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Over-education and childcare time

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Abstract: Research shows that over-education has negative effects on individuals in terms of their wage and job satisfaction. In this paper, we study the intergenerational implications of over-education via childcare time. We analyze whether being over-educated affects the time mothers devote to take care of their children. We use the American Time Use Survey from 2004 to 2017. We find that over-educated mothers devote less time to primary childcare than they would do were they matched. The effect of being a college graduate mother on primary childcare time during weekdays is significantly lower when she is over-educated. Results suggest that being over-educated is not a deliberate choice prioritizing family over career.

JEL Codes: D13, J13, J22, J24.

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1. Introduction

This paper looks at a potential intergenerational effect of over-education. We study whether over-educated mothers spend more or less time with their children than their matched counterparts. On the one hand, research has shown that over-education of today's generation causes frustration and lower earnings. This may well give rise to worse parenting and thus translate onto the next generation. On the other hand, some argue that over-education may be the result of prioritizing family over career, and as such, we should expect that over-educated mothers do more childcare time. Given that childcare time is an important input in the human capital production function, the answer to this question is important. We are the first ones to look at a possible mechanism of intergenerational impact of over-education. The importance of this research question lies in the fact that massive over-education has been widely described and documented across the industrialized world (Ghignoni and Verashchagina, n.d.; Seamus McGuinness 2006; Verhaest and Van Der Velden 2013).

Over-education has been identified to have negative consequences for workers in terms of wages, wage growth, and job satisfaction. Individuals in a job that requires lower education than they acquired earn generally lower wages than if they were matched (Korpi and Tahlin 2007; Sattinger and Hartog 2013; Sicherman 1991; Sloane, Battu, and Seaman 1999). Moreover, over-education at the early career stages tends to leave permanent scarring effects on workers' wages (Congregado et al. 2016). Majority of research on over-education indicate a lower job satisfaction among the affected workers (Battu, Belfield, and Sloane 1999; Seamus McGuinness and Sloane 2011; Verhaest and Van der Velden 2010; Verhaest and Omey 2006; Kucel and Vilalta-Bufi 2013a). Although there is no agreement on what causes over-education, it remains largely clear that it is a negative phenomenon for workers affected by it. In this paper, we ask whether it has some adverse effect on workers' families and their next generation. Specifically, we are interested in studying whether over-educated mothers provide less childcare to their kids and thus "transmit" to them the negative effect of their over-education, or whether instead they provide more childcare, which would suggest that over-education is on average a voluntary state as a result of prioritizing family over career.

Various types of inter-generational effects of parental investments on children have been analyzed in the literature (see a broad review in Francesconi & Heckman (2016) and Black and Devereux (Black et al. 2011)). The most important is parental time, which is considered as an input in the production of cognitive and non-cognitive skills of children. Time input of parents, particularly in early childhood, is found to favor children's cognitive development (Del Boca, Flinn, and Wiswall 2014; Zhu and Vural 2013). Positive returns to childcare time are proportionally higher for more educated mothers. At the same time, more education provides for higher wages, but these in turn have a limited impact on child development compared to childcare time (Del Boca, Flinn, and Wiswall 2014). Most papers find that education rather than financial resources matter to explain childcare time decisions (Bonke and Esping-Andersen 2011; Gimenez-Nadal and Molina 2013; Craig 2006; Guryan, Hurst, and Kearney 2008; Zhu and Vural 2013).

According to the household production model by Becker and Tomes (Becker and Tomes 1986) domestic duties are shared by the family members. In such a setup, the household composition becomes salient to the childcare time provided by women (Price 2008; Kalenkoski, Ribar, and Stratton 2013). In this context, the parent with a lower wage should provide more childcare since the time opportunity cost is lower for him/her. Then, over-educated married women might provide more childcare than single women because their jobs suffer from over-education wage penalty and so their partner's time opportunity cost might be relatively larger.

Lastly, over-education literature has pointed out, that individuals may become over-educated because they lack skills required in matching jobs (Büchel and Mertens 2004; Sicherman 1991). If over-educated mothers indeed had lower skills, that could also imply worse quality childcare, which translates into lower returns to childcare and lower incentives to devote time to it.

To sum up, we propose three mechanisms that might relate over-education and childcare. First, since over-education comes with a wage penalty, the opportunity cost of spending time with the kid is lower for over-educated individuals. In a household bargaining setup (Becker and Tomes, 1986), over-educated individuals are then more likely to specialize in childcare. Second, if over-education was the result of giving up better career opportunities to gain better family life, over-educated individuals would again be more likely to provide more childcare. Finally, a third, and contrary argument would claim that

if over-education was not voluntary, either it could create strong frustration, or it could imply lower quality childcare, both of which lead to less childcare time.

In our estimation we split the sample of women in two groups: single and cohabiting/married. We apply a propensity score matching estimation to make the two samples similar in terms of observed characteristics. If we find that over-educated mothers do more childcare when they are cohabiting/married, this is consistent with the household bargaining dimension. If over-educated mothers (single and married) spend more time with their children, then results point towards a voluntary choice of family over career. Finally, if we find that single and cohabiting/married mothers devote less time to childcare when they are over-educated, the frustration and low-quality childcare story becomes relevant. We also distinguish between a weekday and the weekend. We expect stronger results for the weekend, when the time constraint is less binding and therefore preferences are more apparent than in a weekday. In all estimations we analyze the time spent in primary childcare, secondary childcare and work.

Results reveal a significant and negative relationship between being over-educated and time spent caring for children. On average, an over-educated married mother with children aged between 4 and 11 years old spends on a weekday between 7 and 11 minutes less in primary childcare than her not over-educated peers. We obtain similar results for the weekend.

The rest of the paper is organized as follows. In section 2, we first review the competing mechanisms that relate education level and childcare time. Then we discuss the channels through which over-education might affect childcare time. In section 3, we describe the data and the econometric specification used in the analysis. In section 4, we present and discuss the results. We estimate separately the SURE models for married and single women, for weekdays and weekend days. In section 5, we conclude.

2. Theoretical background

We are interested in unravelling a possible inter-generational mechanism of transmission of over-education costs. In doing so, we look at the childcare time of women who are over-educated and single, and over-educated and non-single (cohabiting or married). In

what follows we provide several mechanisms that could relate over-education and childcare time.

First, married mothers participate in the household bargaining with their partners. If over-educated, their time opportunity cost is comparatively lower than the time of their partners due to the wage penalty associated to over-education. In such circumstances, married women should provide more childcare in general, either primary or secondary. Adding the weekday-weekend dimension extends this argument further. Married women in a weekday should provide comparative more childcare when over-educated than in the weekend. It is so, because weekdays are typically more time-constrained due to work time and so women whose work time is less valuable when over-educated should provide more childcare releasing their partners' time for work.

Second, over-education gives rise to a host of negative effects, primarily lower wage but also lower job satisfaction (Kucel and Vilalta-Bufi 2013a) and even regret of studies (Kucel and Vilalta-Bufi 2013b). This may lead to frustration among workers, which might decrease the incentives to enhance the human capital of their kids, providing less childcare time. Alternatively, if over-educated individuals have lower skills, they might provide low-quality childcare and then it is optimal for them to devote less time to childcare.

Third, overeducation could be a voluntary choice for those individuals that prioritize family over career. Then, they would provide more childcare than their matched peers.

Our three mechanisms rest upon two major research strands. First, we rely on the findings of the over-education literature. It finds, that over-educated workers suffer a wage penalty compared to if they were matched (Groot and Massen van den Brink 2000; S. McGuinness 2006; Chevalier 2003). Workers run a wage penalty which varies between 4-7% of their prospective wage if they were matched (Korpi and Tahlin 2007; Sattinger and Hartog 2013; Sicherman 1991; Sloane, Battu, and Seaman 1999). Even if only over-educated for a spell at the early career, as proposed by Sicherman and Galor (Sicherman and Galor 1990), workers actually suffer a decreased wages later in their labor lives due to that incident (Congregado et al. 2016). On top of that, research on over-education points towards a lower job satisfaction among the affected workers (Battu, Belfield, and Sloane 1999; Seamus McGuinness and Sloane 2011; Verhaest and Van der Velden 2010; Verhaest and Omey 2006; Kucel and Vilalta-Bufi 2013a), leading them to higher quits

propensity (Alba-Ramirez 1993; Dekker, Grip, and Heijke 2002; Seamus McGuinness and Wooden 2009; Rubb 2005; Frei and Sousa-Poza 2012; Sloane, Battu, and Seaman 1999).
Second, we base on the literature on childcare time. It is well established that education increases childcare time (Bonke and Esping-Andersen 2011; Gimenez-Nadal and Molina 2013; Craig 2006; Guryan, Hurst, and Kearney 2008). This result could be driven by the education level itself or by the higher earnings of better educated individuals. A possible explanation for education having a direct effect on childcare is that parents with higher education might have parenting preferences that involve more childcare time. This argument, lies well with the observation that workers may voluntarily choose to be over-educated in order to have more time for parenting (Buchel 2002).
Similarly, different education levels may indicate different quality of childcare time, which gives incentives to educated parents to spend more time with their children (Moav 2005). Parents with higher education tend to earn higher wages, thus their time opportunity cost is larger and, consequently, they should devote more time to work and less to childcare than parents with lower human capital do (substitution effect). However, the opposite is found in the empirical literature. Several papers propose explanations to reconcile the fact that parents with more human capital spend more time with their children (Ramey et al. 2010; Guryan, Hurst, and Kearney 2008). First, since childcare is found to be a normal good, parents with more income, which have often higher education, want to spend more time with their kids (income effect). If the income effect is larger than the substitution effect, then individuals with high human capital and thus, higher wages, can devote more time to childcare. In the same vein, Zhu and Vural (2013) argue that time and goods investment on children are complementary. Following this token, parents with higher income invest more in goods, which makes it optimal to spend also more time with children. Other explanations are put forward in Guryan et al. (2008) emphasizing total time spend "around with children" which we denote here by "secondary childcare".

3. Data and econometric specification

We use the 2003-2017 multi-year American Time Use Survey (ATUS). Respondents are randomly selected from a subset of households that have completed their final month in the Current Population Survey (CPS). Only one individual of the selected household

completes the survey, which contains a single-day time-diary. Individuals report the activities from the previous day in detailed time intervals. The activities are classified into more than 400 time use categories that cover the whole 24 hours. They also report who was with them during each activity. Roughly, half of the interviews correspond to a weekday and half to a weekend day.

We use aggregate categories of time use. Time devoted to work includes hours working and work-related activities, as well as any income-generating activities, job search, and interview activities. Primary childcare time refers to those activities where children are the focus of attention. It includes physical care for children, interactive activities such as reading, playing, and talking to children, activities related to children's education (homework, meetings at school…), and activities related to children's health. In contrast, secondary childcare time refers to supervising own children from the household while simultaneously doing another primary activity, such as cooking, cleaning, ironing etc.

The sample is composed by full-time employed women[1] with at least one own child below 18 years old. Unfortunately, there is no information on the secondary childcare time devoted to own child in the household for 2003, so we drop this year from the analysis. The final sample consists of 13535 women of which 4791 (35%) are single and 8744 (65%) are married or cohabiting. About half the sample reports information about a weekday and the other half about a weekend day.

We define as over-educated each employed individual in the ATUS that has a higher education level than the required level in his/her occupation in the year of the survey. To compute the required level of education we use the American Community Survey (ACS) Public Use Microdata Sample (PUMS)[2]. We consider the required level of education to be the 60% level of education in each occupation (4 digit).[3] Then, we match the required level of education to each individual according to her occupation and survey year.

Our overeducation variable is a dummy indicating whether the education level of the individual is higher than the required level.

Tables 1 and 2 present the descriptive statistics for the key variables used in the analysis. Table 1 presents the descriptive statistics for the weekday sample, distinguishing between

[1] Full-time refers to at least 35 hours of work weekly.
[2] We compute over-education including both genders.
[3] We do robustness analysis with 50 and 70% level.

married and single women and their respective education-job matches. Table 2 does the same as Table 1 but for the weekend sample.

Table 1 shows that there are no marked differences between the matched and over-educated women concerning the primary childcare time within a civil status category: single women regardless if matched or not provide the same amount of primary childcare, while married women babysit slightly more when over-educated (81 vs. 78 minutes of primary childcare per day). With regards to secondary childcare, there are some differences between the matched and over-educated women for both groups: married and single. Married women generally provide more secondary childcare in a weekday than single women and even more so, when they are matched. A similar pattern can be observed for the single, who provides on average 9 minutes more of secondary childcare per day when matched. There are not marked differences for the single women about their work time if matched or over-educated, while the over-educated married women work significantly more than matched ones (482 minutes vs. 458 minutes).

Secondly, the over-educated group, regardless if married or single is primarily college educated (87.4% single and 96.5% married). Therefore, it is relevant to compare over-educated and matched women who are college graduates.

There are other notable differences across the single-married groups. Married women are mostly non-black non-Hispanic, while between 20 and 26% of single women are black. The number of children is on average larger for married women, while most single women have only one child. About the age of the youngest child, married women have on average younger children on average compared to single women. Moreover, the average income per household member is much lower for single women than for married ones.

The same results can be observed for the weekend sample. The only notable difference is that married women work much less than single women in the weekend sample while the converse holds for the weekday sample.

All these observed differences in the key explanatory variables make a strong case for establishing a propensity score matching between the married and single women in our sample. Then, if single and married women have similar observable characteristics, differences in their behavior might be attributed to the household bargaining mechanism, which occurs only for married women. To do so, we predict the propensity scores using standard controls such as age, race, education level, number and age of children and the

region. By using nearest neighbor propensity scores, we reduce the bias between the two groups by 14% on average. Figure 1 shows the balancing of the samples. In the next step we generate the propensity scores and multiply them by the weights of the ATUS survey to correct for the bias between the married and single groups in the main analysis (Ridgeway et al. 2015).

Following the standard methodology in the time use research, we estimate a SURE model with Tobit specifications. We pool all the years together and cluster the standard errors accordingly. The dependent variables are primary childcare time (*PCC*), secondary childcare time (*SCC*), and work time (*Work*).[4] We use Tobit specifications because data on time use are left-censored at zero. While individuals could desire to devote a negative amount of time to some activity, we only observe the positive outcomes. Therefore, the dependent variables are latent, and the observed time use variables are censored at zero. The variable of interest is a dummy indicating whether the individual is over-educated in the job. We also interact it with the age of the youngest kid since childcare time requirements varies widely with it. We control for individual and household characteristics (X_i): age (and its squared), race, education level, number of children in the household, household size, household income per member of household, region, year of the survey and the age of the youngest kid.

$$PCC_i = \alpha_P + \beta_P overeducation_i + \delta_P overeducation_i * kidage_i + \gamma_P X_i + u_{iP},$$

$$SCC_i = \alpha_S + \beta_S overeducation_i + \delta_S overeducation_i * kidage_i + \gamma_S X_i + u_{iS},$$

$$Work_i = \alpha_W + \beta_W overeducation_i + \delta_W overeducation_i * kidage_i + \gamma_W X_i + u_{iW}.$$

The estimated coefficients reveal whether there exists the assumed linear relationship between each explanatory variable and the latent variable. To learn the effect of an explanatory variable on the observed time use, we compute the marginal effects of this variable.

We assume that the unobserved components u_{iP}, u_{iS}, u_{iW} are distributed as follows:

$$\begin{bmatrix} u_{iP} \\ u_{iS} \\ u_{iW} \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma_P^2 & \rho_{PS}\sigma_P\sigma_S & \rho_{PW}\sigma_P\sigma_W \\ \rho_{PS}\sigma_P\sigma_S & \sigma_S^2 & \rho_{SW}\sigma_S\sigma_W \\ \rho_{PW}\sigma_P\sigma_W & \rho_{SW}\sigma_S\sigma_W & \sigma_W^2 \end{bmatrix} \right)$$

[4] In a robustness exercise, we add leisure and housework time use.

We consider that these distributions are day-type specific. Therefore, we perform the analysis over four sub-samples separating married/single and type of day (weekday or weekend). We perform SURE estimations using the `cmp` command. All analysis use weights provided by ATUS, which correct for group representation, multiplied by the propensity scores.[5]

Following the theoretical discussion about the relationship between overeducation and childcare time, we pose the following hypotheses.

H1: Overeducated women have a lower opportunity cost of their time, so they are more likely to devote more time to childcare than matched women. This particularly affects primary and secondary childcare of married women due to the household bargaining story.

H2: Overeducated women chose family over career. Therefore, they devote more time to childcare than matched women.

H3: Overeducated women are frustrated because they could not get a good match, or they got overeducated because have lower skills than matched women. Both facts lead to lower childcare quality, which translates into lower investment in the education of their children. In particular, they devote less time to childcare. This should especially affect primary childcare.

H1 implies a positive effect of over-education on primary and secondary childcare for married women; H2 implies a positive effect of overeducation on childcare for single and married women; H3 implies a negative effect of overeducation on primary childcare.

4. Main results

Table 3 presents the results for single and married samples in a weekday. As indicated in the previous section, we interact the variable over-education with the age of the youngest child. This is important because childcare necessities are very different across ages. A child below 2 years old for instance requires mostly physical and medical care, while an older child allows for other activities, such as reading and playing together. The impact of childcare on the child development might also be different. We observe that in a weekday

[5] Results do not change if we use ATUS weights only.

there are no significant differences in childcare time between overeducated and matched women when the child is below 2 years old, neither when the child is 12 years old or older. However, overeducated mothers devote less time to secondary childcare than matched women when the child is between 4 and 11 years old. In particular, they devote between 20 and 27 minutes less to babysitting the child while doing some other activity. This is true for both, single and married women. At the same time, we observe that they tend to work more than mothers in a matched job. More importantly, results show a negative effect of overeducation on primary childcare with differences across single and married women. Single women spend around 12 minutes less than their matched colleagues when the child is between 2 and 3 years old. This is a large amount when compared to the marginal effect of having a college degree (6.5 minutes). Married women, instead, do between 7 and 11 minutes less of primary childcare when the youngest child is between 4 and 11 years old. This is between 44 and 66% of the marginal effect of being a college graduate (around 17 minutes daily). Looking at these results one could conclude that overeducated mothers spend less time with their children because they work more than matched mothers. One should expect then no differences in the weekend.

Table 4 presents the results for single and married samples in the weekend. Again, there are no significant differences in childcare time between overeducated and matched women when the child is below 2 years old. In contrast to the weekday case, during the weekend we do not observe differences in secondary childcare time between overeducated and matched women either. However, results show that primary childcare time is reduced when the mother is over-educated. This negative effect appears for single mothers with a child 12 years old or older and for married mothers with a child 4 years old or older. The size is non-negligible as it represents between 30 and 47% of the marginal effect of college education. Moreover, this time we do not observe that overeducated women work more than matched women. Therefore, it must be something else than the time constraint that makes overeducated women spend less time with their children. Among the hypotheses posed in our theoretical discussion, only hypothesis H3 is consistent with the negative effect of overeducation on primary childcare. That is, our results suggest two possibilities: either overeducated mothers are frustrated for their job situation and decided no to invest too much in the human capital of their children by doing less primary childcare; or overeducated mothers have lower skills than matched

mothers, which translates into lower childcare quality and explains the lower investment in time for primary childcare. Either way, we observe a negative effect of overeducation that affects the following generation. Our results contradict the hypothesis that women become overeducated because they prioritize family over career.

The rest of variables behave as expected. Hispanic and black women devote less time to primary childcare, while education has a positive effect on primary childcare. Moreover, the younger is the child, the more primary childcare requires, while the opposite is true for secondary childcare.

Results are robust to changes in the measure of overeducation. Tables 5 and 6 report the results when using the median education level in an occupation as the required level of education. Tables 7 and 8 report the results when overeducation is computed using the 70^{th} percentile as the required level of education. In all cases, results remain the same, with some differences in significance level.

Results are also robust to including leisure or housework as an alternative activity. Tables 9 and 10 show the results when housework is an additional activity to childcare and work; while tables 11 and 12 show the results when we introduce leisure. The effect of overeducation on childcare time is robust to all these changes.

5. Conclusions

We show that over-education has negative effects for children in terms of the childcare time they receive. Results show that over-educated women spend less time in primary childcare than their matched peers do, especially in the weekends when the time constraint is not binding. Results are quantitatively important. Being over-educated reduces the college premium time of childcare for college educated women between 30 and 66%, and even cancels it for single women with a child between 2 and 3 years old in the weekday. To our best knowledge, our results are the first ones that draw attention to a possible intergenerational mechanism of over-education disadvantage transmission. Our results are relevant since we find that overeducated mothers devote daily less time to their kids at ages which are key for shaping their human capital. Adding to that the wide-spread persistence of over-education across the industrialized world, we face a sizable economic and social problem, that may perpetuate across generations.

Our results reveal that being overeducated is not a deliberate choice to prioritize family over career since that would be contradictory with overeducated mothers devoting less time to childcare. Our results point rather to overeducated mothers being frustrated with their studies or having a lower childcare quality. Both mechanisms could explain the negative results of overeducation on childcare time.

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Tables and figures

Table 1: Descriptive statistics of the weekday sample for over-educated/matched by marital status.

	Single mothers in weekday				Married mothers in weekday			
	Over-educated		Matched		Over-educated		Matched	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Primary childcare	66	76	66	83	81	90	78	92
Secondary childcare	166	188	175	197	184	194	196	209
Work time	450	211	451	222	482	201	458	213
Age	38	8	37	9	40	7	39	7
Non-Black, non-Hispanic	0.640	0.481	0.617	0.486	0.837	0.370	0.817	0.387
Hispanic	0.098	0.297	0.176	0.381	0.091	0.288	0.120	0.325
Black	0.262	0.440	0.207	0.405	0.072	0.259	0.063	0.243
Some college	0.126	0.333	0.268	0.443	0.035	0.185	0.184	0.388
College graduate	0.874	0.333	0.321	0.467	0.965	0.185	0.552	0.497
Number of own children in the household								
1 child	0.579	0.494	0.552	0.497	0.411	0.492	0.441	0.497
2 children	0.310	0.463	0.311	0.463	0.437	0.496	0.415	0.493
3 or more children	0.111	0.315	0.137	0.344	0.151	0.359	0.143	0.351
Age of the youngest child:								
<2 years	0.096	0.295	0.096	0.295	0.175	0.380	0.161	0.368
2-3 years	0.130	0.337	0.126	0.331	0.159	0.366	0.136	0.342
4-6 years	0.169	0.375	0.192	0.394	0.182	0.386	0.169	0.375
7-11 years	0.293	0.456	0.290	0.454	0.251	0.434	0.279	0.448
More than 12 years old	0.312	0.464	0.296	0.457	0.234	0.424	0.255	0.436
Income per household member (in $)	19695	16758	16124	13838	28352	16982	24887	14860
N	522		1,800		1,076		3,158	

Table 2: Descriptive statistics of the weekend sample for over-educated/matched by marital status.

	Single mothers in weekend				Married mothers in weekend			
	Over-educated		Matched		Over-educated		Matched	
Variable	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
Primary childcare	62	96	61	100	87	114	80	111
Secondary childcare	331	313	345	310	430	294	414	306
Work time	105	204	119	224	85	183	89	193
Age	39	8	37	8	39	7	39	7
Non-Black, non-Hispanic	0.656	0.476	0.597	0.491	0.851	0.356	0.802	0.398
Hispanic	0.118	0.323	0.184	0.387	0.080	0.271	0.137	0.344
Black	0.226	0.419	0.219	0.414	0.069	0.254	0.061	0.239
Some college	0.088	0.284	0.266	0.442	0.034	0.182	0.183	0.386
College graduate	0.912	0.284	0.304	0.460	0.966	0.182	0.525	0.499
Number of own children in the household								
1 child	0.590	0.492	0.510	0.500	0.416	0.493	0.412	0.492
2 children	0.294	0.456	0.341	0.474	0.438	0.496	0.438	0.496
3 or more children	0.116	0.321	0.149	0.356	0.146	0.353	0.149	0.356
Age of the youngest child:								
<2 years	0.086	0.281	0.099	0.298	0.182	0.386	0.162	0.369
2-3 years	0.122	0.328	0.126	0.332	0.153	0.360	0.142	0.349
4-6 years	0.186	0.389	0.181	0.385	0.177	0.382	0.175	0.380
7-11 years	0.286	0.452	0.323	0.468	0.268	0.443	0.264	0.441
More than 12 years old	0.320	0.467	0.271	0.445	0.219	0.414	0.257	0.437
Income per household member (in $)	20273	18081	15367	12673	28634	16362	23830	14856
N	500		1,969		1,168		3,342	

Table 3: Marginal effects for SURE tobit estimation for weekdays sample with matched single and married groups.

Matching included	Single women weekday			Married women weekday		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	4.258	-21.64	10.61	-12.77	-6.876	12.14
	(0.17)	(-0.80)	(0.22)	(-1.08)	(-0.38)	(0.61)
Over-educated with child aged 2-3	-11.93*	-36.11	82.59**	0.859	-4.665	16.10
	(-1.79)	(-1.35)	(2.54)	(0.19)	(-0.61)	(1.07)
Over-educated with child age 4-6	-7.921	-27.82**	56.74**	-11.25***	-23.98*	45.29***
	(-1.19)	(-2.30)	(2.10)	(-3.42)	(-1.89)	(3.64)
Over-educated with child aged 7-11	-3.593	-26.36*	-4.955	-7.362***	-20.74*	28.04*
	(-0.86)	(-1.90)	(-0.22)	(-3.17)	(-1.85)	(1.90)
Over-educated with child 12 years and older	2.051	11.81	-62.57*	0.680	-8.610	28.35**
	(0.51)	(1.29)	(-1.88)	(0.21)	(-1.15)	(2.14)
Race (Ref: non-black, non-Hispanic)						
Hispanic	-6.609**	-8.552	13.98	-3.942	7.169	3.407
	(-2.29)	(-0.93)	(1.01)	(-1.61)	(1.05)	(0.31)
Black (non-Hispanic)	-11.27***	-3.961	15.27	-12.76***	-18.18***	24.45**
	(-4.40)	(-0.68)	(1.05)	(-3.27)	(-2.83)	(2.28)
Some college education	-2.403	4.221	-0.901	7.945***	0.0114	19.57*
	(-0.65)	(0.42)	(-0.06)	(2.99)	(0.00)	(1.79)
College degree	6.509*	7.741	7.377	16.68***	9.436	-0.653
	(1.94)	(1.00)	(0.48)	(7.51)	(1.60)	(-0.06)
Age of the youngest child in the family (Ref: 12 years and older						
Below 2 years	83.40***	151.9***	-116.7***	84.77***	147.5***	-44.26***
	(8.66)	(8.33)	(-4.41)	(14.49)	(18.34)	(-3.22)
2-3 years of age	39.13***	134.1***	-53.22***	43.54***	144.9***	-10.14
	(10.28)	(10.30)	(-3.08)	(17.96)	(18.87)	(-0.73)
4-6 years of age	34.59***	118.5***	-33.61*	34.71***	147.5***	-16.66
	(7.88)	(14.05)	(-1.77)	(16.33)	(16.93)	(-1.37)
7-11 years of age	17.39***	139.4***	-15.28	21.28***	160.6***	-15.27
	(5.89)	(18.73)	(-1.16)	(14.34)	(22.09)	(-1.59)
Number of own children in the household (Ref: 1 child)						
2 children	10.08**	8.315	32.50**	11.33***	38.00***	4.838
	(2.55)	(0.83)	(2.21)	(4.58)	(3.96)	(0.50)
3 or more children	5.664	31.45**	40.77	16.50***	61.35***	-9.502
	(0.97)	(2.16)	(1.28)	(4.17)	(4.42)	(-0.63)
N	2322	2322	2322	4234	4234	4234

Marginal effects; *t* statistics in parentheses

Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies), age & age sqrd.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4: Marginal effects for SURE tobit estimation for weekend sample with matched single and married groups.

Matching included	Single women weekend			Married women weekend		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	2.229	10.11	5.272	-12.23	-17.59	5.638
	(0.11)	(0.36)	(0.13)	(-1.09)	(-1.20)	(0.62)
Over-educated with child aged 2-3	6.456	39.97	-56.54**	2.296	-9.191	-5.976
	(0.52)	(0.87)	(-2.34)	(0.32)	(-0.54)	(-0.34)
Over-educated with child age 4-6	-8.291	-14.68	14.71	-7.088*	-8.105	9.102
	(-0.81)	(-0.51)	(0.80)	(-1.66)	(-0.35)	(0.87)
Over-educated with child aged 7-11	-3.459	11.07	-2.608	-10.10***	-7.292	8.118
	(-0.68)	(0.35)	(-0.14)	(-2.60)	(-0.29)	(0.78)
Over-educated with child 12 years and older	-7.267**	7.677	26.61	-6.483*	10.89	4.339
	(-2.27)	(0.53)	(1.23)	(-1.91)	(0.96)	(0.50)
Race (Ref: non-black, non-Hispanic)						
Hispanic	-11.73**	25.47	21.38*	-11.39**	-4.495	-4.569
	(-2.40)	(1.47)	(1.73)	(-2.51)	(-0.35)	(-0.65)
Black (non-Hispanic)	-14.25***	-19.55**	4.943	-13.88***	-20.49	-0.930
	(-3.49)	(-1.96)	(0.50)	(-3.25)	(-1.24)	(-0.08)
Some college education	9.291**	4.516	-19.89	9.795**	5.238	-1.323
	(2.03)	(0.38)	(-1.55)	(2.52)	(0.38)	(-0.15)
College degree	17.08***	11.86	-27.33	21.61***	19.57**	0.394
	(3.70)	(0.69)	(-1.55)	(6.84)	(2.06)	(0.06)
Age of the youngest child in the family (Ref: 12 years and older						
Below 2 years	87.19***	253.6***	23.08	118.1***	297.9***	-14.09
	(10.45)	(12.31)	(1.42)	(15.05)	(25.74)	(-1.29)
2-3 years of age	52.10***	260.8***	24.74	71.05***	318.4***	-4.134
	(7.37)	(11.83)	(1.23)	(14.07)	(22.88)	(-0.40)
4-6 years of age	34.82***	288.8***	-6.958	44.81***	336.7***	11.55
	(14.39)	(15.54)	(-0.38)	(10.46)	(26.63)	(1.09)
7-11 years of age	17.17***	280.3***	-1.268	19.57***	355.2***	3.935
	(5.42)	(18.49)	(-0.08)	(7.93)	(34.62)	(0.63)
Number of own children in the household (Ref: 1 child)						
2 children	7.754	15.85	4.197	10.79**	83.73***	3.285
	(1.44)	(1.17)	(0.39)	(2.46)	(5.23)	(0.43)
3 or more children	6.315	17.91	32.21	15.67***	128.7***	-2.031
	(0.90)	(0.55)	(1.38)	(3.17)	(5.36)	(-0.20)
N	2469	2469	2469	4510	4510	4510

Marginal effects; *t* statistics in parentheses

Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies), age & age sqrd.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Marginal effects for SURE tobit estimation for weekday sample with required level set at 50 percentile

Matching included: Over-education 50	Single women weekday			Married women weekday		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	11.43	-30.36	17.10	-11.29	-5.941	10.16
	(0.48)	(-1.17)	(0.38)	(-1.04)	(-0.39)	(0.55)
Over-educated with child aged 2-3	-11.52	-20.84	70.33**	1.358	-5.736	16.74
	(-1.44)	(-0.80)	(2.32)	(0.25)	(-0.67)	(0.91)
Over-educated with child age 4-6	-10.31*	-20.25	60.41**	-10.72***	-20.92*	51.89***
	(-1.90)	(-1.59)	(2.17)	(-3.16)	(-1.91)	(3.45)
Over-educated with child aged 7-11	-3.870	-13.03	-2.102	-7.731**	-4.206	12.81
	(-0.93)	(-1.06)	(-0.10)	(-2.25)	(-0.44)	(1.06)
Over-educated with child 12 years and older	1.171	8.357	-47.27	2.064	-9.647	29.68**
	(0.36)	(0.93)	(-1.59)	(0.65)	(-1.33)	(2.02)
N	2322	2322	2322	4234	4234	4234

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income (16 dummies), Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Marginal effects for SURE tobit estimation for weekend sample with required level set at 50 percentile

Matching included: Over-education 50	Single women weekend			Married women weekend		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	-11.17	17.25	-17.42	-8.907	-1.227	-0.699
	(-0.70)	(0.78)	(-0.49)	(-0.92)	(-0.09)	(-0.06)
Over-educated with child aged 2-3	1.856	69.24*	-57.12**	1.218	-6.138	2.094
	(0.17)	(1.82)	(-2.20)	(0.15)	(-0.35)	(0.14)
Over-educated with child age 4-6	-2.474	-4.425	20.24	-3.347	-14.22	10.04
	(-0.33)	(-0.19)	(1.10)	(-0.89)	(-0.72)	(0.82)
Over-educated with child aged 7-11	-3.060	26.27	13.15	-6.660*	-16.60	16.03*
	(-0.63)	(0.93)	(0.62)	(-1.84)	(-0.81)	(1.77)
Over-educated with child 12 years and older	-4.241	9.150	30.94	-2.508	6.407	15.88*
	(-1.53)	(0.82)	(1.57)	(-0.67)	(0.62)	(1.93)
N	2469	2469	2469	4510	4510	4510

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income (16 dummies), Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Marginal effects for SURE tobit estimation for weekday sample with required level set at 70 percentile

Matching included: Over-education 70	Single women weekday			Married women weekday		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	3.115	-40.72**	46.24	-5.760	6.308	-4.861
	(0.11)	(-2.45)	(1.39)	(-0.43)	(0.36)	(-0.23)
Over-educated with child aged 2-3	-12.25	-28.91	81.70***	0.949	-7.546	21.00
	(-1.62)	(-0.98)	(2.84)	(0.20)	(-0.66)	(0.97)
Over-educated with child age 4-6	-13.83**	-29.77*	67.88***	-12.34***	-24.54*	55.01***
	(-2.18)	(-1.92)	(2.69)	(-3.49)	(-1.79)	(2.59)
Over-educated with child aged 7-11	-0.197	-30.68**	-9.775	-8.436***	-15.07	31.51*
	(-0.03)	(-2.45)	(-0.74)	(-3.00)	(-1.21)	(1.90)
Over-educated with child 12 years and older	-1.085	6.010	-57.54*	1.755	-13.92**	24.68
	(-0.46)	(0.50)	(-1.77)	(0.35)	(-2.03)	(1.34)
N	2322	2322	2322	4234	4234	4234

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income (16 dummies), Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Marginal effects for SURE tobit estimation for weekend sample with required level set at 70 percentile

Matching included: Over-education 70	Single women weekend			Married women weekend		
	Primary care	Secondary care	Work time	Primary care	Secondary care	Work time
Over-educated with child below 2	4.278	29.86	0.105	-6.458	0.478	16.03*
	(0.21)	(1.04)	(0.00)	(-0.57)	(0.03)	(1.67)
Over-educated with child aged 2-3	8.960	36.75	-50.51**	-5.647	-14.87	-2.754
	(0.46)	(0.69)	(-1.98)	(-1.00)	(-0.77)	(-0.15)
Over-educated with child age 4-6	-7.152	-38.85	35.98	-10.84**	-27.02	24.13
	(-0.57)	(-1.26)	(1.63)	(-2.17)	(-1.34)	(1.60)
Over-educated with child aged 7-11	-6.788	3.029	2.792	-7.942*	-34.46	15.59
	(-1.12)	(0.08)	(0.11)	(-1.72)	(-1.16)	(1.56)
Over-educated with child 12 years and older	-6.317*	12.33	32.63	-10.33***	12.40	6.102
	(-1.70)	(0.59)	(1.46)	(-2.84)	(0.88)	(0.47)
N	2469	2469	2469	4510	4510	4510

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income (16 dummies), Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Marginal effects for SURE tobit estimation for weekday sample with housework as additional DV

Matching included	Single women weekday				Married women weekday			
	Primary care	Secondary care	Work time	Housework time	Primary care	Secondary care	Work time	Housework time
Over-educated with child below 2	4.407	-22.12	12.16	-0.715	-12.75	-7.017	10.09	-1.203
	(0.17)	(-0.82)	(0.25)	(-0.05)	(-1.08)	(-0.39)	(0.50)	(-0.12)
Over-educated with child aged 2-3	-11.81*	-36.32	81.55**	-28.68***	0.853	-4.635	14.53	9.708
	(-1.77)	(-1.36)	(2.54)	(-3.93)	(0.19)	(-0.61)	(0.94)	(1.64)
Over-educated with child age 4-6	-7.840	-27.95**	56.99**	-29.92***	-11.30***	-23.95*	45.31***	-7.923
	(-1.18)	(-2.30)	(2.17)	(-3.67)	(-3.44)	(-1.89)	(3.50)	(-0.92)
Over-educated with child aged 7-11	-3.727	-26.47*	-5.301	4.839	-7.336***	-20.77*	28.47*	-13.50***
	(-0.89)	(-1.91)	(-0.23)	(0.60)	(-3.16)	(-1.85)	(1.94)	(-2.61)
Over-educated with child 12 years and older	1.983	11.22	-66.34*	16.14	0.723	-8.306	28.35**	8.521*
	(0.49)	(1.23)	(-1.89)	(1.05)	(0.22)	(-1.10)	(2.16)	(1.77)
N	2322	2322	2322	2322	4234	4234	4234	4234

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Marginal effects for SURE tobit estimation for weekend sample with housework as additional DV

Matching included	Single women weekend				Married women weekend			
	Primary care	Secondary care	Work time	Housework time	Primary care	Secondary care	Work time	Housework time
Over-educated with child below 2	2.323	10.48	6.683	-15.26	-12.13	-17.90	3.915	1.815
	(0.12)	(0.38)	(0.17)	(-0.61)	(-1.08)	(-1.22)	(0.46)	(0.16)
Over-educated with child aged 2-3	6.163	40.27	-46.45*	3.420	2.206	-9.428	-6.405	2.140
	(0.50)	(0.88)	(-1.93)	(0.19)	(0.31)	(-0.56)	(-0.37)	(0.13)
Over-educated with child age 4-6	-8.264	-14.59	20.69	-40.84***	-7.106*	-8.128	11.37	1.640
	(-0.81)	(-0.51)	(1.17)	(-2.90)	(-1.66)	(-0.35)	(1.14)	(0.14)
Over-educated with child aged 7-11	-3.500	11.05	-3.580	-16.84*	-10.07***	-7.433	6.589	14.31*
	(-0.69)	(0.35)	(-0.19)	(-1.66)	(-2.61)	(-0.29)	(0.66)	(1.81)
Over-educated with child 12 years and older	-7.174**	7.525	27.92	-11.76	-6.619**	10.48	5.414	-3.590
	(-2.22)	(0.53)	(1.38)	(-0.83)	(-1.96)	(0.92)	(0.61)	(-0.28)
N	2469	2469	2469	2469	4510	4510	4510	4510

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Marginal effects for SURE tobit estimation for weekday sample with leisure as additional DV

Matching included	Single women weekday				Married women weekday			
	Primary care	Secondary care	Work time	Leisure time	Primary care	Secondary care	Work time	Leisure time
Over-educated with child below 2	4.172	-21.35	11.18	-22.66	-12.92	-6.844	12.77	-4.184
	(0.16)	(-0.79)	(0.23)	(-1.64)	(-1.10)	(-0.38)	(0.66)	(-0.64)
Over-educated with child aged 2-3	-12.03*	-36.08	82.81**	-5.479	1.039	-4.652	16.98	-15.31***
	(-1.79)	(-1.35)	(2.57)	(-0.32)	(0.22)	(-0.61)	(1.14)	(-3.04)
Over-educated with child age 4-6	-8.002	-27.99**	55.77**	-12.44	-10.95***	-23.97*	45.27***	-14.97**
	(-1.19)	(-2.32)	(2.02)	(-0.89)	(-3.33)	(-1.90)	(3.78)	(-2.32)
Over-educated with child aged 7-11	-3.498	-26.29*	-4.979	1.601	-7.526***	-20.60*	28.04*	1.365
	(-0.84)	(-1.89)	(-0.22)	(0.20)	(-3.13)	(-1.83)	(1.86)	(0.18)
Over-educated with child 12 years and older	1.722	12.46	-61.01*	27.76**	0.872	-8.768	27.54**	-13.41*
	(0.43)	(1.35)	(-1.87)	(2.12)	(0.26)	(-1.18)	(2.05)	(-1.86)
N	2322	2322	2322	2322	4234	4234	4234	

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 12: Marginal effects for SURE tobit estimation for weekend sample with leisure as additional DV

Matching included	Single women weekend				Married women weekend			
	Primary care	Secondary care	Work time	Leisure time	Primary care	Secondary care	Work time	Leisure time
Over-educated with child below 2	2.348	9.719	4.741	5.037	-12.20	-17.53	5.026	-8.327
	(0.12)	(0.35)	(0.13)	(0.19)	(-1.08)	(-1.20)	(0.57)	(-0.63)
Over-educated with child aged 2-3	5.916	39.77	-59.71**	40.03	2.575	-9.194	-5.194	-8.749
	(0.46)	(0.86)	(-2.50)	(1.58)	(0.36)	(-0.55)	(-0.32)	(-0.77)
Over-educated with child age 4-6	-8.694	-14.57	9.664	15.12	-7.045*	-8.256	4.701	-6.998
	(-0.84)	(-0.51)	(0.58)	(0.58)	(-1.69)	(-0.36)	(0.46)	(-0.43)
Over-educated with child aged 7-11	-3.457	10.78	-1.727	29.37*	-9.902***	-7.412	8.288	-14.44
	(-0.65)	(0.34)	(-0.09)	(1.91)	(-2.62)	(-0.29)	(0.83)	(-1.23)
Over-educated with child 12 years and older	-7.877**	7.939	28.77	8.827	-6.311*	10.92	1.440	12.92
	(-2.50)	(0.55)	(1.41)	(0.87)	(-1.83)	(0.96)	(0.18)	(0.64)
N	2469	2469	2469	2469	4510	4510	4510	4510

Marginal effects; *t* statistics in parentheses
Controls: Household size (7 dummies), Family income, Year 2004-2017 (dummies), Region (4 dummies)
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 1: Balancing the married (treated) and single (untreated) samples.