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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2019: 30 Jahre Mauerfall - Demokratie und Marktwirtschaft - Session: Labor Economics - Demography and Gender II, No. D15-V2

Provided in Cooperation with:

Verein für Socialpolitik / German Economic Association

Suggested Citation: Jessen, Jonas; Waights, Sevrin; Spieß, C. Katharina (2019) : The Impact of Formal Child Care on Parenting Intensity, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2019: 30 Jahre Mauerfall - Demokratie und Marktwirtschaft - Session: Labor Economics - Demography and Gender II, No. D15-V2, ZBW - Leibniz-Informationszentrum Wirtschaft, Kiel, Hamburg

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The Impact of Formal Child Care on Parenting Intensity

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1st March 2019

PRELIMINARY VERSION
Comments are solicited.

We examine the impact of formal child care usage on parenting intensity. We measure parenting intensity as the amount of time that parents spend on child rearing and, in particular, on educational activities with children. Using time-use data and a household survey, we estimate the effects at the extensive (use vs. non-use) and intensive (full-day vs. half-day) margins of child care, respectively. We make use of variation in child care availability across age groups and geographies to implement fuzzy-DD and IV-2SLS approaches. Our estimates imply that child care usage reduces the amount of time that parents spend with their children overall but that there are only small impacts on the time spent on educational activities, specifically. As a result, child care usage increases the educational content of the home environment. This finding offers evidence for a previously under-explored channel for child development effects, i.e. through the effect of child care on parenting intensity. We find these effects to be more pronounced for less-educated parents, which may help explain the bigger child development impacts for this group seen in the literature.

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1 Introduction

The positive effect of child care usage on childrens' development—documented as being particularly pronounced for disadvantaged children—is typically thought to come through the institution itself (e.g. Havnes and Mogstad, 2011; Cornelissen et al., 2018; Felfe and Lalive, 2018). This institutional channel is likely to be most relevant when formal child care provides a higher educational standard relative to home environment. Less-educated and lower-earning parents, in particular, may find it difficult to invest time, money, and knowledge into their children's educational development at home. Therefore, for disadvantaged parents there are potentially greater gains from using formal child care where trained teachers are able to fully dedicate themselves to the child's educational development.

A less explored but potentially important channel is through the impact of child care usage on the educational environment provided by the parents. If parents spend less time with a child overall, they may pay place a particular focus on the quality of that time and, having accomplished other tasks like housework while the child was at the institution, they may be able to concentrate more fully on interactions with the child. Furthermore, the standard of the home environment is likely to be positively related to having well rested, happy parents with higher household earnings. Day care allows parents to take on more paid work and/or to dedicate more time to self-care and own development. Alternatively, however, there may be negative effects on the home environment if parents use the time to take up additional activities that are stressful or tiring. Thus the direction of effects of the impact of child care usage on parenting is an important and theoretically open question.

The impact of child care on parenting is largely unexplored in the literature. To some extent impacts on the *quantity* of time dedicated to parenting are to be expected.¹ However, correlational research indicates that there is no decrease in the *quality* of time (Booth et al., 2002; Bittman et al., 2004). Quality is arguably a vague concept, but typically refers to activities that can be considered as being skill-forming. Baker et al. (2008) is one of the only existing studies that looks at the causal impact of child care usage on parenting outcomes. They examine the effects of Quebec's roll out of child care on child development outcomes as well as measures of the quality of parental interactions with children. The results indicate that child care usage reduces the quality of parental interaction and the well being of parents themselves.

This paper aims to address this lack of evidence by examining the impact of child care usage on parenting intensity. We measure parenting intensity as the amount of time that parents spend on child rearing and, in particular, on educational activities with children. In line with the literature (Doepke et al., 2019), we will use the term *educational activities*,

¹With the exception when children received an equal amount of non-parental, non-institutional care before, e.g. when grandparents took care of the child. This may well happen at times, but is unlikely to be the norm. Section 3.2 provides evidence that the total amount of time of parents in company with their child decreases with the take up of formal child care.

which include activities such as reading, singing or playing, rather than just looking after the children. In addition to parenting activities we also examine the impact on parental well-being and time spent on activities that may impact on parenting quality such as sleep, socialising, paid work and leisure time.

We use time-use data and a household survey to estimate the effects at the extensive (use vs. non-use) and intensive (full-day vs. half-day) margins of child care, respectively. We make use of variation in child care availability across age groups and geographies to implement fuzzy-DD and IV-2SLS approaches. Our estimates imply that child care usage reduces the amount of time that parents spend with their children overall but that there are only small impacts on the time spent on educational activities, specifically. As a result, child care usage increases the educational content of the home environment. This finding offers evidence for a previously under-explored channel for child development effects, i.e. through the effect of child care on parenting intensity. We find these effects to be more pronounced for less-educated parents, which may help explain the bigger child development impacts for this group seen in the literature.

The effect of non-parental care on children’s development is hotly debated in the literature, and despite most papers finding positive effects, no consensus has been reached and findings from other times and countries, with wildly varying formal child care institutions, cannot be generalised. By looking at the effects of both the extensive and the intensive margin of using day care centres on parent-child interaction, this research can shed light on a potential mechanism why children from families of different social backgrounds appear to be affected by day care differently in Germany (e.g. Spiess et al. (2003); Cornelissen et al. (2018); Felfe and Lalive (2018)). If children from families where many skill forming activities occurred go to child care and receive less at home then, this could hinder their development. On the other hand, if children were supported less at home, going to child care will have a more positive impact.

To our best knowledge, no study exists for Germany examining the causal effect of day care use on joint activities of parents and their children. In 2008, the German government passed a law (*TAG*) that from 1 August 2013 onward parents have a legal claim for a position in ECECs for one- and two-years old. As only about a third of children in this age group currently attend formal child care, a large increase of children attending is expected with potentially strong effects on within-family functioning. For children above three years, coverage is very high, but fewer than half attend ECEC full-day, despite strong increases over the past decade (Jessen et al., 2018). Thus for older children half- vs. full-day becomes the main differentiating factor.

We will proceed as follows; Section 2 provides details on the institutional setting and related literature. Section 3 provides an overview of the data used to analyse the extensive margin of child care, the empirical challenges and presents the results on this margin. Section 4 repeats this exercise for the intensive margin and Section 5 concludes.

2 Institutional background and related literature

The expansion of publicly subsidised day care in Germany has received increased political attention in the last decades. It has experienced another boost in 2013 when a law came into effect establishing a legal claim for a place in an early childhood education centre (ECEC) for under-threes. While the amount of three to six years old children in day care has remained on a relatively constant high level in the last decade, for up to three years old the number of children in day care centres has increased by 5.7% in 2016 compared to the previous year (Destatis, 2017). The increase was especially pronounced in West Germany where coverage rates are substantially lower. A goal of this expansion is to boost female labour supply by making it easier for both partners (or single-parents) to reconcile family and work. Clearly, the availability and utilisation of institutional child care has an effect on parents, children and their interaction.

On 1 August 2013 a legal claim for a place in a ECEC for one and two year olds came into effect, guaranteeing parents with a child in that age group that if they apply for a place that they will receive one. It does however not imply that enough places for the whole population of one and two years old are available, restricting parents' (usually mothers) labour supply and requiring other forms of non-formal care arrangements. A similar claim for an ECEC place for under three years old has already been implemented for children over three years in 1996. Attendance rates for this age group has been above 80% for more than two decades and has reached 93.4% in 2017. At the same time less than half of those children attend an ECEC full-day, i.e. more than seven hours per weekday on average.

Child care institutions in Germany are publicly subsidized, they are however not generally run by public carriers. ECECs receiving public subsidies are commonly either run by municipalities or by youth welfare organisations - in fact a higher share by the latter-, but regardless of the carrier they underlie strong regulations. Virtually all institutions in Germany receive public subsidies, meaning that a true private market for child-care is very limited. For ease of reading, we will use the terms public and publicly subsidized childcare interchangeably throughout this paper.

Provision of child care is mainly motivated by making it easier for mothers (and fathers) to return to work after childbirth, but an important factor of it is also that child care is often believed to have a positive impact on child development, especially for those from socially disadvantaged backgrounds. The vast literature on this has traditionally been plagued by the endogeneity of child care decisions. Herbst (2013) gets around this issue by using the *summer dip*² in the United States as the basis for an instrumental variable. He finds small negative effects of using non-parental care and in contrast to most research that disadvantaged children do not benefit either. However, findings from countries with different institutional settings cannot straightforwardly be generalised to the German context, where the child care provided is, as in most European countries,

²The *summer dip* is a dip in childcare participation observed for those assessed during the summer.

universal.³

A number of economic studies have looked at the effects of child care attendance on children's outcomes in Germany. The authors often seek to relate child care attendance to educational attainment whereby commonly studies focus on whether the children attend the highest school track (Gymnasium) later. Spiess et al. (2003) find that a positive correlation can only be observed for children with a migration background. Fritschi and Oesch (2008) who also use SOEP data similarly find that disadvantaged children benefit more, but they also identify positive effects for others. Landvoigt et al. (2007) and Schlotter (2011) look at the duration and intensity of child care attendance and find only small effects for some subgroups. This is because children from better backgrounds are more likely to go to child care and most of them would arguably have gone to the highest school track anyway. If the expansion of child care alters the composition of the children, the effects may differ. Cornelissen et al. (2018) estimate marginal returns of universal child care in Germany. They discover that children who are less (more) likely to select into child care - children from disadvantaged (privileged) backgrounds - would have the highest (lowest) gains and vice versa due to negative selection on gains. The authors argue that their findings are driven by a worse (better) home environment, yet this remains a black box. Felfe and Lalive (2018) also identify substantial heterogeneity and, once again, conclude that early centre-based care benefits disadvantaged children more. Additionally, the quality of the institutions play an important role. Müller et al. (2014) and Camehl (2016) provide summaries of studies of the effect of child care attendance on educational attainment and non-cognitive development respectively.

Cunha et al. (2006) argue that families play a more important role for skill formation over the life cycle than schools. A mechanism through which child care attendance can impact child development is that it may alter the amount and quality of time that parents spend with their children.⁴ Although a reduction in time is likely, this can potentially create an ambition to use the time spent with their children better, which could then lead to an *increase* of the quality of the time together. Booth et al. (2002) compare time patterns of families with infants spending more than 30 hours in care per week to those with zero using the ICHD Study of Early Child Care. Mothers with infants in care spent 12 fewer hours per week with them (fathers surprisingly spent more time), but the quality of their time remained unaffected. Bittman et al. (2004) employ Australian time use data and similarly find that sending a child to day care is associated with a decrease in the amount of time, but no effect on the quality. Both studies use simple OLS techniques in cross-sectional comparisons and are likely to be plagued by endogeneity. In a working paper, Khitarishvili et al. (2017) use panel data from the US and employ a fixed effect

³In contrast to Nordic countries with high enrolment rates, in Germany a relatively low share is in early care. Although the number has been increasing continuously for some time, the expansion is substantially slower than for example in Southern European countries Felfe and Lalive (2018).

⁴Of course, child care institutions also foster skill formation and Cunha et al.'s arguments rests on high returns of investments in early stages of the life. Nonetheless, a distinct role still falls to parents due to one-on-one care and the emotional attachment.

estimator and an instrumental variable estimator inspired by Herbst (2013) to circumvent this. Once again, they conclude that parents maintain high-quality interactions with their children once they start using non-parental care. For Germany this link, so far, has not been established. A gap which we seek to fill with this project.

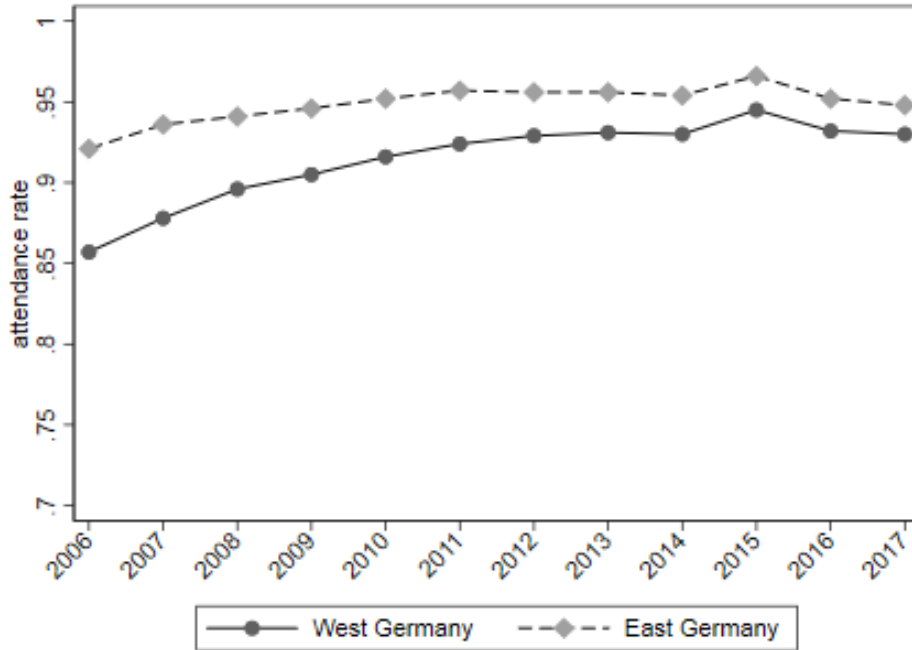


Figure 1: Attendance rates of three to six-years old children in East and West Germany

3 Extensive margin of child care

3.1 Data and empirical approach

We use data from the 2001/02 and 2012/13 waves of the German Time-Use Survey. Around 12,000 individuals from 5,000 households took part in the survey in each wave. The survey records individuals' activities over 3 days. Participants record their primary and an (optional) secondary activity for each 10-minute time slot on survey days. The activities are coded in 3-digit categories. 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 most broad 1-digit category of 'work in the household'. In addition to recording activities, the survey also provides a tick box to indicate if the time was spent with children under the age of 10 years. The parent may or may not be giving child care as an activity while spending time with the child. For example a parent spending time with a child under 10 may record ironing as the main activity and watching television as the secondary activity or, alternatively, the parent may record talking to the child as the main activity with nothing as the secondary activity.

We use this information from the survey to construct three categories of child care.

The first category *child present* is simply the amount of time spent with a child under 10 years based on the tick box. Given that specific interactions with the child are not necessarily recorded we think of this as the most basic form of child care. The second category *child care as main activity* is defined as the amount of time where the parent indicates any child care activity as the main activity. The third category *educational activity* is the amount of time that the parent indicates ‘reading’, ‘playing’, ‘talking’ or ‘doing homework’ with the child. These are activities we seem to be potentially more beneficial to the child’s cognitive development compared with the remaining activities of ‘body care and supervision’, ‘accompanying child’, and ‘other child care’. We then create shares of $\frac{\textit{child care as main activity}}{\textit{child present}}$ and $\frac{\textit{educational activity}}{\textit{child present}}$ as two measures of the quality of the intensity of parental interactions with the child in the home care environment. Finally, we also look at general parental time-use in non-childcare activities of sleep, work, and leisure. These may impact on parental well-being and, therefore, on the quality of interaction with the child.

The time use data is available on a person-day basis, where 10-minute segments are summed to provide the number of minutes that a person spent on each activity on a given survey day. Overall, there are 67,796 person-days recorded in the two waves. We restrict the sample to households with exactly one child of age 5 years or younger.⁵ After this restriction, the main sample has 5,572 parent-days. In addition to detailed time use, the survey records characteristics for household members such as age, gender, education, age of children, and whether formal child care arrangements are used. Table 1 presents summary statistics of the main sample. There are some significant differences in characteristics between parents that use formal child care arrangements and parents that do not. Parents that use child care are older (1.2 years), have more children (0.2 children) are less likely to have attended the lowest education track (-3.8 percentage points) and are less likely to be fully economically active (-11 percentage points).

Pooling the time-use data for 2001/02 and 2012/13 we run the following OLS regressions:

$$A_i = \beta K_i + X_i \gamma + d_{iar} + l_{ir} + \varepsilon_i \quad (1)$$

where A_i is the time allocated to a given activity A (e.g. child care) on parent-day i , K_i an indicator for usage of formal child care, X_i is a vector of controls such as parent age, single-parent status, etc., d_{iar} are child age-region indicators and l_{ir} is an indicator for the later wave (2012/13) for each region. The coefficient β is the difference in conditional mean time allocation to activity A between parents using and not using child care. This estimate does not capture a causal impact of child care attendance on activities, since unobserved determinants of time-use patterns in ε are likely to be correlated with child care usage.

In order to estimate the causal impact of child care usage on parental time-use we

⁵We use those with exactly one child in the specific age range since the child care usage indicator in the data reflect any child, and we want to be sure that the variable does not reflect child care usage of an older child that is still of child care age.

Figure 2: Roll out by child age – West

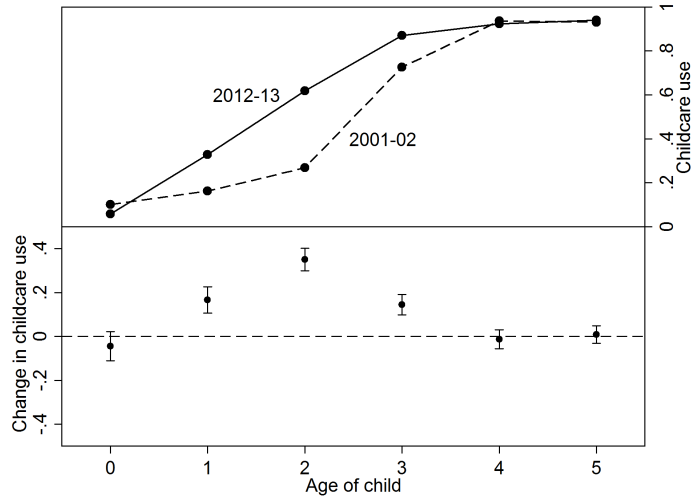
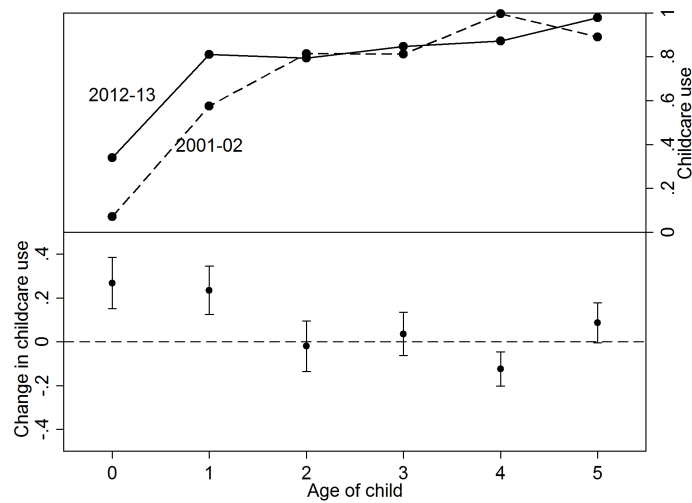


Figure 3: Roll out by child age – East



Notes: Plots show the roll out of childcare for kids 1, 2 and 3 years old in West Germany and 0, and 1 years old in East Germany. The top half of each plot shows childcare attendance rates by age of child in the early (dashed line) and late (dotted line) periods based on the sample of the time-use survey. The bottom halves show the magnitude of the change with the whiskers illustrating 95% C.I.s.

make use of exogenous differences in roll out of child care by child age between the two time-use survey waves 2001-01 and 2012-13. Germany introduced a legal entitlement to child care for children of at least 3 years in 1996, and then for children of at least 1 year in 2013. In accordance with these laws, Germany expanded child care with a priority first on children in the older age group 3-5 year and then on the younger age group 1-2. Figure 2 illustrates that the child care expansion in former-West Germany over the period of the analysis (2001-02 to 2012-13) was specific to 1, 2, and 3 year olds. The increase for 1, and 2 year old corresponds to a coordinated expansion over the period in order to prepare for lowering the age of the legal entitlement in 2013. For 3 year old, the increase likely corresponds to delayed provision of places in accordance with the 1996 legal claim (Bauernschuster and Schlotter, 2015). Shortages of places for this age group were in fact widespread in the years following the change. For 0 year olds there was no increase in places since the priority was on provision for age groups with legal claims. For 4 and 5 years there was no increase since attendance rates were already near 100% in the early period. Figure 3 shows a different pattern in former-East Germany where there were already high attendance rates for the younger age groups. As a result, expansion occurred only for the 1 year olds, and even for the 0 year olds with no legal claim.

We estimate the following first stage regression:

$$K_i = \sum_{a=1}^3 (d_{ia1} * l_i) + \sum_{a=0}^1 (d_{ia2} * l_i) + X_i \gamma + d_{iar} + l_{ir} + \epsilon_i \quad (2)$$

where the excluded instruments represent the age groups and region combinations where there was an expansion in childcare. The remaining age group-regions provide counterfactual parental time-use patterns. We use predicted values from this first stage to instrument child care usage in equation (1) in a 2SLS approach that is a type of fuzzy DD (Duflo, 2001; De Chaisemartin and D’Haultfœuille, 2017). The identifying assumption is that parental time use in different age groups in the same region would follow similar conditional trends had it not been for the differential expansion of childcare.

3.2 Results

Table 2 reports the main results for the extensive margin. The results indicate that child care usage leads to a decrease in the overall time that parents spend with a child. The point estimate falls between 35 minutes and 97 minutes depending on the specification, and all estimates are statistically significant at the 5% or 1% levels. There seems to be little effect on the absolute time spent on specific child care activities as the main activity or on cognitive activities specifically. As a result the quality of home care is not worsened by child care usage. If anything, there may be a small positive effect, as suggested by the OLS estimates. While these small effects are not confirmed by the IV estimates, they are not rejected either, given the larger CIs. The results also suggest that parents may spend a little more time doing paid work, less time on housework, and potentially more time

sleeping and social activities.

Table 4 reports the results for the high education sample and Table ?? for the medium education sample.⁶ The two samples display very different impacts of child care usage on time use by parents. For high educated parents, child care usage seems to have little effect on time spent with a child or the quality of that time, but leads to a qualitative improvement in parental time-use generally, i.e. less housework and more leisure. For medium education parents, child care usage significantly decreases the time spent with a child with little effect on specific child care activities resulting in an improvement in the quality of home care overall. However, there are fewer significant impacts on general parental time use. In fact, there is some evidence for negative impacts on leisure activities.

Overall, the results indicate that the impact of child care usage on child development could come through the home environment channel, but that the nature of this channel may be different for parents of different educational backgrounds. For high educated parents the impacts on housework and leisure might result in improved parental well-being, potentially improving the nature of relationships with a child. For medium educated parents, the reduction of the quantity of time spent with a child increases the quality of the remaining time, which combined with child care attendance, may result in a net increase in development enhancing interactions from the child’s perspective.

4 Intensive margin of child care

4.1 Data and empirical approach

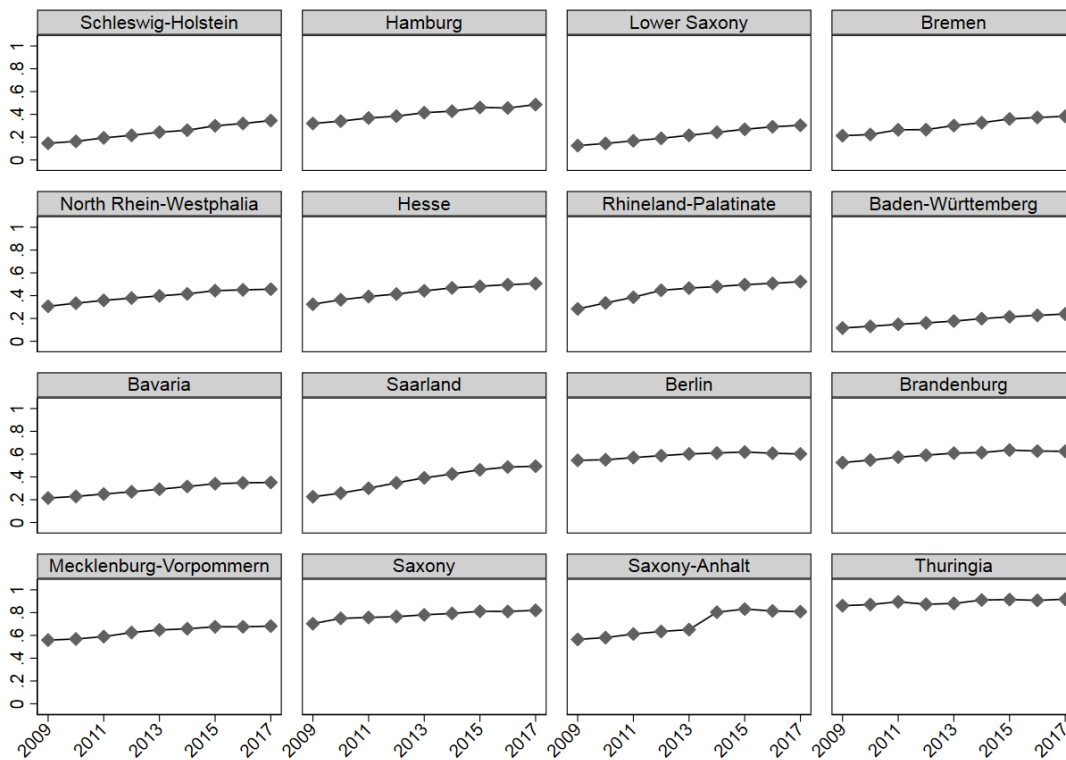
For the analysis on the intensive margin of child care we use data from the German Family Panel (pairfam).⁷ The longitudinal study for researching partnership and family dynamics in Germany has been collected annually since 2008, with nine waves released to date. Questions on parent-child joint activities have been asked since the fifth wave, hence the analysis will be restricted on the five waves since covering the years 2013 to 2017. The survey started with more than 12,000 main respondents (anchors) and - if available - their partners. The extensive questionnaire asks questions on a range of themes including intergenerational relationships and parenting, parenthood and child development, which are relevant for this study. For young children, the anchors are asked numerous questions for each child of the household separately.

The data contain information on which type of child care children received both in the morning and in the afternoon. This includes formal child care such as ECEC or a nanny, as well as informal types of care, e.g. grandparents, other relatives and friends or neighbours. Additionally, it also shows for how many hours per week the child received formal care. Looking at parent-child interaction, questions are asked about shared activities in the

⁶The low education sample suffered from a weak first stage, consistent with the fact that the child care roll out was targeted towards higher educated families.

⁷See Brüderl et al. (2017) for an extensive data documentation.

Figure 4: Full-day childcare share by state over time



Notes: Figure depicts the share of children attending childcare for at least 7 hours among all children aged three to six years per federal state over time. Reference date for each year is March 1. The last five states - Brandenburg to Thuringia - are the East German states. Source: Federal Statistical Office of Germany

past three months, e.g. reading books, singing or playing instruments, playing games or doing sports together. A number of other variables of interest can also be found, for example the age and citizenship of both parents (or the anchors' current partner), age of the child, place of residence and information on employment and the socioeconomic background. The German Family Panel is made available to the scientific community as a scientific use file. Additional regional information at the county level can be accessed confidentially on-site.

Questions on joint activities of parents with their children are asked for children of at least three years of age. As seen in Figure 1, for three to six-years old children, near full child care coverage has been reached, providing little variation in this respect. Expansion of full-day slots on the other hand is lagging behind, hence the intensive margin of child care has become the key political issue for this age group (Felfe and Zierow, 2018). Figure 4 shows the share of children in full-day childcare by federal state over time. In contrast to overall attendance rates, pronounced differences between East and West Germany can be observed with slight increases in both parts.⁸

We define half-day vs. full-day care as follows; children are coded as being in full-

⁸Appendix Figures A1 and A2 show a map of the full-day share as of 2013 and the development of the county share respectively.

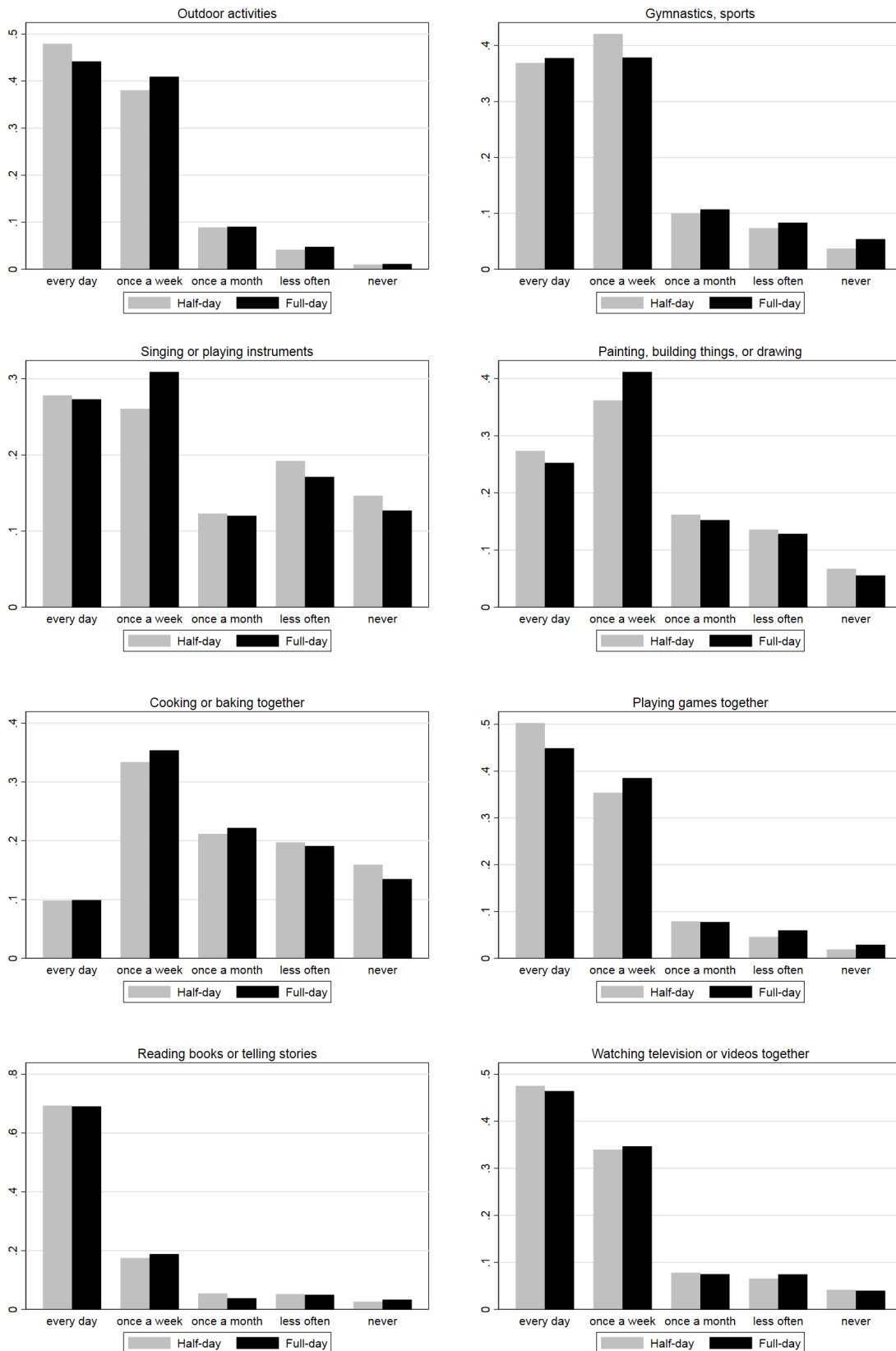
day care if they are usually at an ECEC in the morning *and* afternoon, whereas they are assigned to be in half-day if they are at an ECEC in the morning *or* afternoon. As an alternative measure for full-day care we use the hours spend at an ECEC. Here we define full-day care as being in care for more than 35 hours per week as in the official German definition. To have a clear distinction, half-day is defined for children with 10-25 hours. As the question on hours is available in fewer years, we present those results in the appendix. Both definitions imply that the analysis is restricted to children attending a formal child care institution.⁹ Conditioning on child care attendance, 67 percent of East German children and 32 percent of West German children are in full-day care at our data. With near full attendance rates, the intensive margin becomes the main differentiating factor in child care utilisation for this age group.

Table 5 shows summary statistics for children attending half- or full-day care and for their families and households. Half of the children are female and they are about 54 months (4,5 years) old on average, with children in full-day care being slightly older. Differences in predetermined, i.e. before the decision on the extent of child care was made, characteristics of the anchor suggest that children in half- and full-day care come from different backgrounds and that selection issues will arise; anchors from children in full-day care are older, less likely to have a migration background and have obtained higher schooling degrees. Children in full-day care are also less likely to come from (currently) married parents and more often from single parents. Labour market outcomes - labour force participation, working hours as well as personal and household net income - may be determined simultaneously with the extent of child care. Getting a full-day slot can allow both partners to work and / or enable more working hours corresponding to a higher income. Anchors from children in full-day care earn about 13 percent more, but as these households are less likely to have a double labour market income, their household net income is only marginally statistically significant higher. Finally we observe that anchors of full-day children display lower life satisfaction. However, this cannot be causally attributed to the child being in an ECEC for longer leading to less time spend together, but may simply result from the increase in working hours associated with this.

An overview of shared activities between children in half- and full-day care is shown in Figure 5. The following question is asked for each child of an anchor: *How often have you done the following things with your child during the past 3 months?* Frequencies are indicated on a five-point ordinal scale ranging from (almost) every day to never. For the charts, responses are pooled over the waves 5 to 9. For some activities, e.g. *reading books or telling stories* or *cooking or baking together*, only relatively small unconditional differences in the frequency between the intensive margin of child care can be observed. For other activities, such as *outdoor activities, painting, building things, or drawing or playing games together*, a shift from the activity occurring daily to weekly is apparent for children attending child care full-day.

⁹In both definitions care by nannies are included, although — in contrast to younger children — in this age group very few children receive this type of care.

Figure 5: Shared activities by half- or full-day ECEC



Notes: Figure shows the frequency of activities of anchors with their children in the previous three months. Source: Pairfam, waves 5-9. $N = 4269$

The empirical strategy in this section follows a comparable approach outlined in Section 3.1 with similar limitations. Pooling over the waves 5 to 9, (covering the years 2013 to 2017), in a first step we run the following OLS regression:

$$Y_{ijkt} = \beta full_i + X_{ijt}\gamma + wave_t + \alpha_s + \epsilon \quad (3)$$

with Y_{ijkt} being an activity of child i of family j in county k at time t . X_{ijt} is a set of child and family characteristics, and $wave_t$ and α_s are wave and state fixed effects (5 and 16 respectively). $full_i$ is a binary variable that equals one if the child is in child care full-day, β is the coefficient of interest. Despite a rich set of covariates, it is unlikely that all unobservable determinants of joint activities and child care usage can be accounted for, which leads to biased estimates.

To account for selection on unobservables and for the simultaneous determination of child care usage and joint activities, we instrument full-day attendance by using the county share of full-day attendance as a predictor for actual attendance. The underlying assumption of this strategy is that demand for hours of child care exceed the supply at a local level.¹⁰ Gupta and Simonsen (2012) use a similar strategy to account for non-random selection into child care in Denmark. The instrument is also similar in flavour to using local labour market conditions as an instrument for maternal employment as has been done in the literature, e.g. Baum (2003), Cawley and Liu (2007) or Felde and Lalive (2018).

We estimate the first-stage regression

$$full_i = \mu Share_k + X_{ijt}\eta + wave_t + \alpha_s + u \quad (4)$$

with $Share_k$ being the county level of full-day child care attendance as provided by the Federal Statistical Office and the other arguments as in Equation 3. The predicted values of $full_i$, the individual full-day attendance, are then used in Equation 3.

A valid instrument must be *relevant*, i.e. local child care conditions must affect individual attendance, and it needs to fulfil the *exclusion restriction*, meaning that local child care conditions should only have an influence on joint activities through the channel of affecting full-day attendance. The first assumption can be tested empirically. Appendix Table A5 shows first stage estimates and the corresponding F-statistic. The county full-day share is a clear predictor for individual full-day attendance and the F-statistic shows that the county full-day share is a strong instrument at conventional levels (see Stock and Yogo, 2005) for all children. However when the sample is split by the anchor's education level, it becomes evident that the county share is a better predictor for children from

¹⁰This assumption can be checked empirically. Using the German Child Care study (*KiBS*), we look at the discrepancy between hours of child care wished for by parents and the actual hours of child care utilised for children aged three to seven in 2016 ($N = 7,997$). With a median shortage of more than six hours and a 75th percentile of ten hours, an underprovision at the intensive margin of child care is clear. A more detailed depiction of this is available from the authors upon request.

higher educated parents. For children from parents with low education, the county share has no explanatory power on individual attendance.¹¹ Thus we refrain from reporting 2SLS estimates for this group. A potential pitfall of the regional level instrument is that while it impacts individual decision making, we cannot account for regional sorting of individuals. Parents with a stronger preference for full-day care may move to counties with a better provision and those parents may also be different to others in terms of the amount of joint activities they conduct with their children. By using a set of child and anchor-specific covariates we try to alleviate those concerns.

4.2 Results

Table 6 shows the main results for the full sample. OLS coefficients change only little when control variables are added. As the confidence intervals of the 2SLS estimates are relatively large, we do not interpret the magnitude but rather the direction of effects.

Of the educational activities, only *playing games together* is done less often when the child is in formal care full-day. The OLS coefficients are significant at the 1% level, once we account for selection with an instrumental variable at the 5% level. The most regularly performed activity and perhaps also the most obviously development enhancing one, *reading books or telling stories*, is unaffected. Turning to care-taking activities next, negative effects can be found for *outdoor activities* and at the margin for *watching television* in the IV estimates. The latter is the most passive interaction and is likely due to the reduced time children spent at home. The other two activities that are reduced once children are in full-day care are activities that are performed regularly in ECEC, suggesting that parents consciously decide how to alter the interactions with their children in order to maintain development.

In a next step the sample is split by the highest school degree obtained by the anchor. The most pronounced mean difference is in the frequency of reading to their child which is increasing strongly with the education level (from 48 percent of the low educated anchors reading to their child daily to 78 percent for high educated parents). The same holds to a lower degree singing or playing instruments. For other activities, no monotonic patterns by education level can be observed. Standard errors for the effect of using full-day care are comparable for the high education group to those in the full sample, whereas the ones for the medium education group are substantially larger. The results for the high educated sample suggests a maintenance of a home environment and, if anything, even a slight improvement as parents sing and play instruments with their children more often (significant at the 10% level) and an increase is also observed for sports and cooking or baking. The OLS estimates for all education groups also suggest a reduction in the frequency of playing games together and for outdoor activities, but this pattern can only be confirmed by the IV estimates for the high education groups. A reduction of in reading

¹¹Note that the same pattern was observed in Section 3.2, where children from higher educated families profited more from the expansion of child care for under threes.

frequency is seen by medium educated group in the OLS estimates, but the large standard errors make the IV estimate inconclusive.

All in all the results indicate that especially high educated parents manage to maintain educational activities with their children once they go to ECES full-day. This holds especially true for the high education sample which even sing with their children more regularly. A meaningful reduction of parent-child interactions is only pronounced in outdoor activities. The results suggest that parents see formal child care only partially as a substitute for parental care, but rather as a complement as the reduced total time available together does not reflect in fewer development enhancing activities.

5 Conclusion

Child care usage has increased strongly in developed countries in the past decades. Not only enabling a faster return to the labour market for both parents, it is also seen as an instrument to foster child development. Early differences in cognitive and non-cognitive outcomes between children of different socioeconomic groups are well documented. As most — though not all — research on the developmental effects of formal child care usage on children has found that those from disadvantaged backgrounds profit more (boys especially), child care can be a mechanism to *level the playing field* in early years.

The extant literature argues that children from disadvantaged backgrounds have stronger positive effects due to the worse counterfactual in an untreated state, i.e. a less beneficial home environment (see e.g. Cornelissen et al., 2018). A largely unexplored but potentially important mechanism is the interplay of the home environment with the usage of child care. When children attend formal child care, parents may consciously alter the parent-child interactions in order to maintain the development of their children, depending on whether child care is mostly seen as a complement or a substitute to parental care.

Using time-use data and a household survey, we estimate the effects of child care on parenting intensity at the extensive (for children below three years) and intensive (three to six years) margin. Our results imply that although increased take up of child care at the intensive margin (use vs. non-use) reduces the absolute amount of time parents spent with their children, but that the educational content of the home environment can be preserved. At the extensive margin (full-day vs. half-day) the estimates confirm that activities that also occur at the child care institutions are reduced by parents of all education levels, but that especially high educated parents maintain or even increase educational activities with their children.

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Table 1: Time-use survey participant characteristics by child care use

Variable	Child care usage		Difference
	(1) Not used	(2) Used	
Female	0.53 (0.01)	0.52 (0.01)	-0.007 (0.015)
Age	31.93 (0.24)	33.21 (0.17)	1.278*** (0.291)
Number of children	1.83 (0.02)	2.03 (0.01)	0.204*** (0.025)
Abitur (Upper track school)	0.37 (0.01)	0.39 (0.01)	0.017 (0.014)
Realschule (Middle track school)	0.34 (0.01)	0.32 (0.01)	-0.016 (0.014)
Hauptschule (Lower track school)	0.15 (0.01)	0.11 (0.01)	-0.038*** (0.010)
Married	0.69 (0.01)	0.69 (0.01)	-0.002 (0.014)
Single parent	0.09 (0.01)	0.08 (0.00)	-0.009 (0.008)
Economically active	0.42 (0.01)	0.31 (0.01)	-0.110*** (0.014)
Economically part-active	0.13 (0.01)	0.14 (0.01)	0.013 (0.010)
Non-German citizenship	0.02 (0.00)	0.02 (0.00)	-0.006 (0.004)
Resident in (former) East Germany	0.14 (0.01)	0.22 (0.01)	0.082*** (0.011)
Observations	1580	3992	5572

Pooled time-use surveys for 2001/02 and 2012/13. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 2: Effects of child care on parental time-use

Outcome variable	Mean	OLS		2SLS
	(1)	(2)	(3)	(4)
Parenting				
Child present	331.206*** (3.166)	-35.377*** (9.553)	-40.979*** (8.198)	-97.044** (45.263)
Child care main activity	80.725*** (1.217)	-3.346 (3.499)	-5.985** (3.030)	-21.859 (17.763)
Educational activity	66.915*** (1.229)	-0.847 (3.467)	-2.531 (3.221)	-8.860 (19.843)
<u>Child care main activity</u> Child present	0.262*** (0.005)	0.039** (0.017)	0.037** (0.017)	-0.059 (0.074)
<u>Educational activity</u> Child present	0.207*** (0.004)	0.023** (0.010)	0.022** (0.010)	0.004 (0.054)
Non-parenting				
Paid work	164.311*** (3.194)	20.020** (9.392)	16.204** (7.633)	53.637 (42.345)
Housework	165.456*** (1.940)	-13.458** (5.677)	-13.554*** (5.033)	-75.237*** (26.749)
Sleep	503.552*** (1.450)	-4.812 (4.395)	-2.500 (4.017)	45.825** (22.282)
Social activity	94.641*** (1.577)	-6.781 (4.762)	-7.217 (4.642)	46.100* (25.101)
Sports or nature activity	56.814*** (1.295)	3.709 (3.844)	4.322 (3.486)	14.323 (17.743)
Control variables		NO	YES	YES
Weak ident. F-stat		.	.	29.358
Observations	5572	5572	5572	5572

Each cell in columns (2)-(4) reports the estimate from a separate regression of the effect of child care on outcome variable in the left column. Column (1) reports the mean of the outcome variable. Columns (2) and (3) report OLS regressions of equation (1) and column (4) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (2) includes no further controls. Columns (3) and (4) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Effects of child care on parental time-use: high education sample

Outcome variable	Mean	OLS		2SLS
	(1)	(2)	(3)	(4)
Parenting				
Child present	371.941*** (5.060)	-43.112*** (16.375)	-46.891*** (13.787)	24.248 (58.535)
Child care main activity	104.396*** (2.079)	-3.447 (6.499)	-6.508 (5.993)	10.378 (25.179)
Educational activity	84.690*** (2.052)	-10.023* (5.954)	-10.803* (5.795)	-11.002 (24.533)
$\frac{\text{Child care main activity}}{\text{Child present}}$	0.309*** (0.006)	0.032* (0.017)	0.030* (0.017)	-0.002 (0.073)
$\frac{\text{Educational activity}}{\text{Child present}}$	0.245*** (0.006)	0.003 (0.016)	0.007 (0.016)	0.010 (0.064)
Non-parenting				
Paid work	187.615*** (5.164)	4.318 (16.710)	0.689 (13.287)	-29.226 (55.483)
Housework	178.955*** (3.062)	-37.986*** (9.675)	-32.214*** (8.606)	-97.748*** (34.465)
Sleep	487.434*** (2.071)	9.256 (6.265)	8.513 (5.967)	80.865*** (26.281)
Social activity	92.044*** (2.334)	5.153 (7.063)	2.474 (6.763)	60.454** (29.711)
Sports or nature activity	40.821*** (1.590)	12.613*** (4.218)	12.106*** (4.408)	34.252* (19.410)
Control variables		NO	YES	YES
Weak ident. F-stat		.	.	20.982
Observations	2143	2143	2143	2143

Each cell in columns (2)-(4) reports the estimate from a separate regression of the effect of child care on outcome variable in the left column. Column (1) reports the mean of the outcome variable. Columns (2) and (3) report OLS regressions of equation (1) and column (4) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (2) includes no further controls. Columns (3) and (4) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: Effects of child care on parental time-use: medium education sample

Outcome variable	Mean	OLS		2SLS
	(1)	(2)	(3)	(4)
Parenting				
Child present	353.317*** (5.348)	-80.677*** (15.753)	-82.366*** (13.769)	-213.169*** (62.175)
Child care main activity	92.831*** (2.100)	-11.319* (6.121)	-9.773* (5.613)	-27.185 (26.851)
Educational activity	78.284*** (2.194)	-0.037 (6.104)	-0.229 (6.002)	-28.038 (30.287)
<u>Child care main activity</u> Child present	0.296*** (0.010)	0.107*** (0.041)	0.115*** (0.041)	0.279* (0.159)
<u>Educational activity</u> Child present	0.244*** (0.007)	0.049*** (0.018)	0.052*** (0.018)	0.049 (0.111)
Non-parenting				
Paid work	186.776*** (5.856)	48.071*** (16.909)	51.750*** (13.912)	141.703** (65.497)
Housework	189.880*** (3.425)	-4.592 (9.758)	-9.023 (8.920)	-14.873 (41.119)
Sleep	490.546*** (2.518)	-28.052*** (7.576)	-26.256*** (7.263)	-8.687 (35.460)
Social activity	95.568*** (2.792)	-9.936 (8.733)	-8.903 (8.626)	-81.148** (39.902)
Sports or nature activity	39.158*** (1.711)	-0.124 (5.411)	-1.207 (5.278)	8.252 (23.546)
Control variables		NO	YES	YES
Weak ident. F-stat		.	.	14.295
Observations	1830	1830	1830	1830

Each cell in columns (2)-(4) reports the estimate from a separate regression of the effect of child care on outcome variable in the left column. Column (1) reports the mean of the outcome variable. Columns (2) and (3) report OLS regressions of equation (1) and column (4) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (2) includes no further controls. Columns (3) and (4) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Characteristics of household survey participants by child care usage

Variable	(1)	(2)	(3)
	Amount of child care		Difference
	Half-day	Full-day	
<u>Child characteristics</u>			
Female	0.47 (0.01)	0.49 (0.01)	0.020 (0.015)
Child age in months	53.71 (0.21)	54.78 (0.23)	1.063*** (0.316)
Health (good or very good)	0.92 (0.01)	0.92 (0.01)	0.003 (0.008)
Siblings	1.14 (0.02)	1.02 (0.02)	-0.115*** (0.029)
<u>Anchor and household characteristics</u>			
Female	0.58 (0.01)	0.60 (0.01)	0.011 (0.015)
Age	35.63 (0.11)	36.03 (0.12)	0.394** (0.162)
Migration background	0.22 (0.01)	0.18 (0.01)	-0.036*** (0.012)
High education (Abitur)	0.43 (0.01)	0.52 (0.01)	0.089*** (0.015)
Medium education	0.38 (0.01)	0.36 (0.01)	-0.016 (0.015)
Low education	0.19 (0.01)	0.11 (0.01)	-0.076*** (0.011)
Married	0.80 (0.01)	0.70 (0.01)	-0.108*** (0.013)
Single parent	0.07 (0.01)	0.09 (0.01)	0.019** (0.008)
Working (at least 5 hours)	0.74 (0.01)	0.83 (0.01)	0.090*** (0.012)
Working hours	25.25 (0.41)	30.37 (0.40)	5.119*** (0.569)
Personal net income	1343.25 (33.56)	1521.35 (33.19)	178.094*** (47.201)
Household net income	3394.45 (53.79)	3527.68 (48.30)	133.237* (72.297)
Satisfaction with family	8.52 (0.03)	8.31 (0.04)	-0.209*** (0.049)
Satisfaction with leisure	6.27 (0.04)	6.18 (0.05)	-0.089 (0.064)
Life satisfaction	7.71 (0.03)	7.60 (0.04)	-0.107** (0.049)
Observations	2298	1972	4270

Pooled over Pairfam waves 5-9. Full-day child care indicates usage of formal child care institution in the morning and afternoon. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6: Effect of full-day child care on parent-child activities

Outcome variable (daily)	Mean	OLS		2SLS
	(1)	(2)	(3)	(4)
Educational activities				
Reading books or telling stories	0.692	0.013 (0.015)	-0.027* (0.014)	-0.137 (0.102)
Singing or playing instruments	0.276	-0.010 (0.015)	-0.024 (0.015)	0.170 (0.109)
Painting, building things, or drawing	0.264	-0.019 (0.014)	-0.027* (0.014)	-0.024 (0.107)
Playing games together	0.477	-0.064*** (0.016)	-0.070*** (0.016)	-0.240** (0.113)
Care-taking activities				
Outdoor activities	0.462	-0.083*** (0.016)	-0.087*** (0.015)	-0.351*** (0.117)
Gymnastics, sports	0.373	-0.019 (0.016)	-0.009 (0.016)	0.146 (0.116)
Cooking or baking	0.098	0.014 (0.010)	0.016 (0.010)	0.078 (0.076)
Watching television, videos together	0.470	-0.025 (0.016)	-0.023 (0.016)	-0.239* (0.123)
Wave and state FEs		Y	Y	Y
Control variables			Y	Y
Weak ident. F-stat				57.740
Observations		4269	4269	4269

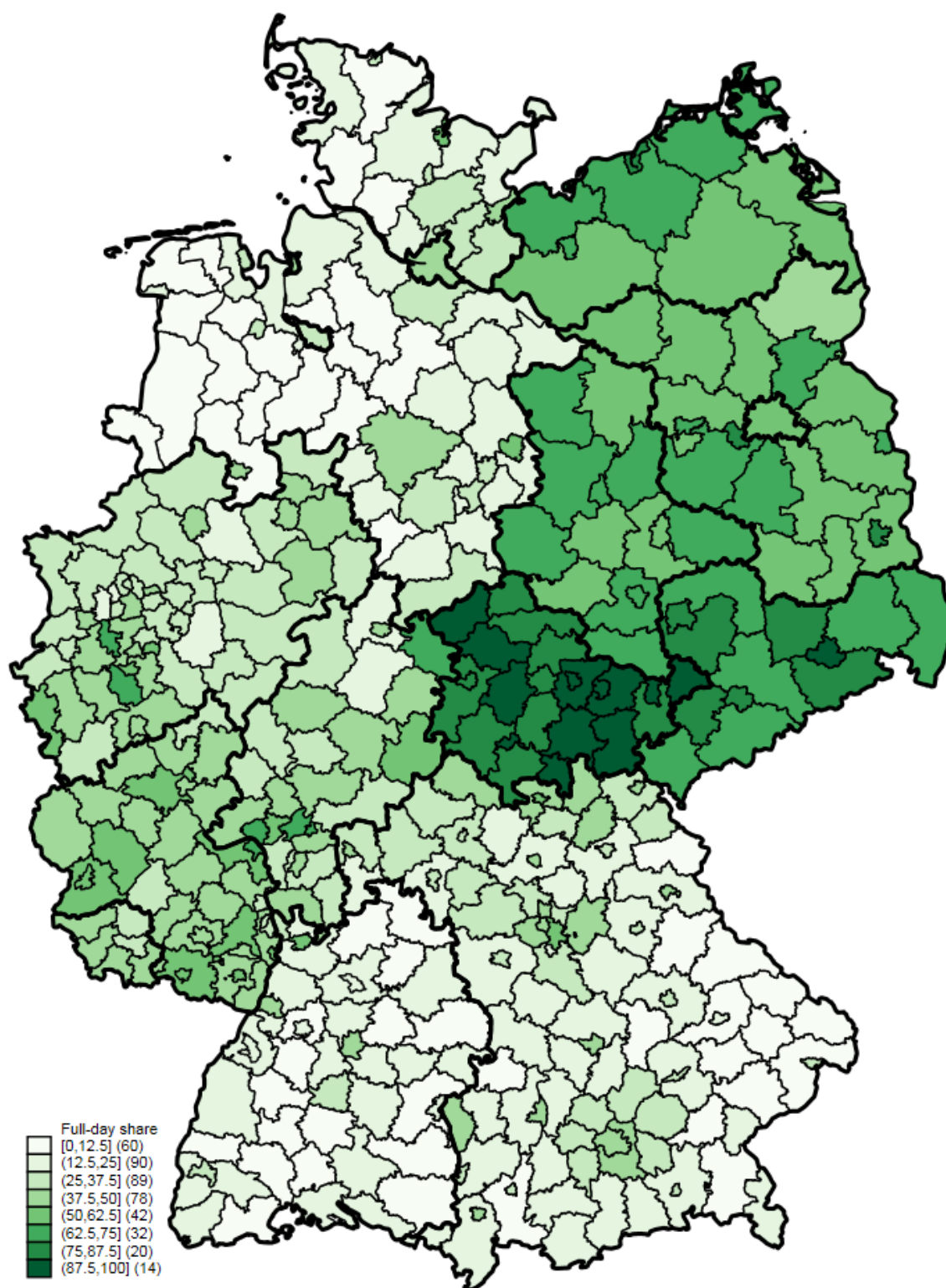
Notes: Relating joint activities of parents with their children in the last three months to usage of full-day childcare. Dependent variables indicate whether activities occur on a daily level. See Figure 5 for a full depiction of the relative frequencies. Full day childcare indicates whether the child attends a formal childcare institution in the morning and afternoon as opposed to only one of them. Controls: Age and gender of child and anchor; siblings of child; education level, migration background and single parent status of the anchor. Robust standard errors in parentheses. $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7: Effect of full-day child care on parent-child activities - by education level

Outcome variable (daily)	Low education		Medium education			High education		
	Mean (1)	OLS (2)	Mean (3)	OLS (4)	2SLS (5)	Mean (6)	OLS (7)	2SLS (8)
Educational activities								
Reading books or telling stories	0.482	-0.061 (0.043)	0.664	-0.067** (0.027)	-0.480 (0.295)	0.783	0.017 (0.019)	0.039 (0.096)
Singing or playing instruments	0.214	-0.007 (0.037)	0.257	0.007 (0.025)	0.327 (0.248)	0.310	-0.041* (0.021)	0.227* (0.116)
Painting, building things, or drawing	0.244	0.027 (0.037)	0.298	-0.038 (0.025)	-0.268 (0.271)	0.243	-0.030 (0.020)	0.052 (0.107)
Playing games together	0.383	-0.120*** (0.040)	0.508	-0.060** (0.027)	-0.622** (0.300)	0.485	-0.059*** (0.022)	-0.071 (0.120)
Care-taking activities								
Outdoor activities	0.390	-0.112*** (0.040)	0.507	-0.080*** (0.027)	-0.352 (0.272)	0.451	-0.077*** (0.021)	-0.269** (0.122)
Gymnastics, sports	0.320	-0.001 (0.040)	0.424	-0.030 (0.029)	-0.054 (0.270)	0.351	0.001 (0.022)	0.261** (0.124)
Cooking or baking	0.103	0.025 (0.029)	0.109	-0.006 (0.018)	-0.110 (0.194)	0.089	0.027* (0.014)	0.179** (0.077)
Watching television, videos together	0.507	-0.001 (0.044)	0.514	-0.012 (0.028)	-0.450 (0.298)	0.423	-0.033 (0.023)	-0.233* (0.129)
Wave and state FEs		Y		Y	Y		Y	Y
Control variables		Y		Y	Y		Y	Y
Weak ident. F-stat					34.440			26.530
Observations	675	674	1,575	1,575	1,575	2,019	2,019	2,019

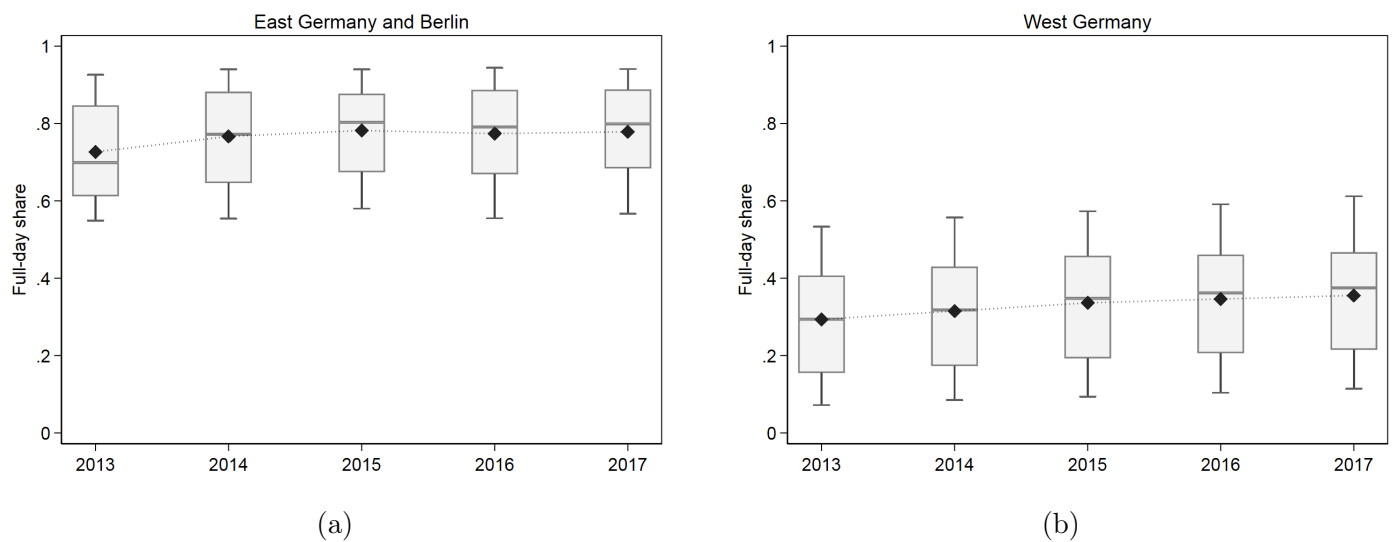
Notes: Relating joint activities of parents with their children in the last three months to usage of full-day childcare. Dependent variables indicate whether activities occur on a daily level. See Figure 5 for a full depiction of the relative frequencies. Full day childcare indicates whether the child attends a formal childcare institution in the morning and afternoon as opposed to only one of them. Sample is split by the highest school degree of the anchor. Controls: Age and gender of child and anchor; siblings of child; education level, migration background and single parent status of the anchor. Robust standard errors in parentheses. $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Figure A1: Full-day childcare share by county - 2013



Notes: Figure depicts the share of children attending childcare for at least 7 hours among all children aged three to six years. Reference date is March 1, 2013. Source: Federal Statistical Office of Germany

Figure A2: Share in full-day child care



Notes: The figure shows the county distribution of children attending childcare for at least 7 hours among all children aged three to six years for the period of analysis. The boxplots show the mean (diamond), median (line in the middle of the box), 25th and 75th percentiles (outer edges) and 5th and 95th percentiles (whiskers). Source: Federal Statistical Office of Germany.

Table A1: Effects of child care on parental time-use: female sample

Outcome variable	OLS		2SLS
	(1)	(2)	(3)
Parent in company of child (minutes)	-64.490*** (12.750)	-70.118*** (11.616)	-167.129*** (62.301)
Parent provides child care as main activity (minutes)	-9.559* (5.154)	-13.454*** (4.708)	-50.853* (27.392)
Parent reads, talks, plays or does homework with child (minutes)	-1.304 (5.407)	-3.585 (5.156)	-26.314 (30.116)
Home care quality: childcare / time with child (share)	0.051** (0.025)	0.053** (0.025)	-0.103 (0.109)
Home care quality: reading, talking, playing or homework / time with child (share)	0.042*** (0.011)	0.042*** (0.011)	0.027 (0.067)
Parent does paid work (minutes)	48.011*** (8.893)	37.794*** (8.387)	87.211* (44.795)
Parent does housework (minutes)	-23.974*** (7.903)	-20.615*** (7.051)	-51.672 (35.881)
Parent sleeps (minutes)	-10.284* (5.768)	-6.981 (5.453)	61.309* (31.370)
Parent does social activity (minutes)	-16.333** (6.865)	-16.994** (6.843)	64.956* (34.469)
Parent does sports or nature activity (minutes)	0.467 (4.551)	0.431 (4.390)	-11.411 (23.378)
Control variables	NO	YES	YES
Weak ident. F-stat	.	.	15.595
Observations	2934	2934	2934

Horizontal lines separate models by outcome variable (reported in left column). Therefore, each cell reflects a different regression. Columns (1) and (2) report OLS regressions of equation (1) and column (3) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (1) includes no further controls. Columns (2) and (3) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A2: Effects of child care on parental time-use: male sample

Outcome variable	OLS		2SLS
	(1)	(2)	(3)
Parent in company of child (minutes)	-1.301 (12.081)	-8.714 (10.584)	-72.612 (62.921)
Parent provides child care as main activity (minutes)	4.078 (3.720)	1.837 (3.484)	-15.614 (20.828)
Parent reads, talks, plays or does homework with child (minutes)	0.447 (3.965)	-1.322 (3.710)	0.719 (25.037)
Home care quality: childcare / time with child (share)	0.025 (0.021)	0.020 (0.021)	-0.065 (0.102)
Home care quality: reading, talking, playing or homework / time with child (share)	0.000 (0.017)	-0.002 (0.017)	-0.020 (0.085)
Parent does paid work (minutes)	-11.484 (15.493)	-9.044 (12.002)	34.806 (67.616)
Parent does housework (minutes)	-2.497 (7.029)	-4.863 (6.792)	-118.441*** (39.160)
Parent sleeps (minutes)	1.866 (6.660)	2.956 (5.937)	24.956 (31.968)
Parent does social activity (minutes)	2.871 (6.513)	2.629 (6.292)	35.437 (37.738)
Parent does sports or nature activity (minutes)	6.828 (6.257)	7.486 (5.402)	34.774 (27.494)
Control variables	NO	YES	YES
Weak ident. F-stat	.	.	13.288
Observations	2638	2638	2638

Horizontal lines separate models by outcome variable (reported in left column). Therefore, each cell reflects a different regression. Columns (1) and (2) report OLS regressions of equation (1) and column (3) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (1) includes no further controls. Columns (2) and (3) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A3: Effects of child care on parental time-use: weekdays sample

Outcome variable	OLS		2SLS
	(1)	(2)	(3)
Parent in company of child (minutes)	-50.688*** (11.415)	-52.045*** (9.572)	-55.312 (50.490)
Parent provides child care as main activity (minutes)	-5.704 (4.416)	-7.736** (3.742)	-22.360 (21.019)
Parent reads, talks, plays or does homework with child (minutes)	-0.832 (4.177)	-1.370 (3.851)	-6.688 (21.532)
Home care quality: childcare / time with child (share)	0.042** (0.019)	0.036* (0.019)	-0.063 (0.099)
Home care quality: reading, talking, playing or homework / time with child (share)	0.030** (0.013)	0.028** (0.012)	0.019 (0.068)
Parent does paid work (minutes)	32.966*** (12.701)	23.165** (10.143)	56.552 (54.689)
Parent does housework (minutes)	-13.501* (7.202)	-12.203** (6.144)	-67.110** (31.645)
Parent sleeps (minutes)	-9.747* (5.053)	-7.309 (4.732)	35.441 (24.900)
Parent does social activity (minutes)	-7.190 (5.005)	-6.776 (4.968)	58.363** (27.035)
Parent does sports or nature activity (minutes)	0.945 (4.350)	1.891 (3.977)	33.193* (18.072)
Control variables	NO	YES	YES
Weak ident. F-stat	.	.	20.717
Observations	3587	3587	3587

Horizontal lines separate models by outcome variable (reported in left column). Therefore, each cell reflects a different regression. Columns (1) and (2) report OLS regressions of equation (1) and column (3) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (1) includes no further controls. Columns (2) and (3) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A4: Effects of child care on parental time-use: weekend days sample

Outcome variable	OLS		2SLS
	(1)	(2)	(3)
Parent in company of child (minutes)	-12.943 (15.347)	-20.718 (14.615)	-155.581* (87.256)
Parent provides child care as main activity (minutes)	0.446 (5.738)	-3.114 (5.041)	-9.572 (31.727)
Parent reads, talks, plays or does homework with child (minutes)	-1.391 (6.164)	-4.775 (5.726)	-1.597 (40.893)
Home care quality: childcare / time with child (share)	0.039 (0.033)	0.038 (0.033)	-0.044 (0.103)
Home care quality: reading, talking, playing or homework / time with child (share)	0.013 (0.017)	0.011 (0.017)	-0.032 (0.089)
Parent does paid work (minutes)	3.367 (8.285)	3.756 (8.266)	19.663 (47.697)
Parent does housework (minutes)	-13.501 (9.184)	-16.565* (8.472)	-90.317* (47.296)
Parent sleeps (minutes)	1.438 (7.722)	6.071 (7.412)	63.396 (43.646)
Parent does social activity (minutes)	-7.932 (9.396)	-7.831 (9.457)	12.249 (51.047)
Parent does sports or nature activity (minutes)	7.692 (7.233)	9.056 (6.599)	-19.978 (38.808)
Control variables	NO	YES	YES
Weak ident. F-stat	.	.	8.878
Observations	1985	1985	1985

Horizontal lines separate models by outcome variable (reported in left column). Therefore, each cell reflects a different regression. Columns (1) and (2) report OLS regressions of equation (1) and column (3) reports IV regressions using the first stage of equation (2). All columns include the five child age indicators interacted with the East and West indicators, and the late wave indicator interacted with the East and West indicators. Column (1) includes no further controls. Columns (2) and (3) include control variables: parent age, gender, single parent status, number of kids, married status, non-German citizenship, weekday indicator, and education level. Robust standard errors are in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A5: First stage estimation of share in full-day care on a county level on the individual full-day probability

	All children			Low education	Medium education	High education
	(1)	(2)	(3)	(4)	(5)	(6)
County full-day share	0.633*** 0.064	0.627*** 0.064	0.573*** 0.064	0.148 0.161	0.422*** 0.110	0.779*** 0.093
State and wave FEs	Y	Y	Y	Y	Y	Y
Child controls	-	Y	Y	Y	Y	Y
Anchor controls	-	-	Y	Y	Y	Y
F-statistic	94.365	65.924	57.740	-	34.440	26.530
R-squared	0.178	0.184	0.198	0.194	0.255	0.184
N	4269	4269	4269	675	1575	2019

Notes: First stage estimates using the county share of children in the age group (3-7 years) in full-day childcare as an instrument for the individual probability to be in childcare full-time (in childcare in the morning and afternoon). Controls added in column (2): sex, age, and number of siblings of the child. Controls added in column (3): sex, age, migrant status and whether the anchor is a single parent. Robust standard errors in parentheses. Source: Pairfam Wave 5-9 and Federal Statistical Office of Germany. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.