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Jonas Jessen
C. Katharina Spiess
Sevrin Waights

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Jonas Jessen
DIW Berlin and European University Viadrina

C. Katharina Spiess
Federal Institute for Population Research (BiB), Johannes Gutenberg University Mainz, DIW Berlin and IZA

Sevrin Waights
DIW Berlin, Humboldt University of Berlin and LSE

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ABSTRACT

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We examine the relationship between parenting activities and center-based care using time diary and survey data for mothers in Germany. While mothers using center-based care spend significantly less time in the presence of their child, we find that differences in the time spent on specific activities such as reading, talking, and playing with the child are relatively small or zero. The pattern of results is more pronounced for lower education mothers. The lack of large decreases in activities are explained by two factors: (i) that center care replaces time that parents spend with the child but are doing other things such as housework or leisure (a small direct effect), and (ii) that evenings become relatively more activity-rich (a compensating indirect effect). For the intensive margin (full-day vs. half-day) we find more additional reductions in parenting activities, but these are compensated for by lower education mothers during non-center hours. Our findings represent novel evidence that activities in the home environment are a complement to center-based care, highlighting a credible additional mechanism for child development effects of center-based care.

JEL Classification:	D13, I21, J13
Keywords:	child care, child development, time use, parenting investments, Oster method

Corresponding author:
Jonas Jessen
DIW Berlin
Mohrenstraße 58
10117 Berlin
Germany
E-mail: jessen@diw.de

1 Introduction

Children in high-income countries spend more time in child care centers than ever before (OECD, 2017). Many studies find positive effects of center-based care on child development, especially for children from less-educated parents, but some also show zero or even negative effects.[1] The direction and size of the effect is most commonly thought to be related to the educational opportunities offered at the child care center relative to the home environment, with some studies focusing specifically on the role of center quality (e.g. Bauchmüller et al., 2014). However, this institutional channel typically takes the educational environment at home as a fixed consideration.[2] A much less-explored channel is whether usage of center-based care might impact child development by changing the home environment, for instance, by affecting parenting activities.

Our study asks: how do parenting activities differ when center-based care is being used? Parental interactions play a key role in children's development, independent of the role of learning institutions, such as child care centers (Cunha et al., 2006; Todd and Wolpin, 2007; Del Bono et al., 2016; Kim et al., 2018; Moroni et al., 2019). Specific activities, such as reading to the child, are particularly valuable (e.g. Kalb and van Ours, 2014; Mayer et al., 2019; Price and Kalil, 2019). However, based on broad trends, it is far from obvious that the increasing usage of center-based care has reduced parenting activities and, consequently, affected child development. Indeed, nowadays parents spend more time on activities with their children than they did in the 1960s (Dotti Sani and Treas, 2016).[3]

Our main contribution is to use time-diary data to estimate the relationship between center-based care usage and parenting activities in Germany, a country with a universal child care system. We estimate conditional differences for (i) time spent together with the child (not necessarily interacting), (ii) time spent on parenting activities overall, and (iii) time spent on specific activities (e.g. reading or playing). These outcomes are created by summing the time

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[1]Some examples are Havnes and Mogstad (2011); Datta Gupta and Simonsen (2012); Havnes and Mogstad (2015); Blanden et al. (2016); Cornelissen et al. (2018); Felfe and Lalive (2018); Felfe and Zierow (2018); Baker et al. (2019); Kuehnle and Oberfichtner (2020).

[2]One of the few economic studies not to take the home environment as given is Kuger et al. (2019); it shows that the quality of center-based care affects the quality of the home environment, using established quality measures for both environments.

[3]Moreover, the type of parents who see the largest increases in parenting activities—i.e. higher educated parents, according to Dotti Sani and Treas (2016)—are those who have seen the largest increases in usage of center-based care (e.g. see Jessen et al., 2018, for Germany).

spent on parenting activities as the main activity (or in the presence of a child) in ten minute segments over the day. To account for potential selection on unobservables into center-based care, we implement the coefficient stability approach of Oster (2019). Our estimates imply that mothers using center-based care spend significantly less time in the presence of their child, but that differences in the time spent on specific activities like reading, talking, and playing with the child are relatively small or zero. The pattern of results is more pronounced for lower education mothers. As such, our results suggest that parents using center-based care are concentrating similar amounts of educational activities into less overall time with their child.

We explore differences in parenting activities during care hours ('direct effects') and during evenings and weekends ('indirect effects'). Direct effects may differ depending on how activity-rich parental care is in the counterfactual, e.g. if parents are occupied with other things such as housework during the day spent with the child. Indirect effects may occur if parents see their parental activities as a complement or a substitute for center-based care, which may be due to positive or negative changes in motivation or time-constraints, respectively. We find that the lack of a large decrease in activities is both due to the direct effect being relatively small and there being a compensating indirect effect in relative terms. Specifically, we see a decrease in time with child outside of center hours due to an earlier bed time but no decrease in parenting activities implying more activity-rich evenings.

A further contribution of our paper is that we do not just focus on center-based care usage, *per se*, but on the effect of the dosage as well: We complement our main analysis with an examination of the effects of full-day vs. half-day care. We do this using the same time-use data and additional survey data, the German Family Panel (pairfam). The dosage of center-based care is an important margin since the literature finds quite different effects on child development by hours of center-based care (e.g. Loeb et al., 2007; Datta Gupta and Simonsen, 2010; Felfe and Zierow, 2018). We find that full-day care, in comparison to half-day care, is also associated with a decrease in parenting activities. We additionally find decreases in the frequencies of certain parenting activities such as playing or outdoor activities. This is in line with the literature that finds more limited child development effects at this margin in the German context (see Felfe and Zierow, 2018).

Our method involves regressing time spent on parenting (and non-parenting) activities on

an indicator for center-based care usage. We estimate an unconditional model and a conditional model with a rich set of controls for child, parent, and household characteristics. To account for potential selection on unobservables into center-based care, we implement the coefficient stability approach of Oster (2019). Selection on unobservables is accounted for by assuming it relates to the degree of selection on observables, which itself is measured based on coefficient movements (and changes in the R^2) that occur when including control variables. We present 'identified sets' that are estimate bounds based on assumed upper and lower limits for the degree of selection on unobservables. In general, we find that our coefficients are relatively stable to the inclusion of controls, thus suggesting fairly limited selection bias.

Ours is the first economic study to examine this question with detailed time-use data. Some existing studies look at related questions. Baker et al. (2008) and Herbst and Tekin (2014) look at the effects of child care programs (in Canada and the U.S., respectively) on the style and quality of parental interaction (among other outcomes). However, while important, quality and style of parenting are not necessarily closely related to the time spent on parenting activities. Further studies focus on the impact of maternal employment on parenting activities showing that parental quality time with children does not need to decline with increases in maternal employment (e.g. Hsin and Felfe, 2014; Del Bono et al., 2016; Bastian and Lochner, forthcoming).

Kröll and Borck (2013) examine the same question (also for Germany) and find that center based care actually increases maternal interactions with children. However, this analysis is based on how often mothers report having undertaken activities with their children in the past fortnight, rather than precise time diary data. A few studies from other social sciences find that center-based care is associated with decreases in parent-child interactions; however, these studies do not attempt to address potential selection on unobservables (e.g. Booth et al., 2002; Folbre and Bittman, 2004; Craig and Powell, 2013; Habibov and Coyle, 2014).

Previous studies neither distinguish between direct and indirect effects, nor attempt to systematically explore adjustments in non-parenting activities.[4] Through this, our study contributes to a literature on the economics of parenting that tries to explain parenting decisions as rational choices that may be affected by the institutional environment (e.g. Doepke and

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[4]A previous study that also analyzes the effect of center-based care on parenting activities also finds evidence of the impact of center-based care on non-parenting outcomes like housework (Craig and Powell, 2013).

Zilibotti, 2017; Doepke et al., 2019). We also pay more attention than previous studies to differences in specific types of parenting activities such as reading and primary care. In doing so, we follow the child development literature, which distinguishes between activities that involve different levels of interaction (Kalil et al., 2012; Fort et al., 2020) and, thus, distinguish between activities according to their productivity with respect to child development.

2 Institutional background

In 2020, 35 percent of children in Germany under three and 93 percent of those aged three to five were enrolled in center-based care. For both age groups, just over half of the enrolled children were in full-time care, defined as 35 hours or more per week. The child care system in Germany can be characterized as a virtually universal, strongly state-subsidized system. For-profit providers play a very limited role, with only 2.6 percent of institutions in 2017 being private and non-charitable (Destatis, 2017). Parental fees are mostly income-dependent and relatively low compared to most other OECD countries (OECD, 2020), with many states having even abolished fees altogether for older age groups and some also for younger age groups (Huebener et al., 2020). In 2012, average fees amounted to 144 Euros per month and family, on average (Schroeder et al., 2015). In general, parents cannot obtain higher quality by paying higher fees, which weakens the link between family income and center-based care quality compared with countries using a market-based system (Stahl et al., 2018). In our analysis, we make no assumptions regarding center-based care quality, as the goal of this study is to assess how parenting activities respond to center-based care usage and not the overall activities that children are exposed to (in center-based care and at home).

Figure 1 shows enrollment rates in center-based care for under and over three year olds separately for East and West Germany over the time period covered by our analysis. For over-threes, the majority of the expansion in child care center slots took place in the 1990s in response to the 1996 introduction of a legal entitlement to a place for children three years and older, and a general trend in Europe to expand center-based care for children three years and older (see e.g. Spiess, 2008). In both East and West Germany, enrollment rates for over-threes have been above 80 percent since before 2000. Despite a strong increase in full-day enrollment in West Germany in the 2010s (Jessen et al., 2018), full-day rates remain below 50 percent. In

East Germany, full-day enrollment rates are much higher, covering 74 percent of over-threes children in 2018.

Figure 1: Share of children enrolled in center-based care by region, age group, and time
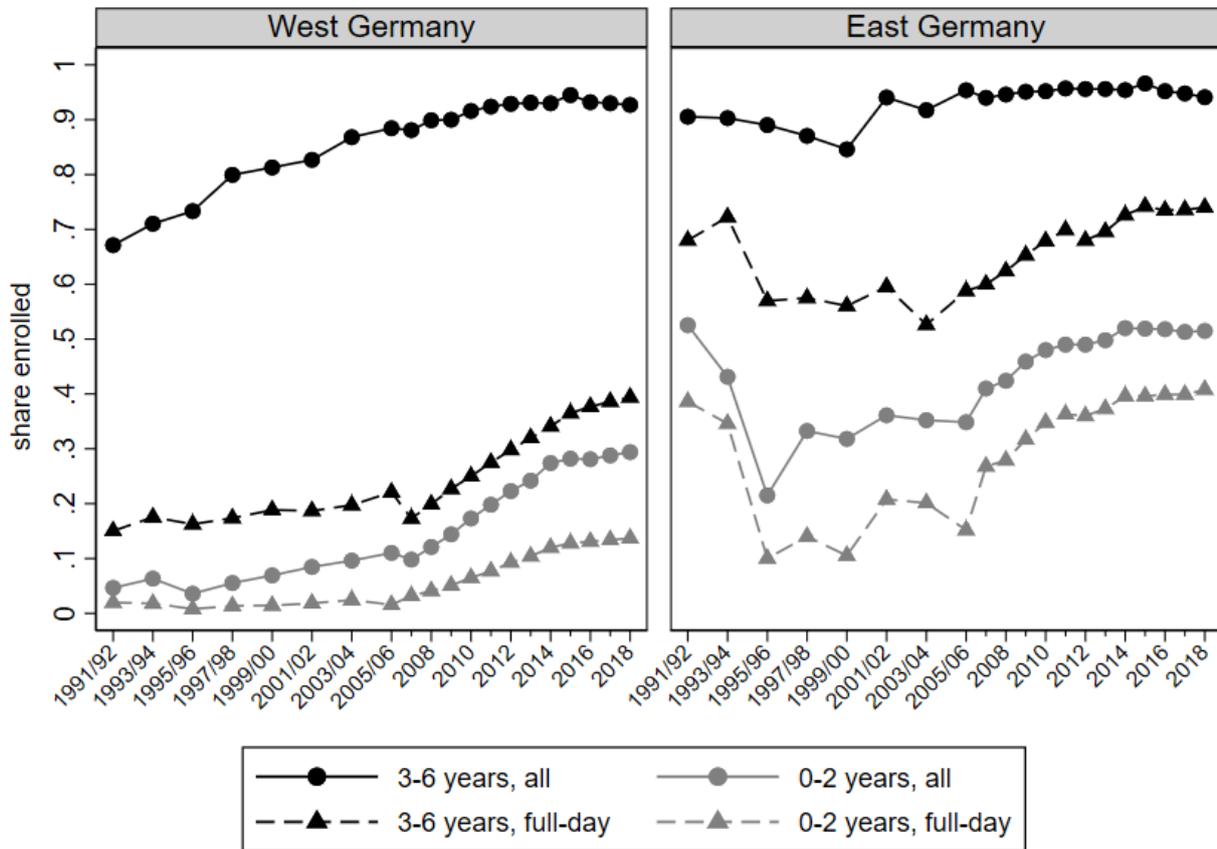
Note: Figure shows the share of children aged 0-6 years enrolled in center-based care and in full-day care by region (West vs. East Germany) and age group over time. Enrollment includes formal child care centers and care by qualified publicly funded family day care. Data for 1991/92-2005/06 from the German Socio-Economic Panel (SOEP v35), which is a long-running household survey containing information on about 15,000 households per year (Goebel et al., 2019). For precision, data is pooled in two-year bins. Annual statistics since 2007 from the German Federal Statistical Office (starting that year, official administrative data contain the share in full-day care).

In contrast, for under three year olds, enrollment rates were very low well into the mid-2000s, particularly in West Germany. In 2008, a federal law (KiföG) was passed, extending the legal claim to a place at a child care center to children of at least one year of age, coming into effect in August 2013. The legal change and the accompanied increased provision came in response to a long-lasting over-demand for center-based care, in particular by parents with infants and toddlers (i.e. Spiess and Wrohlich, 2005; Wrohlich, 2008). However, while enrollment rates for under-threes subsequently climbed, demand increased further still resulting in a continuation of shortages (Jessen et al., 2018).

Parents in Germany make frequent use of informal care, especially by grandparents. In 2017, between 50 percent and 60 percent of all children from six months old until the age of six years had grandparents as caregivers; for older children, grandparents were mainly used in addition to center-based care. Other private caregivers looked after between only 10 and 30 percent of children, depending on child age. Nevertheless, informal care, such as that offered by grandparents, is typically for only a few hours per week and complementary to formal care (Barschett et al., 2021). This is shown in Appendix Tables B4 and B5: informal care is higher for children who attend a child care center, suggesting that informal care may have been used to extend hours of formal care, rather than to substitute for it.

Parental care in Germany is characterized by a strong gender divide, with mothers acting as the primary caregivers (Schober, 2014). Parenting activities (and housework), therefore, are carried out to a much larger degree by mothers despite a slight narrowing of the gender gap since the 1990s, as illustrated in Appendix Figure B1. Consistent with the 'primary-male-breadwinner' model, evidence shows that the roll-out of center-based care, as described above, had an employment effect for mothers but made no difference for fathers (Müller and Wrohlich, 2020). For this reason, we focus our main analysis on mothers and report additional results for fathers in the Appendix.

3 Adjustment mechanisms

This section discusses ways in which center-based care usage might affect parenting activities. We focus on the amount of time spent on activities as an outcome rather than any measure of parenting quality or style, or directly observed parenting quality. We define *direct effects* as changes that occur during the time that children commonly spend at child care centers, and *indirect effects* as changes that occur outside of center hours as a result of parental adjustments.

The direct effect (i.e. during center hours) of center-based care on parenting activities will be negative if center-based care usage reduces the time that a parent spends with their child, when they would have otherwise engaged in some parenting activities in the counterfactual. No effect is only possible if center-based care fully crowds out informal care arrangements, by grandparents, for instance, or if despite being with the child, no parenting activities are done in the counterfactual. Despite being partly mechanical, the magnitude of direct effects varies

depending on how concentrated parenting activities are during center hours.

Indirect effects (i.e. outside of center hours) could go in either direction. They may be positive if center-based care is a complement to parenting activities. This could be if center-based care reduces parental time-constraints or increases parental motivation to interact with their child. Time-constraints may be reduced if parents use the center-based care hours to complete other tasks, such as paid work or housework, thereby freeing up non-center hours for parenting activities. Furthermore, not being at home with a child may mean there might be less cleaning and tidying to be done in the evening.[5] Motivation may be increased if spending less time with the child overall means that parents try to ensure that they do more activities with the child in the remaining time. Further, it could be that center-based care inherently encourages parents to interact with their child, e.g. through teacher recommendations (see e.g. Cornelissen et al., 2018; Kuger et al., 2019).[6] Moreover, if center-based care has a direct effect on children's cognitive or socio-emotional development, parents could adjust their inputs in response to this and increase their time spent on specific parenting activities (see Nicoletti and Tonei, 2020).

Indirect effects may be negative if center-based care is a substitute for parenting activities. This could be the result of a decrease in parental motivation, e.g. if parents feel that certain activities are no longer necessary since they are already done with their child in center-based care. This might specifically be the case if there is a notable positive effect of center-based care on child development. Furthermore, substitution could occur through a worsening of parental time constraints, e.g. if parents use center-based care hours to take on significant extra activities, such as paid work, meaning they have more tasks to do in the evenings instead of parenting activities. No effect might arise if center-based care is neither a substitute nor a complement, i.e., if there are no motivation and time-constraints effects or if they are counterbalanced. We aim to shed light on adjustment processes to understand the effects on parenting activities by looking at a set of non-parenting activities.

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[5]One thing to note is that if increased activities are due to a reduction of time constraints, then this may reflect lower parental stress and a higher quality of interaction than captured by a simple increase parenting activities. Sandner et al. (2020) find evidence that the expansion of center-based care in Germany led to a reduction in cases of child abuse and neglect. They propose a reduction of mental and physical overburdening of parents as the driving mechanism underlying this. Additionally, Schmitz (2020) finds that provision of public child care in Germany directly increases maternal well-being.

[6]This holds especially true if care center staff observe developmental deficiencies, if they believe that educational activities are performed too rarely, and/or if they believe that parents are unaware of the benefits associated with them.

While we have priors for the direct effects, there is little evidence on which to base hypotheses regarding the direction of the indirect effects. A separate question is what direction the overall effect might be (i.e. direct and indirect together). There might be positive indirect effects on parenting activities that are large enough to overcompensate for a negative direct effect. Again, we have little guidance to form any priors in this regard. In Appendix section A, we provide stylized examples to illustrate the specific cases.

4   Data and empirical approach

4.1   German Time-Use Survey

We use diary data from three waves of the German Time-Use Survey, which is a repeated cross-section of around 5,000 households per survey wave taken in 1991/92, 2001/02, and 2012/13 (Maier, 2014; Destatis, 2015). The diary data record the main and (optional) secondary activity of each adult household member in five- or ten-minute slots over two or three days using a 3-digit classification.[7] An example of a 3-digit activity is 'reading to child', which is from the 2-digit activity of 'child care', which belongs to the 1-digit category of 'work in the household'. We use the activities recorded under 'child care' as our parenting activities. In Appendix Table B2 we show the full list of 3-digit categories contributing to parenting activities.

In addition to recording specific activities, the survey also indicates for each time slot whether it was spent with a child under the age of ten years present. Importantly, the parent need not necessarily record a parenting activity as the main or secondary activity while spending time with the child. For example, a parent may record ironing as the main activity and watching television as the secondary activity, while also indicating that their child was present. The data also include information on households—such as usage of center-based care, age of youngest child, number of children, single-parent household, and location in East or West Germany. At the respondent-level, the data include information on age, gender, education, marital status, and economic activity.

We use parent-days as the unit of observation for our analysis. We define two main meas-

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[7]The first wave consists of two successively recorded days that are uniformly distributed, meaning that about three quarters of the days in the sample are weekdays. In the two later waves, individuals' activities are recorded over three days, two weekdays and one weekend day.

ures of parental involvement: (1) *time with child*, as the number of minutes that a parent spends together with their child; and (2) *parenting activities*, as the minutes spent on child care activities as the main activity. We think of time with child as capturing a more basic form of child care with often no dedicated interactions. In contrast, parenting activities involve specific interactions with the child, which likely better foster child development (see e.g. Kalil et al., 2012; Hsin and Felfe, 2014). Thus, we think of parenting activities as being the relevant measure of the educational potential of the home environment and thus also a measure of home quality. We also distinguish between particular types of parenting activities: reading to the child, playing with the child, talking with the child, and primary care.[8] We also estimate effects on non-parenting activities, like 'paid work', 'housework', and 'leisure' to investigate adjustments by time of the day.[9] Those broader categories are classified consistently across survey waves and, thus, we pool all survey waves. The coding for the specific 3-digit parenting activities changed after the 1991/92 wave so to ensure that our results are not artifacts of the change in classification we only consider the last two survey waves for those outcomes.

In our analysis, we focus on mothers as they are commonly the main caregivers in Germany.[10] Appendix Figure B1 shows the average daily duration of our main parenting and non-parenting activities, indicating that mothers spend more time on parenting by a factor of two to three. In the Appendix, we also present main results for fathers, with—as expected—much smaller effects. We split our analysis sample by educational background, which is defined as higher if the mother holds an "Abitur" secondary school certificate from the upper educational track in Germany and, thus, is eligible for university. The education split is motivated by differential effects of center-based care on child development found in the literature and well-established differences in parenting activities by education (see e.g. Bradley et al., 2001; Guryan et al., 2008; Kalil et al., 2012; Gimenez-Nadal and Molina, 2013; Dotti Sani and Treas, 2016). We also differentiate by the time of the day (center hours or non-center hours) in specifications that aim to estimate direct and indirect effects. In these specifications, the outcomes are the sum of minutes dedicated to each activity during either center hours or non-center hours in a

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[8]'Primary care' covers bodily hygiene, feeding and clothing the child, as well as passive supervision (i.e. 'keeping an eye on' the child).

[9]Appendix Table B3 shows an overview of 1-digit activities contained in the survey. Housework consists of the 1-digit activity 'household and family care', but excludes child care and care for adults. Leisure consist of the 1-digit activities 'social life and entertainment', 'sport, hobbies and games', and 'media usage'.

[10]In fact, women spent more hours per day on child care than men in all European countries analyzed in Gimenez-Nadal and Molina (2020).

day.

We restrict our sample to parents whose youngest child is of the enrollment age for center-based care (i.e. under six years old). Furthermore, we drop all parents who have more than one child under ten years old. This restriction reduces the sample by 59% but ensures that time with child measures effects on the enrolled child and not any potential indirect effects on time with an older child (who is also under ten years). We do not expect the effects to be dramatically different for the dropped households (with further children under ten) since it is enrollment of the youngest child in center-based care that usually makes the key difference in terms of the child care responsibilities of parents. We corroborate this point in Appendix section C.2. We use the household survey data (pairfam), which reports activities on a child-level allowing to contrast effects estimated using the same restriction for one child under ten using the entire estimation sample without this restriction. All estimates for parenting activities for the two samples are statistically indistinguishable.

After imposing these restrictions (and focusing on mothers), our analysis sample comprises 2,453 parent-days and 995 person observations.

Table 1 presents summary statistics of the main sample, split by enrollment in center-based care.[11] Differences between the samples are apparent as seen in column (3); mothers of children enrolled are on average older, have obtained higher education, are more likely to be full- or part-time employed, and more live in East Germany, where overall enrollment is higher (see section 2). Children in center-based care also are older, the age difference between survey waves are relatively constant as children of all age groups increasingly attend. Due to those described differences between the groups, in the empirical analysis it is paramount to control for those factors, as these are also likely to correlate with parenting behavior.

To illustrate the diary data, Figure 2 plots the number of minutes per hour of the day spent doing different activities by usage of center-based care. In these descriptive plots, we focus on weekdays, since this demonstrates the clearest differences in terms of direct and indirect effects. However, in our analysis, the baseline specifications pools weekdays and weekend days, to give a clearer picture of effects on parenting activities overall. The descriptive plots show

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[11]Children enrolled in family day care ("Tagespflege") are also treated as being in enrolled in center-based care, as this form of care is similarly publicly subsidized and underlying regulations. We can only distinguish between center- and family day care in one survey wave; otherwise these are treated as being identical in the surveys.

Table 1: Sample characteristics by enrollment in center-based care

	(1)	(2)	(3)
	Center-based care		
Variable	No	Yes	Difference
Mother characteristics			
Age in years	32.01	34.89	2.876***
	(0.20)	(0.16)	(0.257)
Higher educated (0/1)	0.38	0.44	0.056***
	(0.02)	(0.01)	(0.021)
Married (0/1)	0.75	0.71	-0.038**
	(0.01)	(0.01)	(0.019)
Single parent (0/1)	0.14	0.17	0.024
	(0.01)	(0.01)	(0.015)
Full-time employed (0/1)	0.26	0.45	0.184***
	(0.02)	(0.01)	(0.020)
Part-time employed (0/1)	0.19	0.29	0.104***
	(0.01)	(0.01)	(0.018)
East Germany (0/1)	0.13	0.34	0.214***
	(0.01)	(0.01)	(0.016)
Child characteristics			
Girl (0/1)	0.50	0.52	0.027
	(0.02)	(0.01)	(0.021)
Age (all waves)	1.27	3.60	2.333***
	(0.04)	(0.03)	(0.052)
Age (2001/02)	1.21	3.70	2.490***
	(0.07)	(0.06)	(0.094)
Age (2001/02)	1.24	3.65	2.406***
	(0.09)	(0.08)	(0.121)
Age (2012/13)	1.05	3.38	2.334***
	(0.08)	(0.07)	(0.099)
Sample period (row shares)			
1991/92	0.36	0.64	
2001/02	0.39	0.61	
2012/13	0.28	0.72	
Person-day observations	859	1594	2453

Robust standard errors in parentheses.*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

that center-based care is associated with mothers spending less time with their children on weekdays during regular care center hours (08:00-16:00), especially in the morning. There are also fewer parenting activities, although this pattern is less pronounced and followed by an apparent increase in the late afternoon and evening (16:00-20:00). Time in paid work is higher for center-based care users, while both housework and leisure are lower during center-based care hours. Finally, we see that mothers with their child in center-based care wake up earlier.

Figure 2: Mothers' activities on weekdays by usage of center-based care
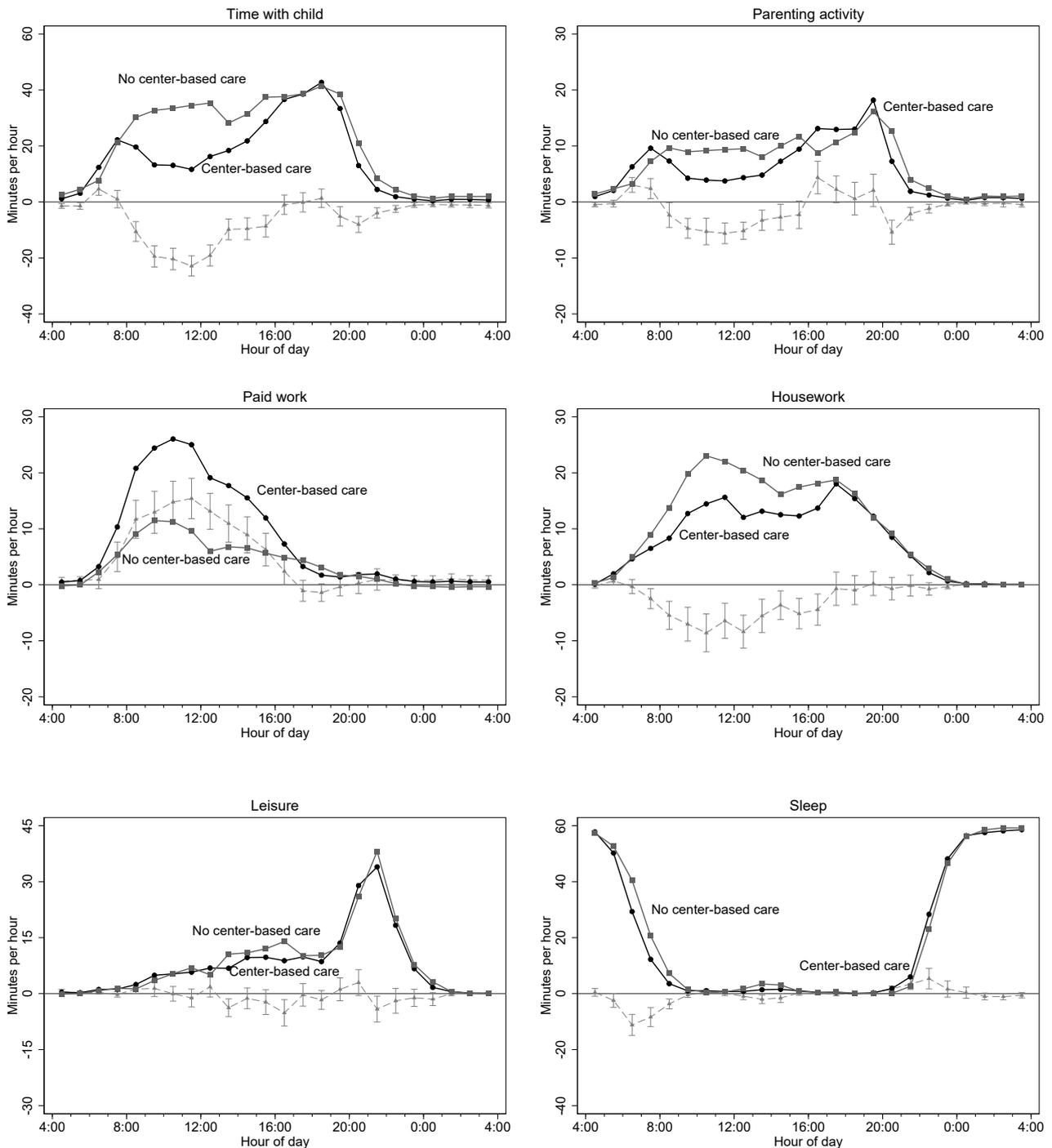
Notes: Circles denote mothers with a child in center-based care, squares those without. Differences and averages are estimated in weighted regressions with indicators for child age and evaluated at mean values. Light gray triangles indicate the difference and whiskers are 95% confidence intervals. Data consists of time slots in ten minute intervals (five in the first survey wave), which then are aggregated by hour of day. Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

4.2 The German Family Panel

For an additional analysis of the effects of full-day vs. half-day center-based care, we use the German Family Panel (pairfam), which is a longitudinal household survey collected annually

since 2008 and used for researching partnership and family dynamics.[12] The survey records the frequency of specific parenting activities, but only for older children (three years and above) and since 2013. Therefore, we restrict our sample to data between 2013 and 2019 for children between three and six years of age. While the survey does not collect precise diary data, it gives us around seven times as many observations compared to the time-use sample for the full-day vs. half-day care analysis, allowing for greater precision in estimation. We cannot use pairfam to examine day-care vs. no day-care since the activity-questions are only available for children aged three and above who nearly all attend center-based care.

For each child of a parent, the survey asks: *How often have you done the following things with your child during the past 3 months?* An overview of frequencies of shared activities for mothers with children in half-day and full-day center-based care is shown in Appendix Figure B2. We code indicator variables for whether each activity is carried out at least daily as outcome variables. The data also include information on the type of care each child uses, as well as parent, child, and household characteristics. We code children as being in full-day care if they are in center-based care in the morning and afternoon and half-day if they are at center-based care in the morning or afternoon.[13] Appendix Table B1 shows summary statistics for children attending half-day or full-day care and for their mothers and households.

4.3 Empirical approach

We start our analysis with an unconditional model, whereby we regress parenting activities on center-based care usage controlling only for a set of indicators of child age in years. Given near zero usage rates in the first year of center-based care in this age range and near full usage in the last two years before entering school at age six, the relationship between child age and usage has a relatively large deterministic component. Therefore, we include it in the unconditional model. This unconditional model corresponds to the daily sum of the differences plotted in Figure 2. Next, we estimate a conditional model that accounts for selection into center-based care based on observable characteristics: child age indicators, plus child gender, parent age, parent age squared, parental education indicators for secondary school track (upper, middle,

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[12]See Brüderl et al. (2020) for a data documentation.

[13]We obtain similar results when we define full-day by hours in center-based care (available from the authors upon request), but this measure is not available in the first survey wave we use.

or lower) and for university degree, marital status, single parent status, number of children in household, as well as an indicator for weekday observations. We also include indicators for survey wave × region (East or West Germany) to control for the different institutional settings described in section 2. Despite having a fairly rich set of controls, it remains plausible that selection into usage of center-based care is driven to some degree by unobservable maternal characteristics that are also correlated with parenting activities. Due to this, the estimates ought to be interpreted as conditional correlations rather than as causal effects.

In an additional step, we account for possible selection on unobservables by examining coefficient stability across unconditional and conditional models. We follow Oster (2019) in making assumptions regarding (i) the maximum achievable R^2, i.e. R^2_{max}, and (ii) the extent of selection on unobservables relative to selection on our set of included controls, i.e. δ. Our main specification assumes $R^2_{max} = 1.3\tilde{R}^2$ where $\tilde{R}^2$ is the R^2 of the conditional model.[14] We assume that δ is bounded such that $\delta \in [0, 1]$. At the most 'optimistic' bound of $\delta = 0$, there is no selection on unobservables. At the most 'pessimistic' bound of $\delta = 1$, selection on unobservables plays an equal role to selection on the included controls. This seems a reasonable upper bound given we have a fairly rich set of controls. The corresponding identified set of estimates gives us the upper and lower bound for the true effect assuming that the real δ falls between the two extremes.

Whereas the bounds presented assume that selection on unobservables follows the same direction as selection on unobservables, we also provide the δ that would be required based on the coefficient movements and R^2_{max} for the true coefficient to be zero. A large *absolute* value of δ here indicates that the true coefficient is zero only if selection on unobservables is very large relative to selection on our controls. Relative selection on unobservables may go in the same or opposite direction as selection on observables.

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[14]The value of 1.3 has been derived by Oster (2019) through examining under which assumptions of R^2_{max} 90% of randomized results examined in her study survive. Results with a more conservative assumption of $R^2_{max} = 2.2\tilde{R}^2$ are available from the authors upon request.

5 Results

5.1 Differences in parenting activities

Table 2 reports our estimates for the full sample of mothers and for sample splits by educational attainment.[15] Each coefficient represents the difference in *time with child* (i.e. child present but not necessarily interacting) or time spent on *parenting activities* (i.e. interacting with child) when using center-based care. Column (1) shows that mothers using center-based care spend significantly less time per day together with the enrolled child. In the conditional model, the coefficient of -95.5 minutes equates to around -22.1% of the mean time with child in the sample. To some extent, this decrease is to be expected as a mechanical impact of center-based care usage. Column (2), however, reveals a key result: the decrease in time spent on specific interaction with the child (*parenting activities*) is relatively small at only 13 minutes per day, just -9.8% of the sample mean. Thus, while mothers using center-based care do spend less time in the presence of their child, this does not show up as much in terms of reduced interactions with their child. When we split the sample by educational attainment, we see that this result is more pronounced for mothers with lower education. Although lower education mothers reduce their *time with child* by more than higher education mothers (p-value for the difference is 0.079), their reduction in time spent on *parenting activities* is roughly the same (p-value 0.803).

Comparing the conditional and unconditional models shows that the coefficients do not change by much upon adding control variables. For time with child, R^2 increases strongly by around 0.1 on average indicating that the controls explain a relatively large share of variation in the dependent variables.[16] The R^2 increase is lower for parenting activities, but coefficient movements are also smaller. As the identified sets for this outcome just include zero, we cannot reject the hypothesis that parenting activities remain similar in this pooled specification. Overall coefficients are fairly stable to the inclusion of these important controls and we end up with identified sets that suggest relatively tight ranges when accounting for potential selection on unobservables. While center-based care usage is related to certain observable characteristics

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[15]We show result for fathers in Appendix section C.1. In line with existing evidence (Müller and Wrohlich, 2020), fathers respond much less to their children being in center-based care. Only for fathers from lower education households is a reduction in time with child identified, much lower in magnitude than for mothers, and we see no reduction of parenting activities for fathers.

[16]The increase in R^2 is comparable to the average of the distribution of R^2 increases in the studies examined in Oster (2019).

Table 2: Mothers' differences in parenting activities by usage of center based care

Households	All		Lower education		Higher education	
Outcome (in minutes per day):	Time with child	Parenting activities	Time with child	Parenting activities	Time with child	Parenting activities
	(1)	(2)	(3)	(4)	(5)	(6)
Unconditional	-111***	-15.8***	-141***	-17.7***	-81.6***	-18.3**
	(12.1)	(4.98)	(16.1)	(6.27)	(18.2)	(8.4)
Conditional	-95.5***	-13**	-113***	-12.9**	-70.3***	-15.6*
	(12.3)	(5.22)	(16.6)	(6.45)	(18.1)	(8.95)
Mean	435.035	132.077	427.119	125.380	444.836	140.370
Identified set	[-95.481, -81.861]†	[-12.957, 0.690]	[-113.481, -91.122]†	[-12.878, 4.597]	[-70.345, -60.650]†	[-15.627, 1.088]
δ for 0 coefficient	3.578	0.969	3.083	0.797	3.964	0.964
R^2 (unc., con.)	(0.120, 0.212)	(0.278, 0.314)	(0.122, 0.238)	(0.306, 0.352)	(0.135, 0.219)	(0.249, 0.278)
Observations	2453	2453	1357	1357	1096	1096

Notes: Table shows coefficients from OLS regressions of the outcome variables on an indicator variable for usage of center-based care. Unconditional coefficients are from a regression that includes only indicators for child age in years. The conditional coefficients are from regressions that include the child age dummies, and, additionally, child gender, parent age (linear / squared), parent gender, parental education indicators for upper, middle, or lower secondary school track, and for university degree, marital status, single parent status, number of children in household, a weekday indicator, and wave × region indicators. The identified set shows coefficients obtained using the method developed by Oster (2019), where $R^2_{max} = min\left\{1.3 \times \tilde{R}^2, 1\right\}$ assuming selection on unobservables is between zero ($\delta = 0$) and a level equal to selection on observables ($\delta = 1$). † denotes that the identified set excludes zero. The *δ for 0 coefficient* row shows for each outcome variable shows how large the relative selection on unobservables must be to obtain a coefficient of 0. R^2 *(unc., con.)* shows the R^2 of the unconditional and conditional regressions. Mothers are defined as having obtained higher education when they have a degree from the upper secondary school track (required to enroll in university). Robust standard errors reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

(evident in Table 1), the stability of the coefficients in Table 2 suggests that these differences are not, on average, associated with very different patterns of parental time use.

5.2 Direct and indirect effects

Our main results show large reductions in time spent in the presence of the child with relatively small reductions in parenting activities. This finding can be explained either if (a) not much interaction with the child occurs during this center hours in the counterfactual of no center-based care usage (i.e. a small direct effect) or (b) lost interactions during center hours are compensated for outside of care hours (indirect effect). We explore this issue in Figure 3.

Panel (a), plots estimates (identified sets and 90 percent confidence intervals) by time of the day and educational attainment for parenting outcomes.[17] The differences during typical care center hours (8am-4pm on weekdays) aim to capture direct effects, whereas changes during non-center hours (all remaining hours, i.e. 4pm-8am on weekdays, and full weekend days) reflect indirect effects. During center hours, both higher and lower education mothers decrease their time with child by a roughly similar amount, but for lower education mothers the decrease

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[17]Distinguished by time of day, the increases in R^2 are much larger, about 0.4 for time with child during center hours and 0.4-0.6 during non-center hours, as well as 0.2 for parenting activities during center and non-center hours and, as a result, identified sets in Figure 3 are quite compact.

in parenting activities is smaller.[18] Outside of center hours, there is an additional reduction in time with child for lower education mothers but not for higher education mothers. This reduction is consistent with an earlier bedtime.[19] However, despite the reduced time with their child in the evenings, lower education mothers do not reduce any parenting activities. Thus the time spent with children in the evening is more activity-rich. As such both direct and indirect effects play an important role in explaining the differences in effects between households with lower and higher maternal education.

Panel (b) presents the differences in three non-parenting activities: paid work, housework, and leisure by time of day and education in an effort to explore explanations for differences in parenting activities. The figures show that paid work increases during center hours (a direct effect) with differences that are a little larger for lower education mothers. At the same time, there are decreases in housework that presumably would have been done during time with the child had it been at home. This is consistent with evidence that mothers use day-care to take up paid work (Müller and Wrohlich, 2020) instead of multi-tasking child care and housework. Mothers from lower education households also experience a reduction in leisure during center hours, which helps to explain their smaller direct reduction in parenting activities.[20] Outside of center hours, there is also a small increase in paid work, which appears to reflect early or late shifts.[21] For lower education mothers there is also decrease in housework outside of center hours, which may help explain how evening are kept to be relatively activity-rich for the child.

In Appendix Figure C4, we explore heterogeneities and we briefly summarize those results here. We find that parenting activities during non-center hours increase when the child is a girl while time with them is held constant.[22] For boys, in contrast, time with child is reduced and parenting activities are held constant during non-center hours; i.e., mothers do not overcompensate for the reduced time during center hours. The direct effect for parenting activities is smaller for children older than three years and, similarly, we identify a positive indirect effect for this group, but not for younger children. We identify no heterogeneities by region (East

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[18]The right and left scales are adjusted such that given distances from the zero line reflects the same relative effect (relative to the mean) for each outcome.

[19]In Appendix Table C2, we present the full regression table, which also includes separate effects for the 'night time' (which we define as 8pm-8am).

[20]Indeed this time of the day is less parenting activity-rich for lower education mothers as they spend seven minutes (17%) less time on parenting activities compared with higher education mothers in the counterfactual.

[21]Appendix Table C2 reveals that these changes occur during the 'night'.

[22]When we look at those effects for fathers—available upon request—we find no evidence that fathers increase parenting activities with boys as an indirect effect.

Figure 3: Mothers' differences in activities by time of day and education

(a) Parenting activities

(b) Other activities
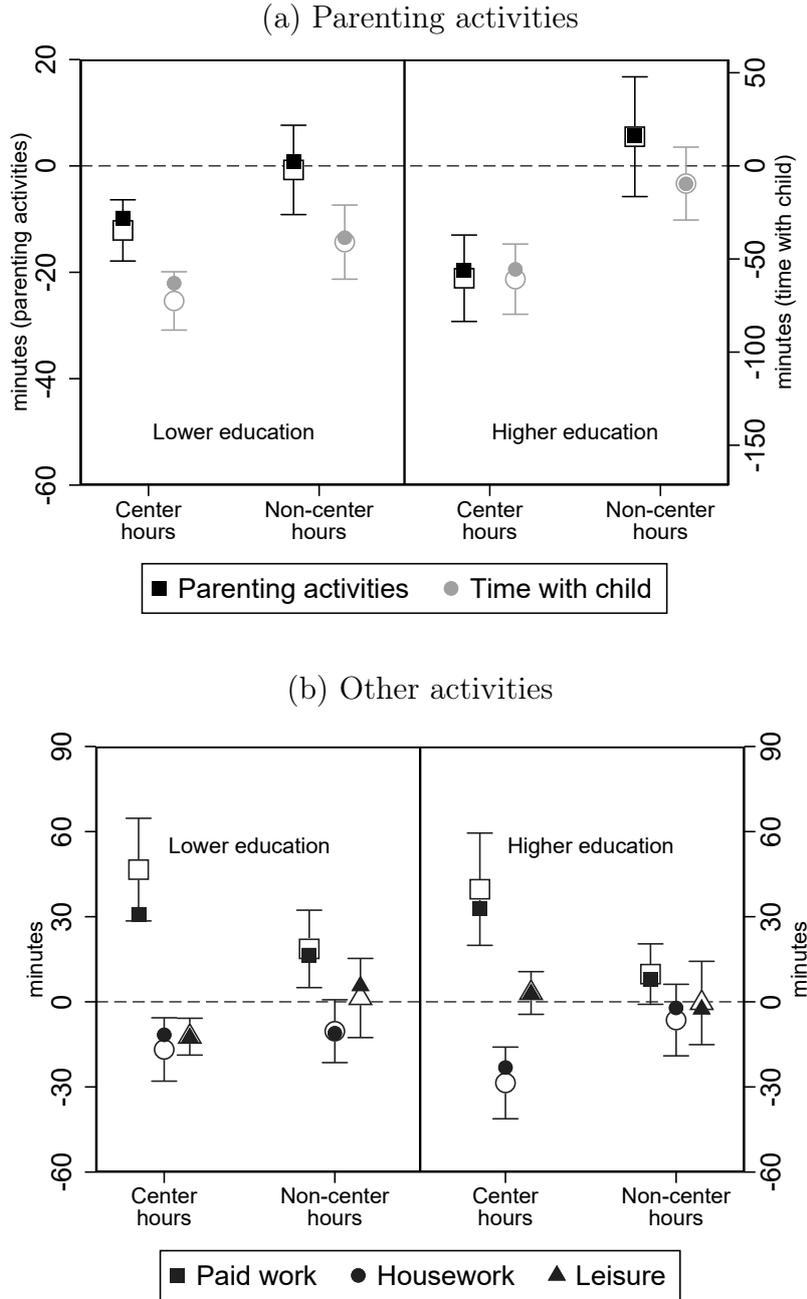
Notes: Center hours are from 8am-4pm on weekdays, non-center hours are the remaining hours on weekdays (12am-8am and 4pm-12am) and the entire weekend days. Education level is defined based on whether mother has a secondary school degree from the higher track (*Abitur*). The plots show the conditional difference in outcome variables by center-based care usage. Each estimate is based on a separate regression of the outcome summed over center hours or non-center hours on an indicator for usage of center-based care and controls (see notes to Table 2 for details) using all three waves of the time-use survey (1991/02, 2001/02, and 2012/13). The hollow shapes and whiskers indicate the conditional coefficient ($\delta = 0$) and 90% confidence intervals. The filled shapes indicate estimates under the assumption of $\delta = 1$, i.e. equally large selection on unobservables as on observables. The filled and hollow shapes together indicate the identified set. Appendix Table C2 reports coefficients along with means of the outcome variables, and the δ required for zero coefficient, as well as separating out effects occurring at 'night' (which we define as 8pm-8am). Source: German Time-Use Survey (1991/92, 2001/02, and 2012/13)

or West Germany) and no conclusive effects by survey wave; while the point estimates for the direct effects are larger for later waves, consistent with increasing time spent in center-based care, the difference are not statistically significant.

5.3 Specific parenting activities

The specific type of parenting activity is at least as relevant for child development as the total time spent on activities overall (Fiorini and Keane, 2014). Therefore in Figure 4 we explore which specific parenting activities comprise the overall reductions so far reported.[23] We focus on differences during center hours since no differences were found outside of center hours for either lower or higher education mothers. The largest decreases come from playing and primary care, the latter of which perhaps represent the activity with the least educational content, comprising general supervision and basic hygiene. There are no decreases for reading or talking for either lower or higher education mothers. Reading and talking are activities that may help improve language skills and it is interesting to notice that parents of both education levels do not compromise on these activities despite spending less time with their child. While the decreases are larger for higher education mothers these are proportional with the larger overall decrease in activities, thus suggesting no particular differences in focus between the educational groups.

Figure 4: Differences in specific parenting activities during center hours
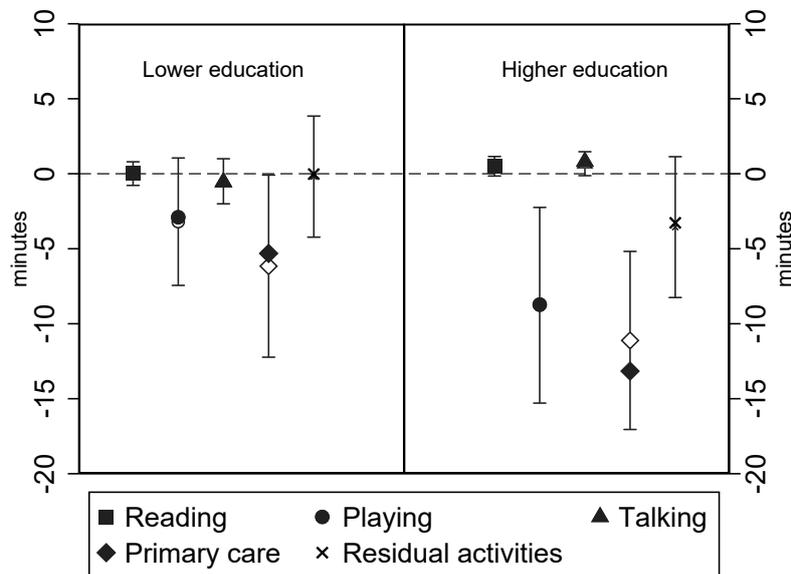
Notes: Each estimate is based on a separate regression of the specific parenting activities on an indicator for usage of center-based care and controls (as in Table 2) using the sample of center-based care users. The filled and hollow shapes together indicate the identified set. See Figure 3 for further notes. Estimates exclude the first survey wave (1991/92) as parenting activities are only compared consistently in the last two waves. Appendix Table C3 shows detailed regression coefficients, including for other times of day. Source: German Time-Use Survey (2001/02 and 2012/13)

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[23]Given that specific child care activities were classified differently in the 1991/92 wave of the survey, we present these estimates for the latter two waves only.

5.4 Full-day vs. half-day center-based care

Thus far, the analysis has focused on the differences in parenting activities of using center-based care compared with not using it, irrespective of the number of hours of care used per day. The full-day vs. half-day margin may have different implications for parenting activities, which we explore in this section. The intensive margin of daycare is important since this has become the relevant decision for many parents (i.e. children over three years and older in Germany, nearly all of which use center-based care—see Figure 1). Differences in parenting activities may also help explain the child development effects for full-day care, which tend to be differently beneficial for children from disadvantaged households depending on the skills examined (e.g. Loeb et al., 2007; Felfe and Zierow, 2018)

The 2012/13 wave of the German time-use survey contains information on the hours of center-based care normally used. Figure 5 plots the full-day vs. half-day estimates (i.e. conditional on usage of center-based care) on parenting (panel a) and non-parenting activities (panel b). As before, we plot coefficients by time of day and education. Both mothers with higher and lower educational attainment see additional decreases in parenting activities during center hours, but for lower educated mothers we identify a compensating increase during non-center hours as an indirect effect, which is not found for higher educated mothers.

The decreases in time with child during center hours for higher education mothers coincide with changes to paid work and housework, as before. However, in contrast to usage vs. non-usage, the increases in paid work are similar in size to the reductions in time with child suggesting worsening time constraints. We find no statistically significant differences for lower education mothers during center hours, but suggestive evidence for less paid work and housework during non-center hours facilitating the increase in parenting activities.

In order to investigate the full-day margin with greater precision, along with differences in specific parenting activities, we turn to the German Family Panel (pairfam).[24] Using this data, we estimate differences for full-day vs. half-day usage of center-based care in the probability of carrying out specific parenting activities on at least a daily basis. Table 3 shows the effects of full-day care on specific parenting activities (panel a). We think of the first four activities (reading, music, art, and playing) as educational activities and the last three (outdoors, sports,

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[24]Focusing on one wave and only mothers who use center-based care in the time-use data means the sample in the time-use survey is too small to focus on specific parenting activities.

Figure 5: Full-day vs. half-day care differences by time of day and education, wave 3 only (2012/13)
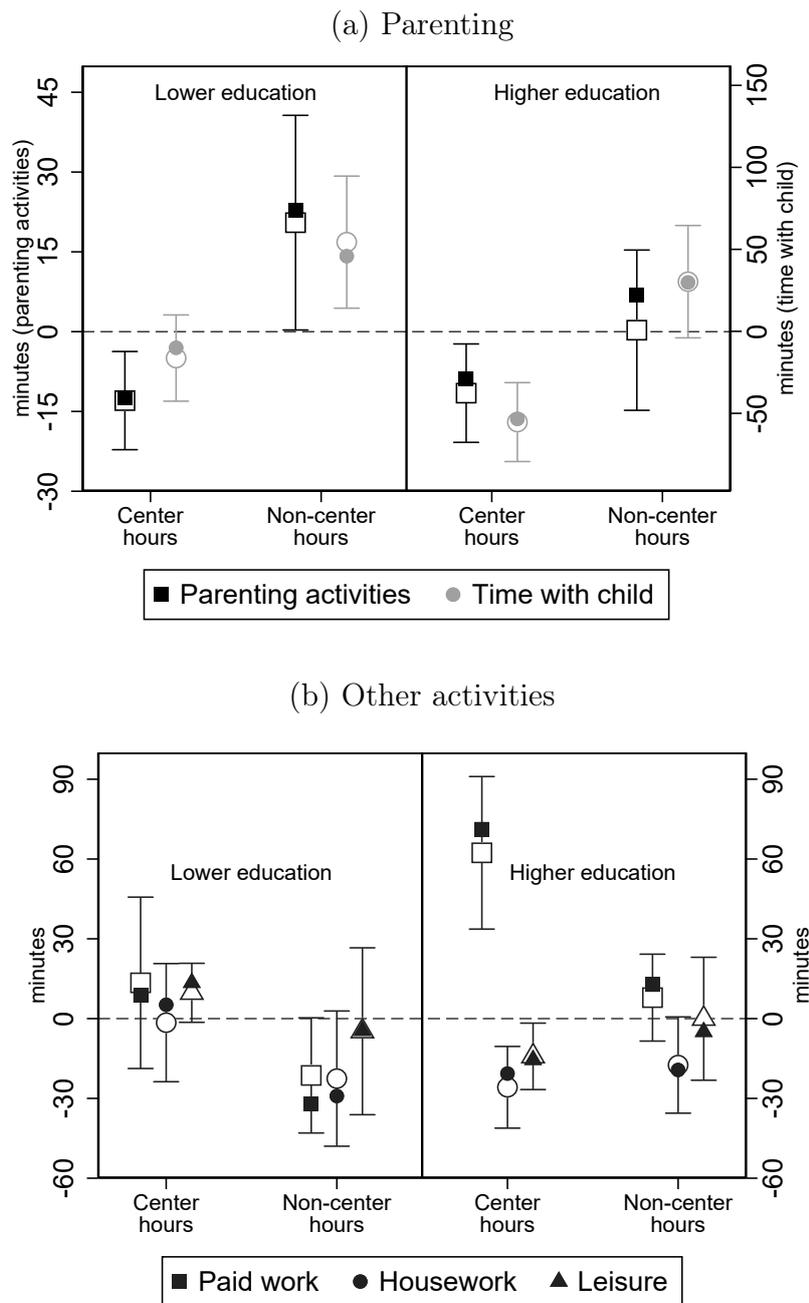
(a) Parenting

(b) Other activities

Notes: Each estimate is based on a separate regression of the outcome summed over center hours or non-center hours on an indicator for usage of full-day center-based care (> 30 vs. 10-30 hours per week) and controls (as in Table 2) using the sample of center-based care users. The filled and hollow shapes together indicate the identified set. See Figure 3 for further notes. Appendix Table C4 reports coefficients along with means of the outcome variables, and the δ required for zero coefficient. Source: German Time-Use Survey (2012/13)

and watching television) as recreational activities.

For mothers with lower education, daily playing is lower by nine percentage points (pp) and there is weaker evidence for a lower frequency in reading when the child is in full-day care. Looking at higher educated mothers, we see stronger negative differences for playing and for

art activities, but the regularity of reading holds constant. For recreational activities, daily outdoor activities become less likely with full-day care for all mothers, but sports and TV are unchanged.

Table 3: Differences in parenting and non-parenting activities using full-day care

	Lower education		Higher education	
	(1)	(2)	(3)	(4)
Panel A: Parenting activities				
Reading books or telling stories (daily)	-0.040*	(0.023)	0.005	(0.016)
Singing or playing instruments (daily)	0.019	(0.024)	-0.013	(0.024)
Painting, building or drawing (daily)	-0.029	(0.024)	-0.082***	(0.023)
Playing games together (daily)	-0.082***	(0.024)	-0.121***	(0.023)
Outdoor activities (daily)	-0.093***	(0.024)	-0.088***	(0.024)
Gymnastics, sports (daily)	0.004	(0.025)	0.008	(0.024)
Watching television or videos (daily)	-0.043*	(0.025)	-0.001	(0.025)
Panel B: Non-parenting activities and other outcomes				
Working (at least 10 h/w)	0.170***	(0.024)	0.185***	(0.023)
Working hours (per week)	6.123***	(0.754)	8.232***	(0.752)
Personal monthly net income	261.447***	(37.959)	419.873***	(51.238)
Too little time with child (0/1)	0.092***	(0.029)	0.186***	(0.028)
Feeling stressed (1-5)	0.057	(0.060)	0.264***	(0.052)
Hours of sleep (parent)	-0.002	(0.061)	-0.049	(0.050)
Hours of sleep (child)	-0.193***	(0.067)	-0.153***	(0.054)
Child is happy and content (1-5)	-0.094**	(0.037)	0.018	(0.031)
Child is irritable and cries often (1-5)	-0.035	(0.059)	-0.005	(0.052)
Observations	1764		1725	

Notes: Table shows conditional coefficients from OLS regressions of the outcome variables on an indicator variable for full-day care (defined as attending center-based care in the morning *and* afternoon) for the sample of center-based care users. Additional controls: dummies for child age, number of children in family, child gender, age of mother, indicator for migrant status, single parent indicator, and an indicator for higher secondary schooling track. See Appendix Figure C5 identified sets. Source: pairfam survey 2013-2019.

Consistent with the time-use data, full-day care is also associated with more paid work, especially for mothers with higher educational attainment. We also find that mothers with higher education are more likely to feel stressed and feel that they spend too little time with their child when full-day care is used—this difference is smaller for mothers with lower education. These findings point to greater time constraints faced by mothers whose children are in full-day care compared to half-day care, potentially reducing the capacity to be involved in parenting activities, particularly for mothers with higher educational attainment. The last three rows of Panel B look at child outcomes. We see evidence for a reduction in children's nightly

sleep. Looking at two measures of children's well-being, as reported by mothers, we find that no differences in irritability but a lower prevalence in perceived happiness of children of lower educated households. This is in line with evidence of negative effects on socio-emotional behavior of full-day care on disadvantaged children (Loeb et al., 2007; Felfe and Zierow, 2018).

6 Conclusion

This paper asks how parenting activities respond to the usage of center-based care. Our analysis shows that differences in parenting activities are relatively small, despite the fact that mothers using center based care spent significantly less time in the presence of their child. We find that the lack of large decreases in activities can be explained both by the fact that the direct effect is small (since day care replaces less activity-rich hours of the day) and since there is a compensating indirect effect making evenings more activity-rich. These results are more pronounced for lower education mothers. A specific analysis of the full-day vs. half-day margin finds that using center-based care for 31 hours or more is associated with decreases in parenting activities that are proportionally compensated for during non-center hours. Further analyses using survey data shows small reductions in the frequency of certain activities (e.g. 8-12 pp reduction of daily playing) as a result of using full-day care over half-day care, as well as increases in maternal stress and some evidence for reduced happiness for children from households with lower maternal education. Thus, with respect to full-day care, the potential benefits through the home environment channel are less clear.

Our findings imply a need for greater awareness that development effects of center-based care may come through changes in the home environment not just through the usage of center-based care *per se* or through quality of this care. Policymakers may want to consider strengthening the home environment channel. One way this might be done is to encourage/enable the usage of center-based care by households with lower educational backgrounds. Our findings imply that the home environment channel is strongest for these households; however, these households are less likely to be enrolled in center-based care with children younger than 3. Research suggests that enrollment gaps with respect to maternal education are best addressed in Germany by improving availability of places reducing (or abolishing) parental fees (Jessen et al., 2020). Another way is for center-based care policy to be designed to allow for an easing of parental

time-constraints. Our analysis covers a period when usage of center-based care was expected to facilitate paid employment and, in the earlier years, this was even the condition for a place. While such conditions may increase the employment effects of center-based care, they may do so at the expense of child development by shutting out one of the mechanisms, i.e. the easing of parental time-constraints.

Data acknowledgments

Main analyses are based on the German Time-Use Survey. Access to scientific use files for all three waves was granted by the Research Data Centre of the Federal Statistical Office.

Further analyses in this paper are based on data from the first eleven waves of the German Family Panel (pairfam), release 11.0 (Brüderl et al., 2020). A detailed description of the study can be found in Huinink et al. (2011).

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APPENDIX (FOR ONLINE PUBLICATION)

A Stylized examples of adjustment mechanisms

Appendix Figure A1 presents stylized examples to illustrate various adjustment effects discussed in section 3. For simplicity of exposition, we focus the illustration on weekdays and waking hours (assumed to be 7:00 until to 20:00). Effects are illustrated by comparing the 'no center-based care' timeline (i.e. the baseline) to the other timeline where center-based care is used. In the 'no center-based care' baseline, the parent spends 13 hours with the child, and four of these are spent on parenting activities throughout the day. In scenario 1, the child attends center-based care from 08:00 until 16:00. As a result, the child is no longer present with the parent during these hours.[25] The direct effect is a decrease in parenting activities in absolute terms of one hour. As parenting activities outside day care hours are unchanged, there is no indirect effect.

Figure A1: Adjustment of parenting activities with use of center-based care
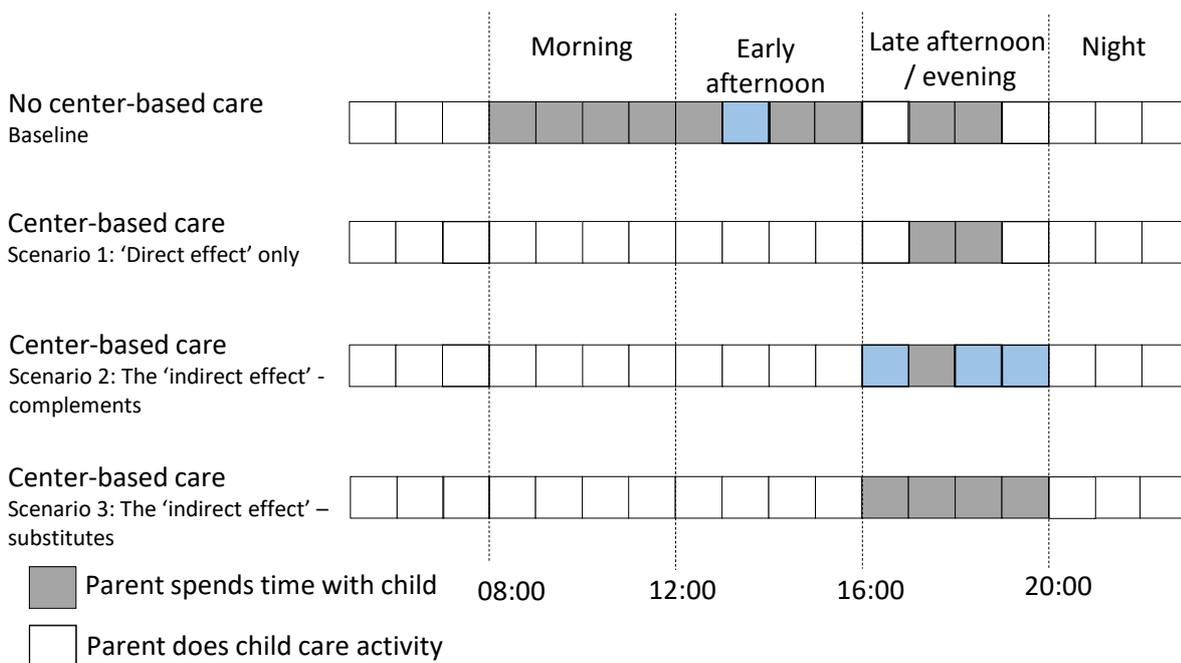
Notes: Figure illustrates adjustments of time with the child and of parenting activities when center-based care is being used under different scenarios. The upper line shows time use when no center-based care is being used, the bottom three lines show different scenarios when the child is in center-based care. See text for additional details.

Scenarios 2 and 3 illustrate the indirect effect, i.e., changes outside of center hours. If center-based care is a complement for parenting activities (scenario 2), it results in an increase of parenting activities in the evening period by one hour in absolute terms. Scenario 3 shows

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[25]In this simplified illustration, we assume a direct relationship between usage of center-based care and time spent with the child. As discussed though, in reality the relationship may be less strong, e.g., in cases where center-based care displaces informal care, e.g., by grandparents.

the indirect effect in the substitute case, where there is a reduction by 2 hours in the evening. The overall absolute effect then is a reduction of parenting activities by 3 hours.

Another aspect not covered by the examples—besides night and weekend adjustments—is that center-based care may affect the *type of parenting activities*: Parents might change the share of specific types of parenting activities that are most greatly associated with child development (e.g. reading to the child, see Kalb and van Ours, 2014; Price and Kalil, 2019) This change could work in ways similar to the previous two effects. The usage of center-based care may displace parenting activities of a certain type from one period of the day to another (e.g. if reading is done before sleep rather than during the day). Likewise, usage of center-based care may result in positive or negative indirect effects on particular activities. We present results for specific parenting activities based on time-use and survey data in subsections 5.3 and 5.4, respectively.

B   Data

B.1   Additional descriptive material for time-use data and pairfam

Figure B1: Average time use for mothers and fathers by survey wave
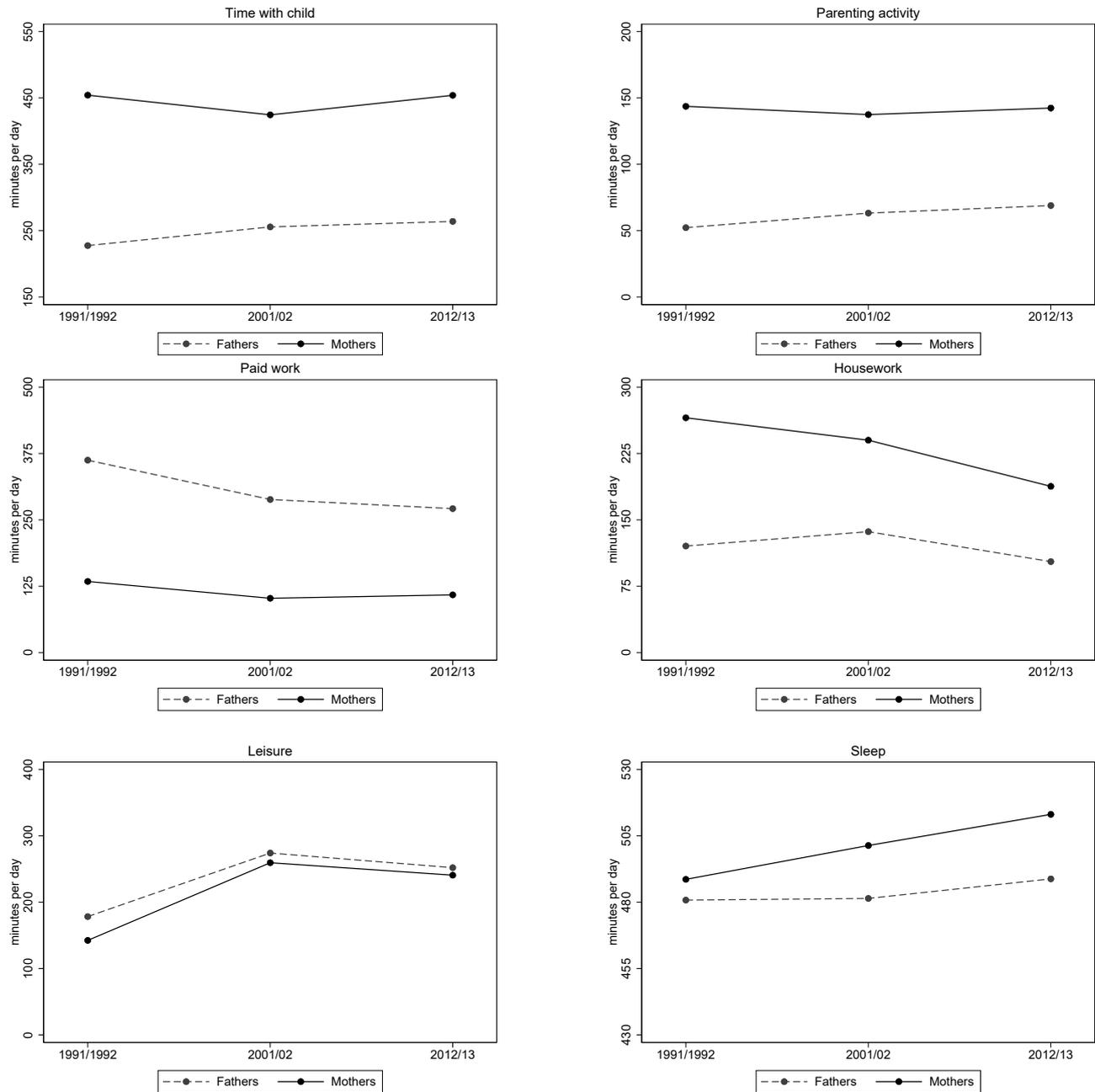
Notes: Coefficients are obtained by regressing activities on an indicator for mothers (vs. fathers) with child-age indicators and then evaluating means at average values (regressions are weighted). Sample consists of weekdays and weekend days. Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

Figure B2: Shared activities with the child by half- or full-day usage of center-based care
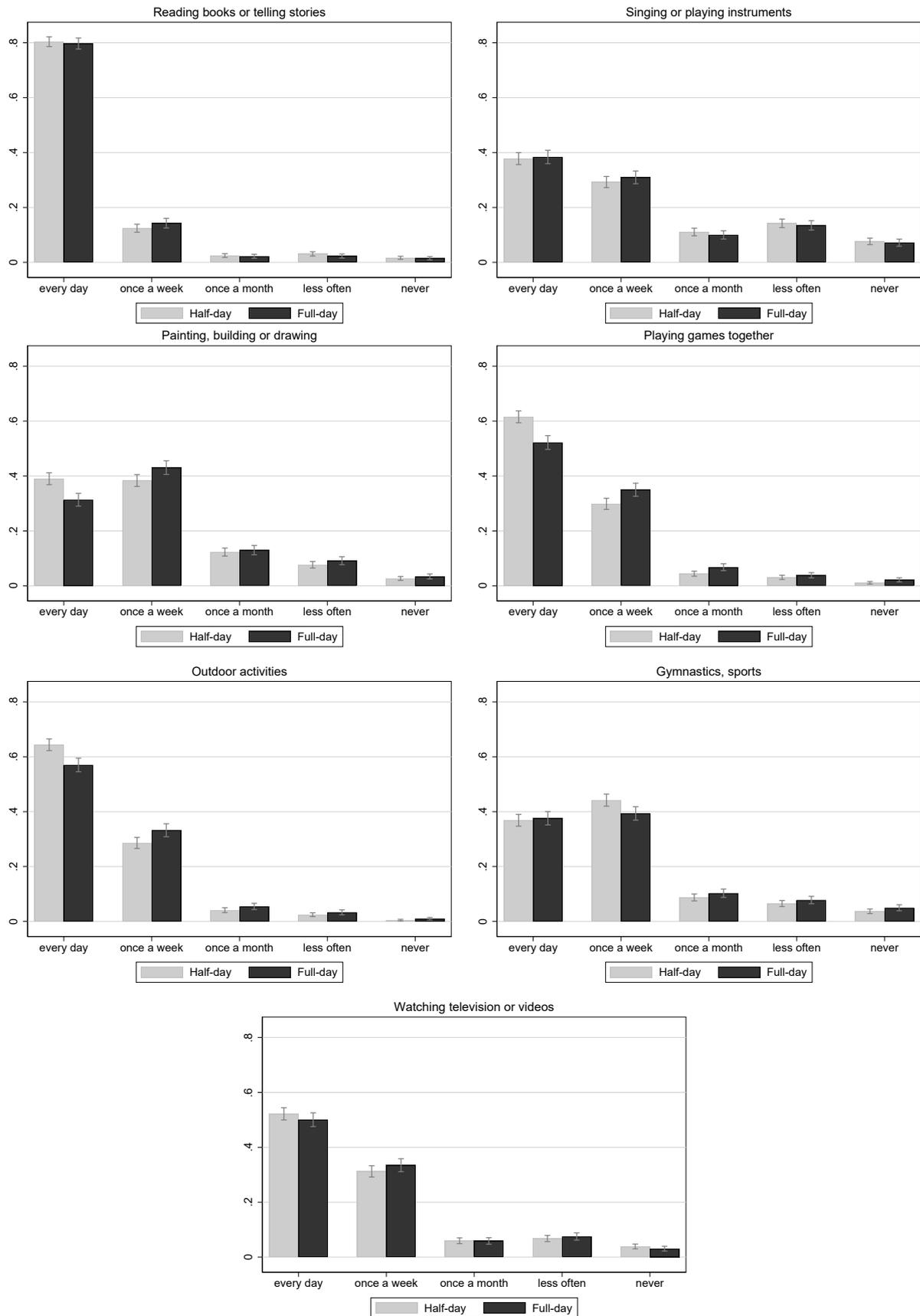
Notes: Figure shows the frequency of activities of mothers with their children (in the previous three months). Whiskers show 95% confidence intervals. Source: pairfam, 2013-2019.

Table B1: Characteristics of pairfam sample

Variable	(1)	(2)	(3)
	Amount of center-based care		
	Half-day	Full-day	Difference
Mother characteristics			
Age in years	34.93	35.12	0.199
	(0.11)	(0.13)	(0.171)
Migration background (0/1)	0.25	0.19	-0.054***
	(0.01)	(0.01)	(0.014)
Higher educated (0/1)	0.45	0.55	0.108***
	(0.01)	(0.01)	(0.017)
Married (0/1)	0.80	0.69	-0.113***
	(0.01)	(0.01)	(0.015)
Paid work (at least 10 h/w, 0/1)	0.56	0.75	0.192***
	(0.01)	(0.01)	(0.016)
Weekly hours in paid work	14.56	23.52	8.956***
	(0.33)	(0.40)	(0.519)
Personal net income (in Euro)	685.70	1107.25	421.550***
	(19.87)	(25.73)	(32.515)
Household net income (in Euro)	3369.22	3532.11	162.885**
	(50.59)	(53.10)	(73.340)
Child characteristics			
Girl (0/1)	0.49	0.49	-0.005
	(0.01)	(0.01)	(0.017)
Age in years	4.53	4.58	0.053*
	(0.02)	(0.02)	(0.029)
Number of siblings	1.45	1.29	-0.159***
	(0.02)	(0.02)	(0.032)
Observations	3345	2660	6005

Notes: Full-day child care indicates usage of center-based care in the morning *and* afternoon. Half-day care morning *or* afternoon. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Source: pairfam, 2013-2019

B.2 Activities categories in time-use data

Table B2: List of detailed parenting activities in time-use data, 2012/13 wave

Code	Activity	German (original)
2-digit category		
47	Child care	"Kinderbetreuung im Haushalt"
3-digit category		
471	Primary care, hygiene and supervision	"Körperpflege und Beaufsichtigung"
472	Assisting homework / giving instructions to child	"Hausaufgabenbetreuung/Anleitungen geben"
473	Playing and doing sports with child	"Spielen und Sport mit Kindern"
474	Talking with child	"Gespräche mit Kindern im Haushalt"
475	Accompanying child / realizing appointments with child	"Kind begleiten/Termine mit dem Kind wahrnehmen"
476	Reading to child / telling stories	"Kindern vorlesen/Geschichten erzählen"
479	Other activities with child	"Sonstige Aktivitäten im Bereich Kinderbetreuung"

Notes: Table reports the detailed (3-digit) parenting activities reported in the time-use data set, 2012/13 wave. The English-language activity labels are our own translation from the tables available with the time-use survey data for 2012/2013. Full tables for each wave (in German) can be accessed at website for the research data center of the German Federal Statistical Office:
https://www.forschungsdatenzentrum.de/de/haushalte/zve

Table B3: Overview of activities in time-use data, 2012/13 wave

Broad activity (1-digit)	German title of 1-digit activity	# of 3-digit activities	Examples of 3-digit activities
Personal care	"Persönlicher Bereich / Physiologische Regeneration"	5	Sleep, eating and drinking, washing and dressing, . . .
Paid work	"Erwerbstätigkeit"	9	Main work, secondary work, On-the job training, ...
Qualifications / Education	"Qualifikation / Bildung"	29	German lessons, higher education, training outside of work hours, . . .
Household and family care	"Haushaltsführung und Betreuung der Familie"	43	Preparing meals, shopping, small repairs, . . .
Voluntary work	"Ehrenamtliche Tätigkeit / Freiwilligenarbeit / Unterstützung für andere Haushalte / Teilnahme an Versammlungen"	5	Voluntary work, supporting other households, political events, . . .
Social life and entertainment	"Soziales Leben und Unterhaltung"	14	Talking (with friends), cinema, relaxation, . . .
Sport, hobbies and games	"Sport / Hobbys / Spiele"	20	Going for a walk, hunting / fishing, computer games, . . .
Media usage	"Mediennutzung"	13	Reading newspaper, watching TV, communication with computer or smartphone, . . .
Travel time	"Zweckbestimmte Wegezeiten und Hilfscodes"	27	Travel time to main work, travel time to school, travel time to visit friends, . . .

Notes: Table summarizes the broad (1-digit) activities that are reported in the German time-use data set. The English-language activity labels are our own translation from the tables available with the time-use survey data for 2012/2013. Full tables for each wave (in German) can be accessed at the website from the research data center of the German Federal Statistical Office:
https://www.forschungsdatenzentrum.de/de/haushalte/zve

B.3 Data on informal care

Variable	Obs	Mean	Std. Dev.	P25	P50	P75
All care types	14311	21.447	20.145	1	20	37
Informal care (outside the household)	14311	5.055	9.433	0	2	6
>0 hours (0/1)	14311	.554	.497	0	1	1
>20 hours (0/1)	14311	.05	.217	0	0	0
>30 hours (0/1)	14311	.02	.141	0	0	0
Family	14311	4.622	8.943	0	1	6
Other informal	14311	.433	3.114	0	0	0
Center-based care	14311	16.392	17.28	0	15	30
>0 hours (0/1)	14311	.52	.5	0	1	1
>20 hours (0/1)	14311	.416	.493	0	0	1
>30 hours (0/1)	14311	.243	.429	0	0	0
Center-based care	14311	15.614	16.846	0	0	30
Center-based care (conditional on usage)	7218	31.325	8.784	25	30	40
Age of child (in months)	14311	33.588	23.072	12	31	63

Notes: P25, P50 and P75 denote the respective percentiles of the distribution. Sample consists of children aged 0-72 months. Averages are calculates using survey weights. All care types include all forms of care indicated besides care provided by the respondent or the partner. Family care consists of care by the partner (if not living in the household), grandparents, older siblings and other relatives. Other informal care arrangements are nannies or a residual *other* category. Formal care reflects hours spent at either center-based care (95.1% in our data) or with publicly funded family day care (4.9%). Sample covers survey years 2010-2018. Data from the German Socio-Economic Panel (SOEP v35, see Goebel et al., 2019).

Table B5: Usage of formal and informal care

	< 3		≥ 3		< 3		≥ 3		All
	Center-based care				Full-day care				
	No	Yes	No	Yes	No	Yes	No	Yes	
Weekly hours at center-based care	0.00	28.56	0.00	28.80	23.60	33.71	24.93	33.61	21.26
	(0.00)	(12.06)	(0.00)	(11.01)	(11.27)	(10.62)	(9.76)	(10.57)	(15.91)
Family care in morning	0.18	0.03	0.14	0.03	0.05	0.02	0.03	0.03	0.07
	(0.39)	(0.18)	(0.35)	(0.16)	(0.21)	(0.15)	(0.16)	(0.16)	(0.25)
Family care in afternoon	0.23	0.25	0.21	0.28	0.28	0.22	0.31	0.24	0.26
	(0.42)	(0.43)	(0.41)	(0.45)	(0.45)	(0.42)	(0.46)	(0.43)	(0.44)
Family care - any time	0.25	0.26	0.24	0.28	0.29	0.22	0.31	0.24	0.27
	(0.44)	(0.44)	(0.43)	(0.45)	(0.45)	(0.42)	(0.46)	(0.43)	(0.44)
Other informal care in morning	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.01
	(0.12)	(0.05)	(0.16)	(0.05)	(0.05)	(0.06)	(0.05)	(0.04)	(0.08)
Other informal care in afternoon	0.02	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.03
	(0.14)	(0.17)	(0.20)	(0.20)	(0.18)	(0.16)	(0.20)	(0.19)	(0.18)
Other informal care - any time	0.02	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.03
	(0.14)	(0.17)	(0.20)	(0.20)	(0.18)	(0.16)	(0.20)	(0.19)	(0.18)
Observations	2560	1871	226	5991	963	908	3336	2655	10648

Notes: Sample consists of children aged 0-72 months. Columns are split by age of the child (0-2 vs. 3-5 years) and by usage of center-based care. Full-day care is defined as using center-based care in the morning and afternoon in contrast to only one of these (thus conditional on day care usage). Family care includes grandparents, siblings and other relatives. Other informal care arrangements consist of friends, a nanny in-house, and other non-relatives. Source: pairfam, 2013-2019.

C   Results

C.1   Results for fathers

Table C1: Fathers' differences in parenting activities

Outcome (in minutes per day):	All		Lower education		Higher education	
	Time with child (1)	Parenting activities (2)	Time with child (3)	Parenting activities (4)	Time with child (5)	Parenting activities (6)
Unconditional	-9.32	1.95	-29.2*	.311	-.157	-5.91
	(12.9)	(4.34)	(16)	(4.93)	(20.8)	(7.9)
Conditional	-22.1*	-1.77	-30.3**	2.62	-4.8	-9.9
	(11.8)	(4.5)	(14.9)	(4.98)	(18.9)	(8.27)
Mean	241.360	56.414	227.138	48.471	258.904	66.212
Identified set	[-27.014, -22.130]†	[-4.147, -1.773]†	[-30.682, -30.281]†	[2.620, 3.774]†	[-6.729, -4.797]†	[-13.466, -9.895]†
δ for 0 coefficient	-6.041	-0.858	33.444	-2.754	-3.004	-4.235
R^2 (unc., con.)	(0.037, 0.266)	(0.065, 0.156)	(0.013, 0.286)	(0.042, 0.149)	(0.007, 0.280)	(0.098, 0.169)
Observations	2037	2037	1125	1125	912	912

Notes: Table shows coefficients for the relationship between center-based care and parenting activities for fathers as in Table 2 for mothers. See Table 2 for further notes. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

Figure C1: Differences in activities for fathers by time of day and education

(a) Parenting activities
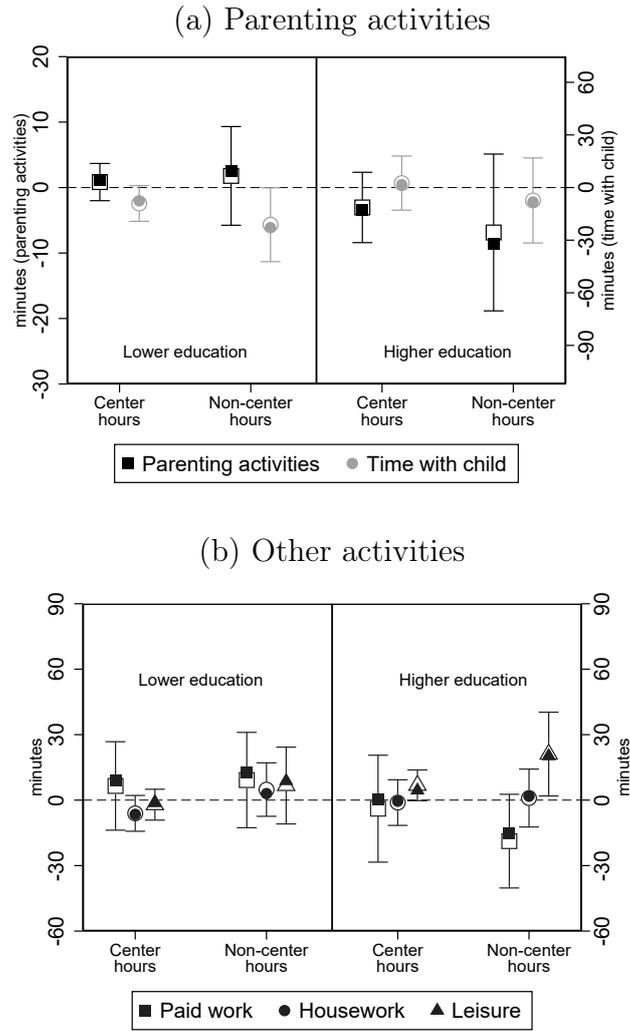
(b) Other activities

Notes: Figure shows direct and indirect effects of usage of center based care on parenting and non-parenting activities for fathers as in Figure 3 for mothers. See Figure 3 for other notes. Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

C.2 Tests of sample restrictions

In this Appendix section, we compare coefficients when different sample restrictions are imposed. Our main analysis sample with the time-use data is restricted to mothers with one child *under 10 years*. In Appendix Figure C2, we compare coefficients when we tighten the requirement and impose that only one child *of any age* is in the family (this reduces the observation number from 2,453 to 1,671). The reason for this is that although we know that the outcome *time with child* is constructed in the survey such that it only refers to children under 10, other parenting activities could still be conducted with older children (although these are arguably mostly performed with younger children). Coefficients in Appendix Figure C2 from both samples are remarkably similar and statistically indistinguishable.

Figure C2: Comparison of coefficients by sample restrictions
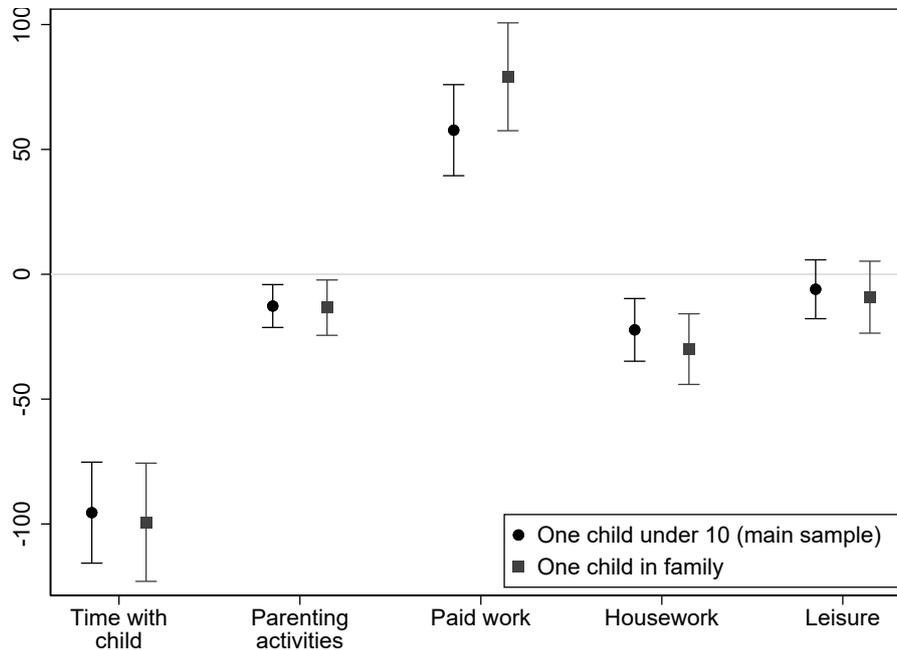
Notes: Figure shows coefficients and 95% confidence intervals for the main analysis sample (one child under 10 years) and for a tighter sample restriction of one child of *any age* in families. Coefficients based on conditional specification with control variables as indicated in Table 2. Source: German Time-Use Survey (1991/92, 2001/02 and 2012/13)

In Appendix Figure C3, we investigate to what degree the data driven sample restriction in the time-use data of one child under 10 years reduces the external validity of the findings, i.e. would the findings also hold for households with more children under 10 years of age? The household survey (pairfam) does not require the same sample restriction as the time-use survey as questions are child-specific (but it contains the information needed to impose the same sample restriction). Thus, we compare the coefficients shown in Table 3 obtained using the unrestricted sample (i.e. with potentially several children in this age group in one household) and apply the same restriction that we use in the time-use data. Appendix Figure C3 shows that, for parenting activities (left panel), coefficients are quite similar and all confidence intervals overlap. For non-parenting activities and other outcomes (right panel) coefficients are again

comparable. Overall this suggests that the sample restriction imposed do not severely threaten the generalizability of the findings to families with more than one child.

Figure C3: Comparison of coefficients by sample restriction
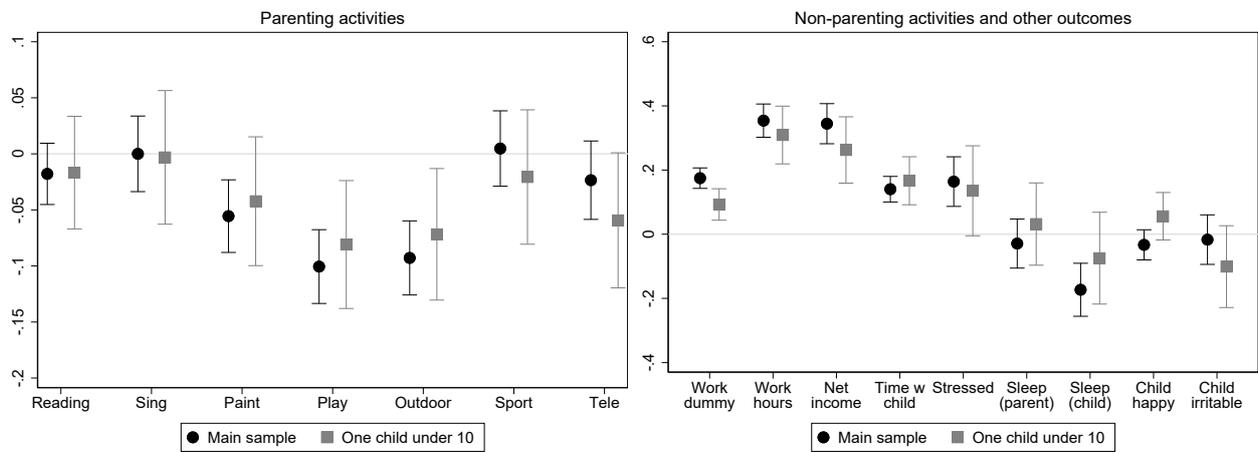
Notes: Figure shows coefficients and 95% confidence intervals for the unrestricted sample (*main sample*) and when applying the same sample restriction as in the time-use data (*one child under 10*). Estimates refer to mothers, i.e., the main sample estimates correspond to column (2) of Table 3. For presentation purposes coefficient and confidence intervals for working hours and net income are rescaled by a factor of 20 and 1000, respectively. $N = 3,483$ for the main sample and $N = 1,086$ for the one child under 10 sample. Source: pairfam, 2013-2019.

C.3 Further result figures and tables

Figure C4: Heterogeneity in overall differences in parenting activities of mothers
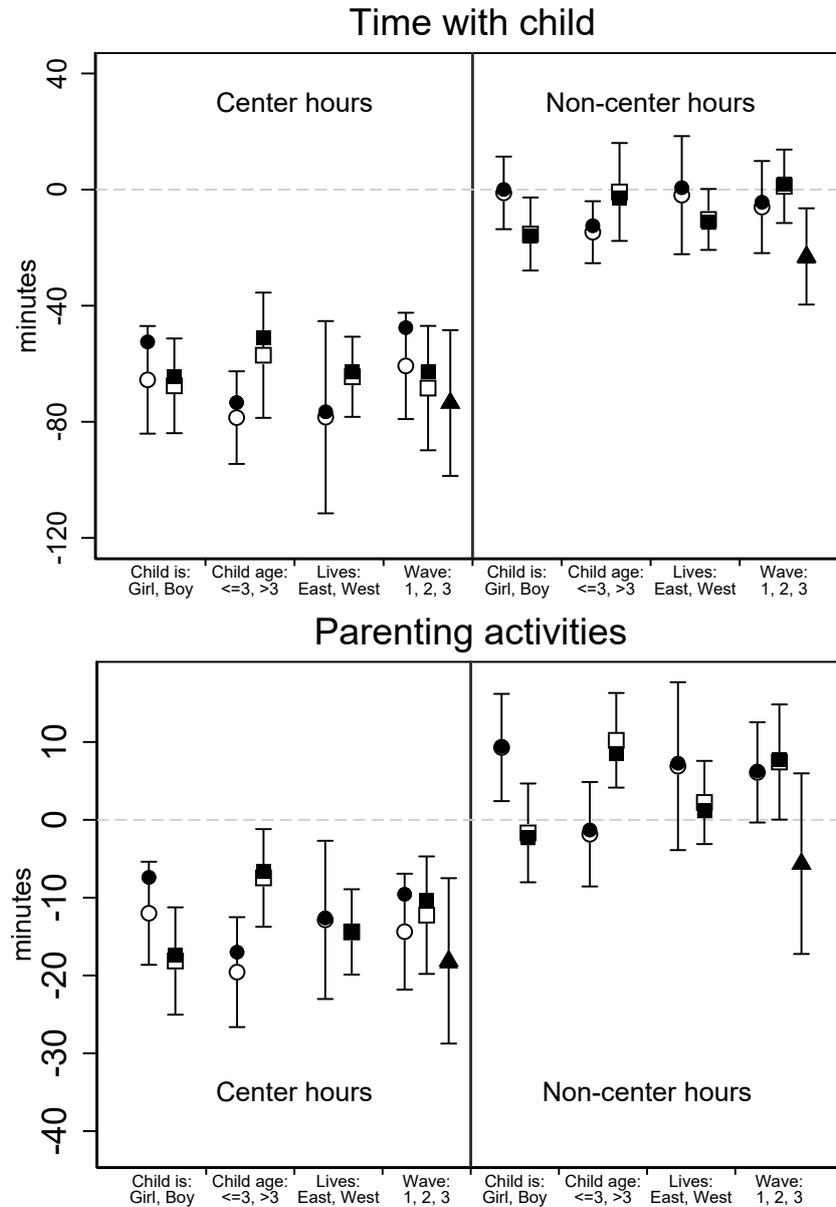
Notes: Plots show heterogeneities in effects of center-based care on parenting activities. Circles denote the respective first, squares the second, and triangles (if applicable) the third group. Estimates are based on separate sub-sample regressions of the outcome variable on a center-based care indicator and controls (see notes to Table 2 for details). Waves 1, 2, and 3 correspond to the time-use survey waves 1991/92, 2001/02, and 2012/13, respectively. The hollow shapes and whiskers indicate conditional coefficient ($\delta = 0$) and the 90% confidence intervals. The filled shapes indicate estimates under the assumption of $\delta = 1$, i.e. equally large selection on unobservables as on observables. The filled and hollow shapes indicate the identified set. Source: German Time-Use Survey (1991/92, 2001/02, and 2012/13)

Figure C5: Coefficients and identified sets for pairfam
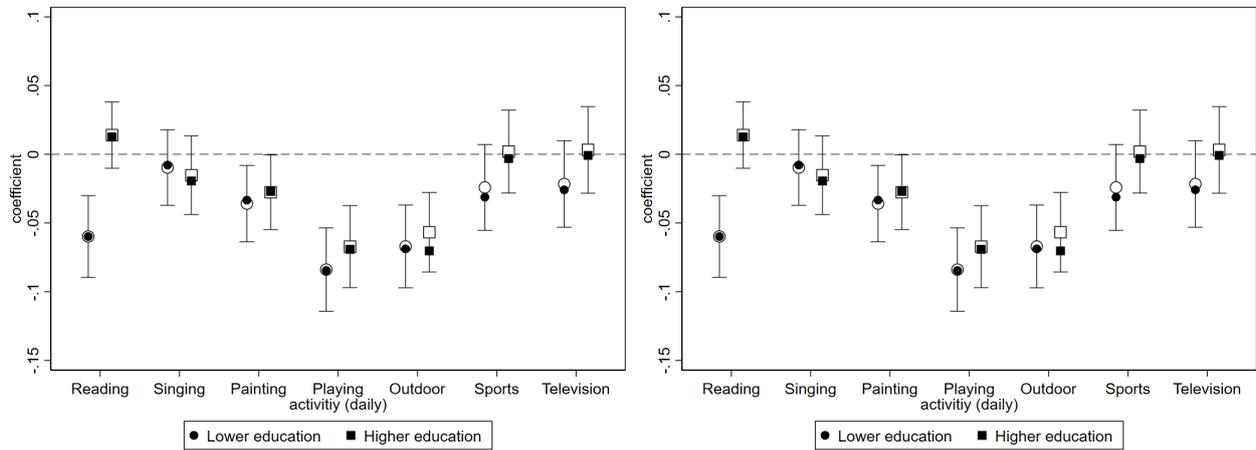
Notes: Figure shows coefficients and 90% confidence intervals for the outcomes shown in Table 3. The filled and hollow shapes together indicate the identified set. See Figure 3 for further notes. For presentation purposes coefficient and confidence intervals for working hours and net income are rescaled by a factor of 20 and 1000, respectively. Source: pairfam, 2013-2019.

Table C2: Differences in mothers' parenting and non-parenting activities, by time of day and education

	Lower education			Higher education		
	Center hrs	Evening and weekend	Night	Center hrs	Evening and weekend	Night
Outcome (in minutes)	(1)	(2)	(3)	(4)	(5)	(6)
Time with child						
Unconditional	-93.3***	-25.9*	-21.4***	-72.5***	-4.72	-4.4
	(12)	(13.6)	(6.42)	(14.3)	(16)	(6.02)
Conditional	-72.5***	-18.2**	-22.7***	-60.8***	-7.87	-1.64
	(9.51)	(9.23)	(6.44)	(11.4)	(9.49)	(6.02)
Mean	122.465	237.745	66.909	126.533	247.071	71.232
Identified set	[-72.529, -62.996]†	[-18.231, -15.457]†	[-23.453, -22.721]†	[-60.834, -55.549]†	[-9.065, -7.868]†	[-1.643, 0.129]
δ for 0 coefficient	5.100	5.367	22.264	6.507	-10.551	0.933
R^2 (unc., con.)	(0.113, 0.486)	(0.014, 0.614)	(0.028, 0.075)	(0.085, 0.456)	(0.023, 0.623)	(0.040, 0.097)
Parenting activities						
Unconditional	-15.8***	4.42	-6.39***	-23.6***	11.4*	-6.13**
	(3.76)	(4.63)	(2.12)	(5.4)	(6.3)	(2.96)
Conditional	-12.1***	4.7	-5.45**	-21.1***	10.2*	-4.69
	(3.5)	(4.46)	(2.27)	(4.93)	(5.89)	(3.07)
Mean	34.127	61.297	29.956	36.291	71.688	32.391
Identified set	[-12.127, -9.790]†	[4.695, 4.885]†	[-5.447, -3.462]†	[-21.119, -19.653]†	[9.462, 10.182]†	[-4.690, -0.763]†
δ for 0 coefficient	3.921	28.961	2.023	6.454	6.802	1.133
R^2 (unc., con.)	(0.157, 0.359)	(0.125, 0.269)	(0.148, 0.185)	(0.139, 0.371)	(0.097, 0.250)	(0.138, 0.167)
Paid work						
Unconditional	80***	.945	21.1***	53***	6.18	6.39**
	(11.6)	(4.57)	(5.79)	(12.1)	(4.43)	(2.65)
Conditional	46.6***	1.88	16.8***	39.7***	6.54	3.23
	(11)	(4.91)	(5.91)	(12)	(4.9)	(3)
Mean	94.643	17.491	15.929	91.802	17.441	12.701
Identified set	[30.885, 46.601]†	[1.876, 2.496]†	[14.383, 16.781]†	[32.993, 39.694]†	[6.543, 6.756]†	[1.731, 3.230]†
δ for 0 coefficient	2.600	-4.135	3.952	4.276	20.204	1.997
R^2 (unc., con.)	(0.086, 0.323)	(0.014, 0.031)	(0.031, 0.085)	(0.075, 0.284)	(0.018, 0.049)	(0.022, 0.096)
Housework						
Unconditional	-30.9***	-4.62	-3.74	-42.4***	-13.3*	-4.6
	(8.95)	(7.17)	(2.84)	(8.87)	(7.91)	(2.98)
Conditional	-16.8**	-6.25	-4.1	-28.6***	-3.89	-2.54
	(6.78)	(5.85)	(3)	(7.67)	(6.57)	(3.06)
Mean	92.417	108.434	32.494	77.486	96.852	27.806
Identified set	[-16.794, -11.628]†	[-6.829, -6.250]†	[-4.228, -4.098]†	[-28.591, -23.167]†	[-3.893, -0.413]†	[-2.542, -1.671]†
δ for 0 coefficient	2.956	-19.859	102.155	4.128	1.112	2.606
R^2 (unc., con.)	(0.018, 0.435)	(0.003, 0.455)	(0.003, 0.091)	(0.027, 0.368)	(0.005, 0.397)	(0.008, 0.055)
Leisure						
Unconditional	-11.4***	-8.47	-2.15	3.78	2.73	2.76
	(4.15)	(6.91)	(5.57)	(5.12)	(7.75)	(5.23)
Conditional	-12.3***	-2.25	3.6	3.11	-2.28	1.88
	(3.94)	(5.78)	(5.74)	(4.57)	(6.71)	(5.44)
Mean	28.125	71.223	101.606	31.464	77.454	96.474
Identified set	[-12.636, -12.287]†	[-2.253, -0.043]†	[3.597, 5.808]†	[2.844, 3.113]†	[-4.136, -2.283]†	[1.502, 1.877]†
δ for 0 coefficient	57.007	1.019	-1.750	7.379	-1.380	4.090
R^2 (unc., con.)	(0.026, 0.231)	(0.005, 0.384)	(0.006, 0.061)	(0.026, 0.273)	(0.005, 0.395)	(0.006, 0.102)
Observations	1357	1357	1357	1096	1096	1096

Notes: Center hours are from 8am-4pm on weekdays; evening and weekend consists of 4pm-8pm on weekdays and entire weekend days (8am-8pm). Nights are from 8pm-8am. Table shows coefficients from OLS regressions of the outcome variables on an indicator variable for center-based care usage. Figure 3 shows the conditional coefficients and the coefficient under the assumption of equally large selection on observables as on unobservables ($\delta = 1$). See Table 2 for other table notes and section 4 for details on the empirical specification. Source: German Time-Use Survey (1991/92, 2001/02, and 2012/13)

Table C3: Differences in mothers' specific parenting activities, by time of day and education

| | Lower education | | | Higher education | | |
| | Center hrs | Evening and weekend | Night | Center hrs | Evening and weekend | Night |
Outcome (in minutes)	(1)	(2)	(3)	(4)	(5)	(6)
Reading						
Unconditional	-.055	2.49**	-.85	.485	.0197	.726
	(.376)	(.998)	(.749)	(.302)	(.886)	(.67)
Conditional	.00886	1.96*	-.837	.497	-.564	.646
	(.477)	(1.08)	(.798)	(.395)	(.905)	(.725)
Mean	0.518	2.527	1.233	0.840	2.934	1.625
Identified set	[0.009, 0.041]†	[1.474, 1.959]†	[-0.837, -0.824]†	[0.497, 0.505]†	[-0.922, -0.564]†	[0.587, 0.646]†
δ for 0 coefficient	-0.298	2.855	8.356	13.822	-1.949	5.431
R^2 (unc., con.)	(0.009, 0.033)	(0.045, 0.074)	(0.028, 0.046)	(0.017, 0.047)	(0.033, 0.087)	(0.051, 0.109)
Playing						
Unconditional	-3.77	-4.53	.732	-8.85**	2.72	-3.02**
	(2.81)	(5.67)	(1.33)	(3.87)	(5.91)	(1.32)
Conditional	-3.2	-5.79	.975	-8.77**	3.06	-2.34*
	(2.58)	(5.55)	(1.33)	(3.96)	(5.81)	(1.34)
Mean	8.356	24.962	1.857	10.358	28.857	3.030
Identified set	[-3.197, -2.900]†	[-6.415, -5.789]†	[0.975, 1.117]†	[-8.769, -8.721]†	[3.055, 3.247]†	[-2.337, -1.484]†
δ for 0 coefficient	6.931	-17.490	-11.026	10.256	46.873	2.002
R^2 (unc., con.)	(0.043, 0.137)	(0.036, 0.123)	(0.015, 0.037)	(0.047, 0.152)	(0.048, 0.145)	(0.045, 0.066)
Talking						
Unconditional	-.356	-.589	-.0937	.35	.0974	-.117
	(.834)	(.635)	(.288)	(.414)	(.276)	(.394)
Conditional	-.504	-1.15*	-.649*	.67	.0573	-.335
	(.912)	(.662)	(.36)	(.484)	(.41)	(.327)
Mean	1.050	1.431	0.852	1.116	1.088	0.716
Identified set	[-0.562, -0.504]†	[-1.423, -1.149]†	[-1.052, -0.649]†	[0.670, 0.812]†	[0.024, 0.057]†	[-0.501, -0.335]†
δ for 0 coefficient	-13.177	-4.043	-1.475	-6.805	1.578	-2.546
R^2 (unc., con.)	(0.008, 0.062)	(0.012, 0.039)	(0.030, 0.055)	(0.011, 0.069)	(0.012, 0.023)	(0.015, 0.029)
Primary care						
Unconditional	-7.03*	6.98*	-6.33**	-9.23**	8.16*	-4.32
	(3.68)	(4.19)	(2.69)	(3.81)	(4.53)	(3.41)
Conditional	-6.16*	6.25	-7.71***	-11.1***	6.49	-4.07
	(3.69)	(4.2)	(2.69)	(3.6)	(4.47)	(3.6)
Mean	15.068	29.772	22.694	17.865	35.496	26.322
Identified set	[-6.160, -5.312]†	[5.350, 6.252]†	[-9.311, -7.710]†	[-13.159, -11.115]†	[4.803, 6.495]†	[-4.072, -3.005]†
δ for 0 coefficient	4.486	4.040	-11.301	-49.456	2.764	1.806
R^2 (unc., con.)	(0.224, 0.360)	(0.203, 0.292)	(0.147, 0.216)	(0.259, 0.416)	(0.193, 0.320)	(0.193, 0.223)
Other child care activities						
Unconditional	-.644	.0411	-1.09	-4.23*	.112	-.21
	(1.73)	(1.84)	(.922)	(2.56)	(1.5)	(.585)
Conditional	-.192	-.604	-1.45	-3.56	-.328	.96
	(2.45)	(1.98)	(.968)	(2.85)	(1.8)	(.703)
Mean	6.712	4.947	1.781	6.433	5.014	1.777
Identified set	[-0.192, -0.022]†	[-1.081, -0.604]†	[-1.599, -1.448]†	[-3.558, -3.273]†	[-0.716, -0.328]†	[0.960, 1.479]†
δ for 0 coefficient	1.122	-1.425	-13.433	6.846	-1.066	-1.826
R^2 (unc., con.)	(0.004, 0.048)	(0.011, 0.021)	(0.011, 0.057)	(0.011, 0.090)	(0.022, 0.039)	(0.011, 0.048)
Observations	657	657	657	726	726	726

Notes: Center hours are from 8am-4pm on weekdays; evening and weekend consists of 4pm-8pm on weekdays and entire weekend days (8am-8pm). Nights are from 8pm-8am. Table shows coefficients from OLS regressions of the outcome variables on an indicator variable for center-based care usage. See Table 2 for other table notes and section 4 for details on the empirical specification. Source: German Time-Use Survey (2001/02 and 2012/13)

Table C4: Full-day vs. half-day center-based care using one wave (2012/13), by time of day and education

	Lower education			Higher education		
	Center hrs	Evening and weekend	Night	Center hrs	Evening and weekend	Night
Outcome (in minutes)	(1)	(2)	(3)	(4)	(5)	(6)
Time with child						
Unconditional	-30.5*	53.1*	21.8***	-58.9***	21.2	10.2
	(16.4)	(29.8)	(8.08)	(15.6)	(22.2)	(7.34)
Conditional	-16.3	35*	19.4**	-55.3***	5.42	24.9***
	(15.9)	(19.9)	(8.5)	(14.6)	(18.7)	(7.24)
Mean	84.982	224.115	60.053	97.463	235.567	65.277
Identified set	[-16.304, -10.030]†	[27.705, 34.983]†	[15.797, 19.413]†	[-55.347, -53.421]†	[-1.008, 5.415]	[24.856, 30.505]†
δ for 0 coefficient	2.318	3.836	2.285	6.196	0.853	-2.343
R^2 (unc., con.)	(0.051, 0.334)	(0.038, 0.619)	(0.077, 0.107)	(0.086, 0.365)	(0.009, 0.535)	(0.017, 0.139)
Parenting activities						
Unconditional	-14**	9.79	7.8*	-15.8***	-6	-2.73
	(5.88)	(10.1)	(4.24)	(5.7)	(7.83)	(3.3)
Conditional	-13**	11	9.51**	-11.6**	-2.51	2.78
	(5.58)	(11.1)	(4.8)	(5.6)	(8.44)	(3.34)
Mean	20.387	50.914	22.907	23.252	64.453	25.128
Identified set	[-12.963, -12.447]†	[10.971, 11.811]†	[9.514, 10.303]†	[-11.563, -8.910]†	[-2.506, -0.156]†	[2.780, 5.465]†
δ for 0 coefficient	7.053	24.899	-76.330	2.980	1.058	-1.036
R^2 (unc., con.)	(0.068, 0.266)	(0.045, 0.101)	(0.036, 0.206)	(0.090, 0.266)	(0.069, 0.183)	(0.038, 0.136)
Paid work						
Unconditional	24.6	-1.89	-12.5	44.7**	6.19	-6.03
	(22.8)	(9.46)	(9.18)	(18.3)	(7.7)	(3.74)
Conditional	13.5	-7.79	-13.6*	62.3***	12.3	-4.42
	(19.5)	(9.88)	(7.65)	(17.4)	(8.6)	(3.29)
Mean	128.628	20.422	21.014	118.266	21.383	15.762
Identified set	[8.699, 13.457]†	[-11.404, -7.786]†	[-15.995, -13.572]†	[62.335, 71.243]†	[12.309, 16.314]†	[-4.420, -3.355]†
δ for 0 coefficient	2.518	-2.677	6.795	-18.792	-4.159	2.736
R^2 (unc., con.)	(0.040, 0.347)	(0.062, 0.162)	(0.281, 0.357)	(0.077, 0.381)	(0.041, 0.105)	(0.020, 0.053)
Housework						
Unconditional	-18.8	-9.76	3.31	-36.2***	-3.77	-9.66**
	(15.4)	(15)	(3.92)	(10.1)	(11.1)	(4.52)
Conditional	-1.52	-22.6	.0621	-25.8***	-10.3	-7.12
	(13.4)	(14)	(4.53)	(9.3)	(9.2)	(4.66)
Mean	86.870	109.725	31.706	69.987	96.586	27.868
Identified set	[-1.524, 5.200]	[-27.679, -22.617]†	[-1.926, 0.062]	[-25.822, -20.654]†	[-13.188, -10.340]†	[-7.122, -5.532]†
δ for 0 coefficient	0.237	-5.947	0.033	3.367	-5.542	2.883
R^2 (unc., con.)	(0.023, 0.481)	(0.022, 0.445)	(0.046, 0.115)	(0.072, 0.370)	(0.032, 0.453)	(0.036, 0.103)
Leisure						
Unconditional	1.53	3.52	-8.85	-11.6	7.07	4.32
	(7.99)	(15)	(10.7)	(7.88)	(13)	(7.79)
Conditional	9.7	4.75	-9.51	-14.2*	.287	-.341
	(6.71)	(13.7)	(10.6)	(7.57)	(10.7)	(7.77)
Mean	23.277	70.035	103.693	28.468	77.348	99.899
Identified set	[9.701, 13.492]†	[4.751, 5.231]†	[-9.863, -9.511]†	[-15.492, -14.185]†	[-2.510, 0.287]	[-2.924, -0.341]†
δ for 0 coefficient	-3.07	-27	20.4	175	.11	-.147
Observations	192	192	192	279	279	279

Notes: Center hours are from 8am-4pm on weekdays; evening and weekend consists of 4pm-8pm on weekdays and entire weekend days (8am-8pm). Nights are from 8pm-8am. Number of observations for parenting activities is indicated in square brackets and for all other variables before the brackets at the bottom of the table. Table shows coefficients from OLS regressions of the outcome variables on an indicator variable for center-based care usage. Figure 5 shows the conditional coefficients and the coefficient under the assumption of equally large selection on observables as on unobservables (δ = 1). See Table 2 for other table notes and section 4 for details on the empirical specification. Source: German Time-Use Survey (2012/13)