 waves of the American Time Use Survey. Samples include women and men, respectively, between the ages of 21 and 55 (inclusive) that have at least one child under the age of 18 of their own present or not present in the household, work full time, and are married with a working spouse. Samples are restricted to respondents who had time diaries summing to a complete day (i.e, 1440 minutes). See Table A2 and the text for time use category definitions. Adjusted earnings quintiles are calculated by segmenting the predicted residuals from a regression of weekly earnings on a cubic in age. Conditional differences report the coefficients from regressions of time spent in each time use category on the quintile dummies (with the first quintile being excluded), a cubic in age, number of own children dummies, and age of youngest own child dummies. For women, the computed quintiles are based on the distribution of weekly earnings amongst women in the sample described above. For men, the computed quintiles are based on the distribution of weekly earnings amongst men in the sample described above. All regression coefficients are estimated using fixed demographic weights adjusted to equally represent each day of the week within subgroups as described in the Appendix. Robust standard errors are in parentheses.

Table 8

Hours Per Week Spent in Child Care across Countries: Ranked by GDP Per Capita

Country	GDP Per Capita	All With Children	Men With Children	Women With Children
Norway	37,200	8.88	5.68	11.70
United States	34,300	8.93	5.62	11.64
United Kingdom	24,500	7.23	4.17	9.83
Netherlands	24,200	6.83	4.36	8.91
Austria	23,900	8.33	3.57	12.27
Canada	23,600	8.56	5.61	11.20
France	21,800	4.43	1.82	6.83
Germany	23,100	7.25	3.87	10.49
Italy	19,000	7.32	4.03	10.37
Slovenia	9,700	5.03	2.75	7.21
Chile	4,900	5.65	2.69	7.90
Estonia	4,100	6.64	2.97	9.37
South Africa	2,900	4.03	0.60	5.88
Palestine	1,200	6.38	2.09	12.35

Notes: This table presents average hours per week spent in total child care for all adults with children, men with children, and women with children by country. Within each country, the samples include all individuals between the ages of 21 and 55 (inclusive) with at least one child under the age of 18 present in the household who had time diaries summing to a complete day (i.e, 1440 minutes). See the data appendix for a description of each country's time use data and the corresponding definitions of time spent with children within each country. All means are calculated using fixed demographic weights adjusted to equally represent each day of the week within subgroups. The GDP per capita numbers are all expressed in 2000 US dollars.

Table 9
Conditional Hours Per Week Difference in Time Spent in Child Care Relative to the US: Ranked by GDP Per Capita

Country	Men With Children (n = 33,742)	Women With Children (n = 43,782)
Norway	-0.56 (0.09)	-1.03 (0.12)
UK	-1.40 (0.02)	-1.35 (0.04)
Netherlands	-1.45 (0.07)	-2.59 (0.10)
Canada	0.16 (0.05)	0.32 (0.06)
France	-3.60 (0.06)	-4.34 (0.13)
Germany	-1.83 (0.03)	-2.14 (0.11)
Italy	-1.33 (0.06)	-1.35 (0.13)
Slovenia	-2.63 (0.06)	-4.11 (0.16)
Chile	-3.09 (0.07)	-5.67 (0.21)
SoAfrica	-5.88 (0.15)	-8.44 (0.27)
Palestine	-5.16 (0.28)	-5.47 (0.43)

Notes: This table presents conditional differences in time spent in total child care relative to the US for all adults with children, men with children, and women with children. Conditional differences are estimated by regressing total time spent in child care on country dummies (with the US being omitted), five year age category dummies, number of children dummies, youngest child under 5 dummy, married dummy, working dummy, female dummy, and a full set of interactions of the married, working, and female dummies. See Table A1 for information about each country's time use data set. Sample includes all individuals between the ages of 21 and 55 (inclusive) with at least one child under the age of 18 present in the household who had time diaries summing to a complete day (i.e, 1440 minutes). See Appendix for discussion of how we classified total child care time across countries. Austria and Estonia are dropped from the analysis because specific control variables are not available (e.g. age of child). Coefficients are estimated using fixed demographic weights adjusted to equally represent each day of the week and each country within subgroups as described in the Appendix. Standard errors, presented in parentheses, are clustered at the country level to account for correlation in unobservables within countries.

Table 10
Conditional Differences in Hours Per Week Spent in Total Child Care for Women by Educational Attainment

Country	Working Women with Kids		Non-Working Women with Kids	
	Fraction High Educated	Difference in Time Spent on Child Care By High Educated	Fraction High Educated	Difference in Time Spent on Child Care By High Educated
Canada	0.36	1.21 (0.47)	0.29	2.91 (1.35)
Chile	0.47	2.18 (1.54)	0.23	-0.11 (1.21)
France	0.37	0.47 (0.35)	0.24	1.47 (0.70)
Germany	0.35	0.04 (0.34)	0.25	0.81 (0.84)
Italy	0.59	2.06 (0.44)	0.33	1.86 (0.62)
Netherlands	0.39	2.01 (1.31)	0.24	0.25 (1.33)
Norway	0.28	1.15 (0.64)	0.15	6.31 (2.06)
Palestine	0.63	1.56 (0.95)	0.27	2.89 (0.86)
Slovenia	0.31	1.52 (0.75)	0.14	2.31 (2.47)
South Africa	0.33	0.58 (0.66)	0.21	0.99 (1.12)
UK	0.35	1.87 (0.56)	0.22	4.17 (1.77)
US	0.31	3.39 (0.33)	0.22	5.43 (0.77)

Notes: This Table reports estimated hours per week differences in time spent in child care between women with high and low levels of education within each country, where "high" is defined as being in roughly the top third of educational attainment among women in one's country. Sample includes all individuals between the ages of 21 and 55 (inclusive) with at least one child under the age of 18 present in the household who had time diaries summing to a complete day (i.e, 1440 minutes). Austria and Estonia are dropped from the analysis because specific control variables are not available (e.g. age of child). Educational differences from a regression of time spent with children on a high education dummy and demographic controls. All regressions are estimated using fixed demographic weights to ensure equal representation across each day of the week within subgroups. Robust standard errors are in parentheses.

We use the 2003-2006 American Time Use Surveys for our U.S. analysis. See table A1 for information about the time use surveys used in the international analysis. This table includes surveys accessed through the Multinational Time Use Survey (MTUS), a harmonized data set with consistent time use categories and demographic variables constructed from many time use surveys. The America Time Use Survey uses a 24-hour recall of the previous day's activities to record time diary information. This survey collects diaries for one individual per household. Below, we briefly summarize the other salient features of these surveys.

The 2003-2006 American Time Use Surveys (ATUS) was conducted by the U.S. Bureau of Labor Statistics (BLS). Participants in ATUS, which includes children over the age of 15, are drawn from the existing sample of the Current Population Survey (CPS). The individual is sampled approximately 3 months after completion of the final CPS survey. At the time of the ATUS survey, the BLS updated the respondent's employment and demographic information. Roughly 1,700 individuals completed the survey each month, yielding an annual sample of over 20,000 individuals in 2003. The size of the sample was decreased to about 13,000 individuals annually for the 2004-2006 surveys.

We restrict our sample to include only those household members between the ages of 21 and 55 with a child present in the household and who had a complete 24-hour time diary. The NBER working paper version of Aguiar and Hurst (2007) documents that the demographic composition of the ATUS are similar to that of the Panel Study of Income Dynamics (PSID), once similar sample restrictions are made. The restriction that all individuals had to have a complete time diary was innocuous for the ATUS data, but is relevant in surveys from the other countries that we examine. In total, our United States sample included 23,694 individuals. In Table A1, the sample sizes, given our sample restrictions, are shown for each time use survey. In surveys in which individuals completed more than a one day survey, we counted each 24 hour diary as a separate observation. The one exception to this rule is in the Netherlands Time Use Survey in which each respondent completes a full week survey. These week long surveys were each counted as one observation. The total pooled sample across all countries includes 88,033 diary observations.

One challenge in comparing the time use data sets with each other is the fact that the surveys report time use at differing levels of aggregation. Table A1 shows the number of different time use sub-categories that are reported in the raw data of each of the surveys. To create consistent measures of time-use across the surveys, we began by working with the raw ATUS data at the level of sub-categories as in Aguiar and Hurst (2007). In order to render our analysis tractable we aggregated an individual's time allocation into 21 categories described in Table A2. Travel time associated with each activity is embedded in the total time spent on the activity, except for child care in which we consider travel for the purpose of child care as a separate classification. For the purposes of classifying child care time use in the other countries that we analyze, we attempt to include similar activities to those defined in the ATUS. As noted in the text we only consider total child care time in the international analysis, because some surveys do not allow classification of child care time into finer categories. Unfortunately, not all surveys allow for child care related travel time to be disaggregated from other travel time. The MTUS has already created a child care time use category and a travel time use category. Because we only have access to these aggregated time use variables, we cannot include travel time related to child care in our measure of child care time use for those surveys accessed through MTUS (Austria, France, Germany, Norway, Slovenia, and South Africa). Furthermore, the time use categories supplied by the surveys of Chile and Palestine do not allow travel time for the purpose of child care to be separated from other travel time. In the other surveys (Canada, Italy, US, and UK) we can

identify travel related to child care as a separate time use classification. Because we cannot always disentangle travel for the purpose of child care from other travel time, but we can separate travel from other child care activities in Canada, Italy, the US, and the UK, in the international analysis we will exclude travel time from our total child care measure.

Likewise, we cannot separately identify time spent caring for non-household children in all countries. The U.S. data, however, does allow us to distinguish between time spent with household children and time spent with non-household children. In our US sample of adults with children, time spent with non-household children accounts for only 0.34 hours per week, which makes up about roughly only 3% of total child care documented in Table 1. Excluding time spent with non-household children from our analysis does not change the income or education gradients highlighted in this paper in any way. We chose to include the time spent with non-household children in our base U.S. analysis for comparability with the international data.

We also attempted to create harmonized demographic variables between the surveys that we utilized. These demographics include 5 year age categories, sex, and marital status of survey respondents, the presence of children under 18 years of age in the household, the presence of children under 5 years of age in the household, the number of children under 18 years of age in the household, and employment status of the individual. Table A3 describes the demographic variables utilized in our analysis. This table also describes any difficulties in defining consistent demographic variables between surveys by summarizing any exceptions in variable definition. For our working variable, this table describes how we classified an individual as working. In our international analysis, we will limit number of children dummies to indicators for zero children, one child, or two or more children, because in the 1998 Canada survey we can only identify up to two children.

In analysis comparing the education gradient in child care time use between countries we define a dichotomous variable indicating highly educated individuals. Education variables are defined very differently in each survey and the number of categories varies from as few as 5 to as many as 31 as seen in Table A4. To define our harmonized education variable we attempted to categorize the 30% highest educated individuals in our women with children sample in each country as highly educated. We chose 30% because this matches the fraction of women with children in the US data that have 16 years of education or more – the highest category in our US education gradient analysis. Table A4 lists which education categories fall into the high and low educated groups for each country. Table 10 shows the fraction of women with children that are classified has highly educated for each country. As this table shows we were able to get close to 30% in most countries, except for Italy in which the coarseness of the categories only allowed us to separate the top 47% of women with children. Table 10 also shows the fraction of the working and non-working women with children samples that are classified as highly educated using the education assignments from the full women with children sample.

The raw time-use data in most of the surveys are reported in units of "minutes per day" (totaling 1,440 minutes a day). We converted the minute-per-day reports to hours per week by multiplying the response by seven and dividing by 60. For the Netherlands, in which each observation covers a full week, we simply divide by 60 to find hours per week. When presenting the means and regression results we weighted the data using the sampling weights within each of the time-use surveys. The weights account for differential response rates to ensure the samples are nationally representative. We make two adjustments to the weights provided by the various data sets. First, we adjusted weights so that each day of the week is equally represented within each demographic subcategory analyzed. Second, we adjust weights so each year of data has an equal sample size within countries with multiple years of data (Canada and the US), and so each country has an

equal sample size in the analysis that pools countries together. Like the first, this adjustment is made within each subcategory that we analyze.

APPENDIX TABLE A1
Description of Time Use Surveys

Country	Survey (Source)	Sample Coverage	Survey Methodology	Survey Coverage	Total Sample Size**	Analysis Sample Size**	Number of Time Use Categories
Austria	Zeitverwendung 1992 (Beitrage zur Osterreichischen Statistik (STAT))	Nationally Representative. One individual from each household over the age of 10 completes the survey.	Each individual completes one diary. Individuals complete diary throughout their day.	Mar. and Sep. 1992	25,162	5,174	197
Canada	General Social Survey Cycles 12 and 19: Time Use (Statistics Canada)	Nationally Representative. Participants chosen through Random Digit Dialing. One individual from each household over the age of 15 completes the survey.	Each individual completes one diary.	Feb. 1998 – Jan 1999	10,749	3,105	178
			24-hour recall of previous day's activities. Activities recorded in respondents own words and then translated into categories.	Jan. 2005 – Dec. 2005	19,597	4,804	182
Chile	Use of Time in Chile (Department of Social Studies, Department of Sociology of the Universidad Catolica of Chile)	Representative of population over 15 years old in Santiago.	Each individual completes two one-day diaries – one weekday (Tuesday, Wednesday, or Thursday) and one weekend day. Respondents complete diary using a predetermined activity codes.	Mar. 1999 – May 1999	4,358	1,742	48
Estonia	Time Use Survey (State Statistical Office of Estonia, Tallinn)	Household members ages 10 and above complete survey.	Each individual completes two one-day diaries. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	Mar. 1999 – Apr. 2000	11,456	3,803	167

Country	Survey (Source)	Sample Coverage	Survey Methodology	Survey Coverage	Total Sample Size**	Analysis Sample Size**	Number of Time Use Categories
Italy	National Time Use Survey (Istituto Nazionale di Statistica)	Nationally representative. All household members complete survey. Parents fill out the survey for those too young to fill it out themselves.	Each individual completes one diary. Individuals complete diary throughout the day. Activities recorded in respondents own words and then translated into categories.	Apr. 2002 – Mar. 2003	51,206	12,345	265
France	Time Use Survey (INSEE)	All individuals within household age 15 and over completed the survey.	Each individual completes one diary. Individuals complete diary throughout their day.	Feb. 1998 – Feb. 1999	15,318	4,600	139
Germany	The 1991/92 Time Budget Survey of the Federal Republic of Germany (Federal Ministry of Family Affairs and Senior Citizens Federal Statistical Office)	All individuals within household ages 12 and above complete survey.	Each individual completes two dairies on successive days. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	Oct., Nov. 1991 and Feb., Mar., Apr., Jun., Jul., 1992	25,775	10,213	231
Netherlands	Time Use Survey (SCP, Cebuco, Publieke Omroep, Universiteit van Tilburg, and Adviesdienst Verkeer en Vervoer)	Nationally Representative. Participants are drawn randomly from the PTT Post address database. One individual from each household over the age of 12 completes the survey.	Each individual completes a 7 day diary. Individuals complete diary throughout their day. Respondents complete diary using a predetermined activity codes.	Oct. 2000	1,813	515	270

Country	Survey (Source)	Sample Coverage	Survey Methodology	Survey Coverage	Total Sample Size**	Analysis Sample Size**	Number of Time Use Categories
Norway	Tidsnyttingsundersokelsen (Central Bureau of Statistics)	One individual from each household over the age of 16 completes the survey.	Each individual completes two dairies on successive days. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	Feb. 1990 – Jan. 1991	6,129	2,152	123
Palestine	Time Use Survey (Palestine Central Bureau of Statistics)	Representative of individuals 10 years old an over who are usually resident in the Palestinian Territory. Participants are drawn from the 1997 Population, Housing and Establishments Census. Two randomly selected individuals (one male and one female) from each household over the age of 10 complete the survey.	Each individual completes one diary. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	May 1999 – May 2000	6,863	2,806	94
Slovenia	Time Use Survey (Statistical Office of the Republic of Slovenia)	All individuals within household ages 10 and above complete survey.	Each individual completes two one-day diaries – one weekday and one weekend day. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	Apr. 2000 – Mar. 2001	12,273	3,395	174

Country	Survey (Source)	Sample Coverage	Survey Methodology	Survey Coverage	Total Sample Size**	Analysis Sample Size**	Number of Time Use Categories
South Africa	Time Use in South Africa (Statistics South Africa)	Nationally Representative. Participants drawn by sampling addresses. Two randomly selected individuals from each household over the age of 10 complete the survey.	Each individual completes one diary. 24-hour recall of the previous day's activities.	Feb., Jun., and Oct. 2000	14,217	3,767	108
United Kingdom	United Kingdom Time Use Survey (Ipsos-RSL and Office for National Statistics)	Nationally Representative. Participants are drawn randomly from the Postcode Address File. All individuals within household ages 8 and above complete survey.	Each individual completes two one-day diaries – one weekday and one weekend day. Individuals complete diary throughout their day. Activities recorded in respondents own words and then translated into categories.	Jun. 2000 – Sep. 2001	20,981	4,881	250
United States	American Time Use Survey (U.S. Bureau of Labor Statistics)	Nationally Representative. Participants are drawn from the existing sample of the Current Population Survey (CPS). One individual from each household over the age of 15 completes the survey. Survey is conducted approximately three months after the individual's last CPS survey.	Each individual completes one diary. 24-hour recall of previous day's activities. Activities recorded in respondents own words and then translated into categories.	Jan. 2003 – Dec. 2003	20,720	7,924	~400 (Some minor changes from year to year)
				Jan. 2004 – Dec. 2004	13,973	5,156	
				Jan. 2005 – Dec. 2005	13,038	5,328	
				Jan. 2006 – Dec. 2006	12,943	5,286	

Notes: Analysis sample refers to the number of observations from each survey that we use in our main empirical analysis. We restrict the sample to include only individuals between the ages of 21 and 55 (inclusive) with at least one child under the age of 18 present in the household. We also restrict the sample to include only those individuals who had time diaries that summed to a complete day (i.e., 1440 minutes). All surveys include sample weights. All weights are adjusted to ensure each day of the week and each survey are uniformly represented.

**Sample sizes refer to the number of diaries. If each respondent for a given survey completed more than one 24 hour diary, each diary is considered as a separate observation, except in the case of the Netherlands where each individual's full week diary is counted as one observation.

Time Use Classification	Examples of Activities Included
Core Market Work	Work for pay, main job (including time spent working at home); Work for pay, other jobs
Total Market Work	Core Market Work plus other work related activities such as: Commuting to/from work; Meals/breaks at work; Searching for a job; Applying for unemployment benefits
Core Non-Market Work	Food preparation; Food presentation; Kitchen/food cleanup; Washing/drying clothes; Ironing; Dusting; Vacuuming; Indoor cleaning; Indoor painting; etc.
Shopping/Obtaining Goods and Services	Grocery shopping; Shopping for other goods; Comparison shopping; Clipping coupons; Going to bank; Going to post office; Meeting with lawyer; Going to veterinarian; etc. (excluding any time spent acquiring medical care)
Total Non-Market Work	Core Non-Market Work plus Shopping/Obtaining Goods and Services" plus all other home production including: Vehicle repair; Outdoor repair; Outdoor painting; Yard work; Pet care; Gardening; etc.
Education	Taking classes for degree; Personal interest courses; Homework for coursework; Research for coursework; etc.
Sleeping	Sleeping; Naps
Personal Care	Grooming; Bathing; Sex; Going to the bathroom; etc. (excluding any time spent on own medical care)
Own Medical Care	Visiting doctor's/dentist's office (including time waiting); Dressing wounds; Taking insulin; etc.
Eating	Eating meals at home; Eating meals away from home; etc.
Primary Child Care	Breast feeding; Rocking a child to sleep; General feeding; Changing diapers; Providing medical care to child; Grooming child; etc.
Educational Child Care	Reading to children; Teaching children; Helping children with homework; Attending meetings at a child's school; etc.
Recreational Child Care	Playing games with children; Playing outdoors with children; Attending a child's sporting event or dance recital; Going to the zoo with children, Taking walks with children; etc.
Sports/Exercise	Playing sports; Attending sporting events; Exercise
TV	Watching television
Entertainment (not TV)	Going to movies and theater; Listening to music; Computer use for leisure
Socializing	Attending/hosting social events; Playing games; Telephone calls
Reading	Reading books, magazines; Personal mail; Personal email
Gardening/Pet care	Caring for lawn, garden, houseplants, and pets
Hobbies	Arts and Crafts; Collecting; Playing musical instrument
Religious/Civic Activities	Religious practice/participation; Fraternal organizations; Volunteer work; Union meetings; AA meetings; etc.

APPENDIX TABLE A3
Demographic Variables: Definitions and Exceptions

Country	Age: 5 year categories: <=20, 21-25, 26-30,…, 56-60, >=61	Male: Equal to 1 if respondent is male.	Married: Equal to 1 if respondent is married.	Hv_child: Equal to 1 if there is a child <18 years old present in the household.	Child_5: Equal to 1 if there is a child <5 years old present in the household.	Num_child: Set of dummies for number of children <18 years old present in the household.	Working: Equal to 1 if respondent is working.
Austria*			No code indicating common law/cohab. – Married may or may not include these individuals		Cannot identify if there are children under 5 in household.	Variable in original data set only included children <15 and did not include all *respondents* <15. MTUS recodes variable to include all respondents <18 with relationship of child to HH head. This may inflate num_child=1, as one cannot know if this is only child in household.	Employment status as full time, part time, or unknown job hours.
Canada	2005 – Categories off by 1 year (20-24, etc.)			Equal to 1 if the *respondent* has a child <18 years old.	Equal to 1 if the *respondent* has a child <5 years old.	Number of *respondent's* children. Also, in 2005 survey, can include children over 18 if youngest child <18.	Main activity last week was working OR paid vacation OR had a job/self employed at any time last week.
Chile							Main activity is paid work.
Estonia	Categories off by 1 year (20-24, etc.)				Cannot identify if there are children under 5 in household.	Cannot identify number of children, because we cannot see how many children <10 years old reside in the household (only know *if* there are any children <10).	Worked, produced agricultural products, or temporarily absent from work in past week.
Italy							Only or prevailing professional condition as employed.
France*			Equal to 1 if individual is married or cohabitating.				Employment status as full time, part time, or unknown job hours.

Country	Age: 5 year categories: <=20, 21-25, 26-30,…, 56-60, >=61	Male: Equal to 1 if respondent is male.	Married: Equal to 1 if respondent is married.	Hv_child: Equal to 1 if there is a child <18 years old present in the household.	Child_5: Equal to 1 if there is a child <5 years old present in the household.	Num_child: Set of dummies for number of children <18 years old present in the household.	Working: Equal to 1 if respondent is working.
Germany*	Original survey had 5 year age groups of the form 20-24 etc. MTUS converted to a continuous. age variable based on midpoints of intervals. Therefore, translation to our 5 year age groups will not be exact for all respondents.		Equal to 1 if individual is married or cohabitating.		Equal to 1 if there is a child <6 years old present in the household.	There is not age definition for children in original data set. Also, variable in original dataset only includes children of the *respondent*. MTUS recodes variable to include all respondents <18 with status in household as child, child in law, or grandchild. This may inflate num_child=1, as one cannot know if this is only child in household.	Employment status as full time, part time, or unknown job hours.
Netherlands			Equal to 1 if respondent is living with a "Permanent Partner."				"yes, currently employed"
Norway*	MTUS computes age by subtracting the year of birth of the respondent from the survey year ("90"). This is somewhat inaccurate given that the survey was conducted in both 1990 and 1991.		Equal to 1 if individual is married or cohabitating.		Equal to 1 if there is a child <7 years old present in the household.	Variable in original dataset does not include respondents who are <18. MTUS recodes variable to include all respondents <18 living with one or two parents. This may inflate num_child=1, as one cannot know if this is only child in household.	Employment status as full time, part time, or unknown job hours.
Palestine							"Worker from 1-14 hours" or "Worker 15 hours or more"
Slovenia*			Equal to 1 if individual is married or cohabitating.				Employment status as full time, part time, or unknown job hours.

Country	Age: 5 year categories: <=20, 21-25, 26-30,…, 56-60, >=61	Male: Equal to 1 if respondent is male.	Married: Equal to 1 if respondent is married.	Hv_child: Equal to 1 if there is a child <18 years old present in the household.	Child_5: Equal to 1 if there is a child <5 years old present in the household.	Num_child: Set of dummies for number of children <18 years old present in the household.	Working: Equal to 1 if respondent is working.
South Africa*			Equal to 1 if individual is married or cohabitating.		Equal to 1 if there is a child <7 years old present in the household.	Variable in original data set had many missing cases. Those respondents aged 18+ had missing cases coded as 0 by MTUS. Those respondents <18 had missing values coded as 1 by MTUS, which may inflate num_child=1, as one cannot know if this is only child in household.	Employment status as full time, part time, or unknown job hours.
United Kingdom							Economically active - in employment.
United States							Employed – at work Employed – absent

Entries in this table represent exceptions to the demographic variable definitions described in the first row. The "working" column summarizes how an individual is classified as working in each survey.

*Data for these countries were accessed through the Multinational Time Use Survey (MTUS). MTUS has harmonized many time use surveys into a data set with consistent time use categories and demographic variables. For these countries, this table describes how

APPENDIX TABLE A4
Education Classification by Country

Education Group	Canada	Chile	France	Germany	Italy
Low	10 Elementary school/no schooling 9 Some secondary/high school 8 High School Diploma	1 Uneducated 2 Basic incomplete 3 Basic complete 4 Half incomplete scientific humanist 5 Half full scientific humanist	0 Without a diploma or not declared 1 CEP, DFEO 2 BEPC 3 CAP, BEP 4 Bac technique	101 'lower 2ndary leaving cert, no vocational training' 102 'lower 2ndary leaving cert & apprenticeship' 103 'lower 2ndary leaving cert & traineeship' 104 'lower 2ndary leaving cert & higher vocational diploma' 105 'lower 2ndary leaving cert & Fachschule, DDR profess diploma' 201 'intermediate 2ndary leaving cert & no vocational' 202 'intermediate 2ndary leaving cert & apprenticeship' 203 'intermediate 2ndary leaving cert & traineeship' 204 'intermediate 2ndary leaving cert & higher voc diploma' 205 'intermediate 2ndary leaving cert & Fachschule, DDRprofess dip' 301 'AllgemeinbildendePolytechnischeOberschule,DDR,no voc' 302 'AllgemeinbildendePolytechnischeOberschule, DDR,apprent' 303 'AllgemeinbildendePolytechnischeOberschule, DDR,trnshp' 304 'AllgemeinbildendePolytechnischeOberschule, DDR,hgr voc'	9 No title (no read and/or write) 8 No title (read and write) 7 Elementary school 6 License middle school 5 High School Diploma (2-3 years)
High	7 Some trade/technical 6 Some community college/CEGEP/nursing 5 Some university 4 Diploma/certificate from trade/technical 3 Diploma/certificate from community college 2 Bachelor's degree 1 Doctorate/masters/ some graduate	6 Half incomplete technique 7 Half complete technique 8 Technique incomplete higher 9 Technique higher complete 10 Higher Education incomplete	5 Bac general 6 Bac + 2 7 Superior a Bac + 2	305 'AllgemeinbildendePolytechnischeOberschule, DDR,F DDR' 401 'tech college entry-level leaving cert, no voc' 402 'tech college entry-level leaving cert & apprentship' 403 'tech college entry-level leaving cert & traineeship' 404 'tech college entry-level leaving cert & higher voc diploma' 405 'tech college entry-level leaving cert & F, DDR professdip' 406 'tech college entry-level leaving cert & tech college degree' 501 'university entry-level leaving cert, no vocational' 502 'university entry-level leaving cert & apprenticeship' 503 'university entry-level leaving cert & traineeship' 504 'university entry-level leaving cert & higher voc diplma' 505 'university entry-level leaving cert & F, DDR profess dip' 506 'university entry-level leaving cert & tec college degree' 507 'university entry-level leaving cert & university degree' 601 'still without school leaving cert, no voc' 602 'still without school leaving cert & apprenticeship' 604 'still without school leaving cert & higher voc diploma'	4 High School Diploma (4-5 years) 3 University degree 2 Degree 1 Doctoral degree or postgraduate specialization

Education Group	Netherlands	Palestine	South Africa	Slovenia	UK	US
Low	1 LA 2 LB 3 MA	1 Illiterate 2 Can read and write 3 Elementary 4 Preparatory	0 None 1 Grade 1/Sub A 2 Grade 2/Sub B 3 Grade 3/Standard 1 4 Grade 4/Standard 2 5 Grade 5/Standard 3 6 Grade 6/Standard 4 7 Grade 7/Standard 5 8 Grade 8/Standard 6/Form 1 9 Grade 9/Standard 7/Form 2 10 Grade 10/Standard 8/Form 3 11 Grade 11/Standard 9/Form 4	1 No education or incomplete basic education (1-3 grades of primary school) 2 Incomplete basic education (4-7 grades of primary school) 3 Basic education (finished primary school) 4 Short-term vocational, vocational education 5 Technical secondary education	14 Under 16yrs - ineligible for questions 13 Eligible - No answer 12 No qualifications 11 Qualifications - Other - but DK grade/level 10 Qualifications - City & Guilds - DK level 9 Qualifications - GCSE - but DK grade 8 Qualifications - but DK which 7 Other qualification (incl professional, vocational, foreign) 6 Qualification below GCSE/O level (eg trade apprenticeships 5 GCSE below grade C, CSE, vocational level 1 & equivalent 4 O levels, GCSE grade A-C, vocational level 2 & equivalent 3 A levels, vocational level 3 & equivalent (eg AS level, NVQ 3)	31 Less than 1st grade 32 1st, 2nd, 3rd, or 4th grade 33 5th or 6th grade 34 7th or 8th grade 35 9th grade 36 10th grade 37 11th grade 38 12th grade - no diploma 39 High school graduate - diploma or equivalent (GED) 40 Some college but no degree 41 Associate degree - occupational/vocational 42 Associate degree - academic program
High	4 MB 5 HA 6 HB 7 HW	5 Secondary 6 Assoicate Diploma 7 Bachelor and Above	12 Grade 12/Standard 12/Form 5/Matric	6 General secondary education 7 Postsecondary vocational education (vocational college, university college, university college specialization) 8 Higher undergraduate education – professional 9 Higher undergraduate education – academic 10 Higher postgraduate education (specialization, master's degree, doctor's degree)	2 Higher edn below degree level (eg HNC, nursing qual) 1 Degree level qualification or above	43 Bachelor's degree (BA, AB, BS, etc.) 44 Master's degree (MA, MS, MEng, MEd, MSW, etc.) 45 Professional school degree (MD, DDS, DVM, etc.) 46 Doctoral degree (PhD, EdD, etc.