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## Early childcare expansion and maternal health

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# 1208<sup>2024</sup>

**SOEP** papers  
on Multidisciplinary Panel Data Research

## Early Childcare Expansion and Maternal Health

Marina Krauß and Niklas Rott

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# Early Childcare Expansion and Maternal Health

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## Abstract

This paper estimates the causal effect of increased availability of early childcare on maternal health. We focus on a substantial expansion of childcare for children under three years in West Germany from 2006 to 2019. By matching county-level childcare attendance rates with individual data from the German Socio-Economic Panel Study (SOEP), we are able to quantify the effects of this expansion on maternal self-assessed health. Using a county-level fixed-effects model, we find that a 10 percentage point increase in the availability of childcare decreases mothers' self-assessed health by 0.173 points on a one to five scale (19% of a standard deviation). A detailed analysis of various health domains reveals negative effects on both physical and mental health as well as on satisfaction with overall health. One plausible mechanism for these negative effects is the transmission of infections from children to mothers. Consistent with this hypothesis, we observe that increased childcare availability leads to mothers worrying more about their children's health. While early childcare expansions offer well-known benefits in many dimensions like maternal employment and child development, our results suggest that there are unintended negative effects in the health domain of mothers.

*Keywords:* early childcare, maternal health, gender equality

*JEL:* I10, I14, J13

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## 1. Introduction

Besides the inherent health risks linked to pregnancy and childbirth, the period after birth presents its own challenges to maternal health. These encompass disrupted sleep, scarce chances for self-care, and heightened stress due to caregiving duties. Expansions of early childcare largely influence this period, as they enable mothers to shift some of their caregiving time to paid work or to more self-care time. However, childcare also exposes children to other children earlier, potentially leading to more infections (Barschkett, 2022; Van den Berg and Siflinger, 2022), which in turn could affect maternal health. While a large body of literature investigates how childcare expansions affect maternal labor supply and child outcomes (see, e.g., Felfe and Lalive, 2018; Andresen and Havnes, 2019; Müller and Wrohlich, 2020; Barschkett, 2022), there is little evidence of their impact on maternal health. This is particularly astonishing given that maternal health influences a wide spectrum of outcomes, ranging from labor market outcomes of mothers to the development and health of their children (Le and Nguyen, 2018; Baranov et al., 2020; Sevim et al., 2023).

In this paper, we investigate the effects of a large expansion of universal early childcare in West Germany on mothers' health. Following two laws setting expansion targets and later introducing a legal entitlement to early childcare, for which local authorities were made accountable, the West German childcare coverage increased from 8% in 2006 to 30% in 2019. However, the speed of expansion varied considerably across counties due to the intertwined decisions of municipal, county, and state authorities accompanied by shocks such as delays in the construction of facilities. Exploiting regional variation in the speed of expansion, we employ a county-level fixed-effects model that includes a comprehensive set of controls for individual and county characteristics to estimate the causal effect of local childcare availability on maternal self-assessed health. Data on maternal health and individual characteristics are sourced from the SOEP, a nationally representative annual panel study of private households in Germany.

We find a highly statistically significant effect of the expansion of early childcare (ECC) on mothers' self-assessed health (SAH). Specifically, mothers' self-assessed health declines by 0.173 points on a one to five scale for every ten percentage point increase in the local childcare coverage, reflecting a decrease in SAH of about 0.18 standard deviations for every one standard deviation increase in ECC coverage. Further analysis shows that mothers experience negative effects in both, physical and mental, health domains. Increased childcare availability decreases their physical functioning and increases their mental stress. Furthermore, mothers are more likely to report that they have to reduce

their social activities due to health problems and are less satisfied with their health. When examining the mechanisms underlying the negative impact on maternal health, we discover evidence of spillover effects from children to mothers. Specifically, the expansion of early childcare results in mothers expressing increased concern about their child’s health.

We corroborate our findings on self-assessed health through various robustness checks. To determine whether specific states or years are driving our results, we perform leave-one-out analyses for the federal states and observation years, neither of which affects our results. The biggest concern regarding the exogeneity of the early childcare availability would be self-selection of mothers into counties with specific coverage rates. However, we find similar results if we exclude mothers who moved during the observation period as well as if we estimate the effects separately for those mothers who still live at their place of childhood and those who moved away. Further, our effect seems to be unaffected of time-invariant individual-level confounds as conducting an individual-level fixed-effects model yields very similar results. Finally, conducting two placebo checks - measuring effects on women without children and mothers with older children - supports the conclusion that we indeed measure the effects of the early childcare expansion rather than confounding trends.

This paper contributes to the literature in several ways. First, we extend the literature investigating the effects of universal early childcare expansions on different dimensions of families’ lives. While a large strand of literature investigates how maternal labor market outcomes are affected by universal early childcare expansions (Goux and Maurin, 2010; Ravazzini, 2018; Carta and Rizzica, 2018; Dujardin et al., 2018; Andresen and Havnes, 2019; Müller and Wrohlich, 2020; Andresen and Nix, 2022b), mainly finding positive effects, only very few papers focus on maternal well-being and health. According to Baker et al. (2008), an expansion of universal (low-quality) childcare in Quebec was associated with an increase in depression scores among mothers. In a recent working paper, Barschkett and Bosque-Mercader (2023) study the health effects of the expansion of early childcare in Germany.<sup>1</sup> Using administrative health data, they discover a rise in infections and respiratory illnesses among mothers. Simultaneously, they observe a beneficial impact on obesity and anemia. We complement their evidence on diagnosis groups by estimating the impact of ECC availability on mothers’ overall health, as it remains uncertain whether the positive or negative effects on maternal health predominate. Furthermore, while administrative claims allow a very detailed analysis of diagnosed illnesses, they

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<sup>1</sup>Investigating a period of just four years, resulting in a small sample size of 800, Kröell and Borck (2013) show a negative impact of childcare expansion in Germany on mothers’ physical health.

can only capture health problems for which indeed a physician was consulted. In contrast, self-reported survey data may account better for potential demand- and supply-side constraints. Supply-side problems may arise due to shortages of physicians, leading to individuals refraining from seeking medical attention even when they are unwell. This could be problematic if regional physician shortages would correlate with regional child-care expansion. On the other hand, demand-side problems may arise because some people are reluctant to seek medical help, especially for mental health problems, and typically do so only for severe mental illness. Additionally, mild infections and respiratory diseases that do not require prescription medications often occur without any physician visits. Therefore, survey data might better capture these mild forms of health problems.<sup>2</sup>

Second, we contribute more broadly to the effects of early childcare programs on mother’s health. Rather than providing universal childcare, a number of countries, particularly developing countries and several U.S. states, opt for targeted childcare programs specifically designed to help disadvantaged families. Although only a limited number of studies have examined the impact of these targeted programs on maternal health, the existing evidence suggests that they may have adverse effects. Herbst and Tekin (2014) examine the effects of (employment-based) childcare subsidies for economically disadvantaged mothers in the United States. Their research shows that recipients of these subsidies tend to have poorer overall health and a higher prevalence of symptoms associated with anxiety, depression, and parenting stress. In line, Rosero and Oosterbeek (2011) show that a childcare program in Ecuador targeting poor children in rural and marginal urban areas increases stress and depression symptoms in mothers. Instead, Angeles et al. (2014) show that a childcare program targeted at low-income mothers in Mexico has no effects on maternal mental health. Evidence on the effects of targeted programs on maternal health, however, is not necessarily transferable to universal programs, as they measure effects only for a specific subgroup (e.g., mothers with low income) and also differ in their design (e.g., are often conditional on maternal employment).

Finally, our paper contributes to the newly emerging literature on the longer-term health effects of motherhood. While the short-term effects of childbirth on maternal health have mainly been examined in the medical literature (for a review, see Shorey et al., 2018), showing that a large share of mothers experience postnatal depression, only a few papers examine longer-term health effects of the arrival of children. Kravdal et al. (2017) provide descriptive evidence suggesting that women (aged 45-69) with only one child are

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<sup>2</sup>Furthermore, it is unclear whether childcare can improve or even worsen the time constraints for mothers, possibly leading to more or less doctor’s appointments.

more likely to buy antidepressants compared to those who do not have children, whereas mothers with more than one child exhibit a lower likelihood of purchasing antidepressants when compared to childless women. Ahammer et al. (2023) investigate the long-term effects of motherhood on mental health in Denmark and Austria and find a lasting increase in antidepressant prescriptions for mothers after the arrival of their first child. The authors explain this effect by the psychological burden of childcare responsibilities for mothers. Our results show that providing outside options for childcare does not lead to better health for mothers as we find that (at least in the short-run) maternal health even decreases while the health gap between partners increases with ECC expansion.

## 2. Institutional Background

In the last decades, West Germany has greatly expanded the provision of universal childcare for children younger than three years. The expansion started with the adoption of the childcare expansion law (Tagesbetreuungsausbaugesetz, TaG) in 2005, in which the German federal government set the target to provide a 17% coverage for early childcare by 2010 (Bauernschuster et al., 2016). In 2007, the federal government expanded this target to a coverage rate of 35% by 2013 (Bauernschuster et al., 2016). More importantly, at the same time, the government introduced a legal entitlement to a subsidized childcare place for every child from the age of one, which was due to come into force in 2013. This put pressure on local authorities to expand early childcare, as they would be responsible and accountable for meeting this legal entitlement. While in 2006 only 8.1% of children were enrolled in childcare on average, in 2019 30.3% of children under the age of three attended childcare (INKAR, 2023). Importantly, demand for slots in childcare still exceeds the supply of slots (Jessen et al., 2020; Kayed et al., 2022).

Due to historical reasons, the situation in East Germany significantly differs, as childcare coverage rates were already high when West Germany was just commencing its early childcare expansion. Additionally, the territories of many East German counties were rearranged during our observation period, implying substantial variation in East German childcare ratios coming from territorial reforms rather than childcare expansion. Therefore, we exclude East Germany from our analysis.



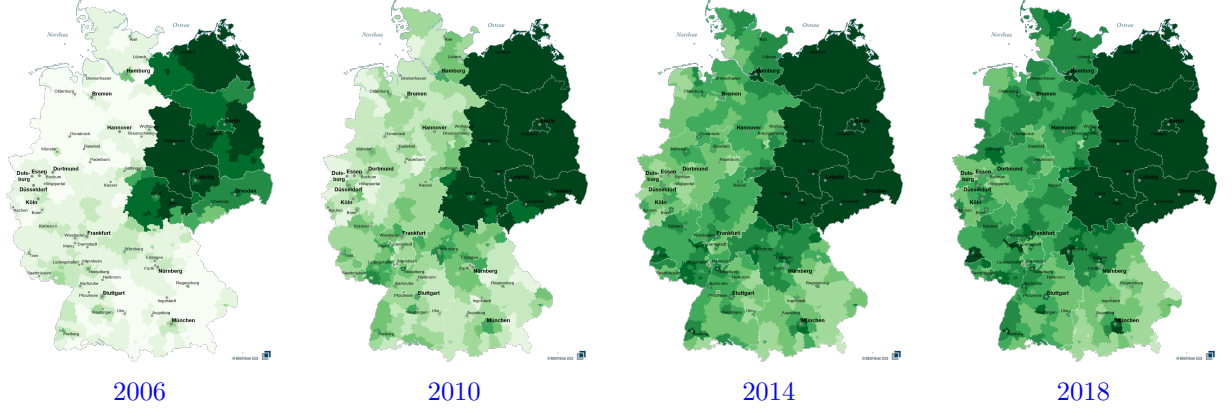


Figure 1: Early Childcare Expansion in Germany

*Notes:* This figure shows the expansion of early childcare in German counties over the years 2006, 2010, 2014, and 2018. The colors reflect eight bins of early childcare usage ratios from zero to five percent, five to ten percent, and so on, up to over 35 percent in the last bin. The darker colored the county is, the higher its early childcare usage rate. Source: INKAR (BBSR).

As shown in Figure 1, the starting levels and the speed of the expansion varied largely in the 323 different counties in West Germany - even within federal states. Additionally, the expansion in counties followed no clear trend, since some counties that started off with higher coverage rates expanded very slowly while other countries with low starting levels increased their childcare supply strongly in a few years (Sandner et al., 2020). These differences are partly driven by the complex process of opening up new childcare centers due to intertwined decisions of authorities at the municipality level, county level, and state level (Bauernschuster et al., 2016; Felfe and Lalive, 2018). While municipality and county authorities had the task of evaluating the local demand for childcare, state authorities were responsible for approving nonprofit organizations seeking to establish new childcare centers (Sandner et al., 2020). All these tasks and combined decisions were prone to problems, which varied in magnitude across counties and could not be influenced by local authorities (Hüsken, 2011). Examples of these problems include finding qualified childcare workers, securing construction sites, delays in construction, understanding the funding system, and potential delays in the approval or rejection process of applications due to non-compliance with regulations (Bauernschuster et al., 2016). Therefore, the actual expansion in the counties is a result of predictors of local childcare demand (e.g., fertility and female employment rate) and shocks arising due to problems in the administrative and construction processes (Felfe and Lalive, 2018). These shocks are the basis for our identification strategy, as they are likely to be independent of maternal health. We investigate the exogeneity of the childcare expansion in Section 6.1.

Turning to prices, early childcare is heavily subsidized by the public sector, covering approximately 75% of the total cost (Spiess, 2013). As a result, prices for childcare slots are relatively affordable for families and low-income families may even qualify for reduced fees or fee exemptions. Most childcare centers are operated by municipalities or non-profit organizations such as churches (Schober, 2014). Overall, the quality of early childcare is relatively high in terms of factors like group sizes and child-staff ratios when compared to other countries (Felfe and Lalive, 2018).

### 3. Data

We use data from the German Socio-Economic Panel (SOEP), an annual representative household survey conducted in Germany since 1984.<sup>3</sup> These survey data include, amongst other things, information about respondents' health, socioeconomic characteristics, and child-related outcomes, such as childcare arrangements. In our study, we utilize the mother-child dataset within the SOEP and focus on mothers having children within the relevant age group (3 years or younger).

#### 3.1. Sample

In our main specifications, we use data from 2006 to 2019 for mothers with children aged 36 months or less, the usual age threshold between early childcare (ECC) and kindergarten in Germany. This time horizon is determined by the availability of ECC ratios starting with the year 2006 and excludes the latest possible observation year 2020 to avoid potential biases arising from the closure of early childcare centers (and beyond) during the COVID-19 pandemic.<sup>4</sup> If the mother has more than one child in the respective age group, we have multiple observations for the same mother at one point in time. In these cases, we only keep the observation for the oldest child as early childcare availability might matter most for these children.<sup>5</sup> Due to the before-mentioned systematic differences in ECC coverage rates, we exclude East Germany in our analysis.

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<sup>3</sup>For further information, see Goebel et al. (2019). [dataset] SOEP (2022)

<sup>4</sup>However, results do not change if we include the year 2020, see Column (1) of Appendix Table B8.

<sup>5</sup>If we were to keep all observations in the sample, we would partially compare mothers with themselves within one observation year. However, keeping all observations in our sample or keeping only the observation for the youngest child in the respective age group leads to similar results. Results are available upon request.

### 3.2. Health Outcomes

As our main outcome for this study, we use mothers' self-assessed general health status, which is surveyed annually. Mothers are asked to rate their current health using five possible response categories: "bad", "poor", "satisfactory", "good", and "very good".

As additional outcome variables, we use more detailed information on mothers' physical and mental health, which is collected every other year.<sup>6</sup> The variables focus on physical limitations in performing daily tasks, the experience of physical pain, feeling energetic, limitations due to mental health or emotional problems in performing daily tasks, and the frequency of emotions such as sadness or calmness. In addition, mothers are asked how often they have to limit social interactions because of physical or mental health problems. The respective questions in the SOEP are based on the SF-12 Health Status Survey, which is a generic instrument designed to evaluate health-related quality of life (Ware et al., 1995). Using these detailed individual health questions, the SOEP also provides two indices - one for the physical health domain and one for the mental health domain. These indices are calculated by weighting the individual questions using principal components analysis. All detailed health variables and the indices are transformed to range from 0 to 100 and standardized to have a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.<sup>7</sup>

Finally, we examine mothers' satisfaction with their health and their concerns about their children's health. Mothers are asked to rate their level of satisfaction with their health on a scale from "completely dissatisfied" to "completely satisfied". Furthermore, they are asked whether they agree with the statement "I am worried about my child's health" with four possible response options: "disagree completely", "disagree", "agree", and "agree completely".

### 3.3. Explanatory and Control Variables

Following related literature (see, e.g., Müller and Wrohlich, 2020; Barschkett, 2022), we use the early childcare ratio as our main explanatory variable, serving as a proxy for early childcare availability.<sup>8</sup> This ratio, defined as the number of children under the age of three enrolled in formal childcare, divided by the total number of children under the age of three in a given county, is taken from the data tool INKAR provided

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<sup>6</sup>Unfortunately, in the years 2010 and 2012 only every fourth mother received the comprehensive health questionnaire.

<sup>7</sup>For the detailed wording of the questions and the construction of the variables see Section Appendix D.

<sup>8</sup>The significant effect of the early childcare ratio on individual usage can be seen in Appendix Table A9.

by the German Federal Institute for Research on Building, Urban Affairs, and Spatial Development (BBSR). Additionally, we obtain county-level characteristics like fertility rates, unemployment rates, and GDP per capita from the same source and merge all administrative data with the SOEP data.

### *3.4. Sample Description*

Table 1 displays the characteristics of our analytical sample. The top panel of Table 1 shows the means for our outcome variables. Mothers, on average, rate their overall health status at 3.8 out of 5 (very good). For the more detailed (physical and mental) health outcomes, the mean values are all close to 50, as these variables are standardized in the SOEP. However, in our sample the means are not exactly 50 and the standard deviations are not exactly 10 because we are examining a subsample of the SOEP. In terms of satisfaction with health or life mothers report average scores of 7.8, and 7.6 out of 10, respectively, indicating a high level of satisfaction. Finally, mothers on average disagree with the statement that they are worried about their children’s health (1.6 out of 4, 1 = disagree completely and 4 = agree completely).

The middle panel of Table 1 outlines the individual characteristics of both mothers and their children. On average, mothers are 33 years old, while their children are 20 months old. Within our sample, 31% of mothers have only one child, while the average number of children in the household is slightly above two. Additionally, 5% of mothers are currently pregnant and 92% are living together with their partner. In terms of education and migration background, 27% have obtained a university-entrance degree (Abitur), while 32% have a migration background. Regarding the employment status of the mothers, 6% work full-time, 17% work part-time, and 8% are marginally employed. Finally, 6% of mothers moved between counties during the observation period.

The bottom panel of Table 1 presents county characteristics. The average rate of early childcare usage is 22.5%, with values ranging from 1% to 47% (see Section 2 and Section 6.1 for details on the childcare expansion). The counties have an average GDP per capita of 38.000 EUR and an average unemployment rate of 6%. Finally, the average fertility rate is 1.46.

## **4. Empirical Strategy**

We use a county-level fixed-effects model (FE) to measure the effect of increased childcare availability on maternal health. The estimated effect captures the impact for both groups: mothers with their children enrolled in childcare and those without. Examining

Table 1: Descriptive Statistics

	Mean	SD	Min	Max	N
<b>Outcome Variables</b>					
Self-Assessed Health (SAH)	3.77	0.89	1	5	8980
SAH is (very) good	0.68	0.47	0	1	8980
Physical Health Index	53.81	7.65	22.55	75.24	2557
Mental Health Index	49.68	9.38	10.02	74.91	2557
Physical Functioning	53.79	7.31	27.25	58.35	2557
Role Physical	52.03	9.16	21.92	59.72	2557
Bodily Pain	52.00	9.33	23.00	59.85	2557
Vitality	50.49	9.65	26.82	70.60	2557
Social Functioning	51.60	9.02	14.69	57.12	2557
Role Emotional	51.70	9.40	13.34	58.08	2557
Mental Health	49.60	9.62	19.73	68.58	2557
General Health	53.74	9.08	24.85	66.37	2557
Satisfaction Health	7.83	1.55	0	10	8960
Satisfaction Life	7.59	1.99	0	10	8974
Worries Health Child	1.61	0.89	1	4	8710
Partners' SAH	3.78	0.89	1	5	7020
Health Gap (Partner SAH - Mother SAH)	-0.03	1.11	-4	4	6178
Mother worse (Partner SAH > Mother SAH)	0.28	0.45	0	1	6178
<b>Individual Characteristics</b>					
Age Mother (in years)	33.18	5.63	18	62	8980
Age Child (in months)	20.24	11.68	0	36	8980
Only Child	0.31	0.46	0	1	8980
Number Children	2.17	1.17	1	11	8980
Pregnant	0.05	0.22	0	1	8980
Cohabiting	0.92	0.27	0	1	8980
University Entrance Degree	0.27	0.44	0	1	8980
Migration Background	0.32	0.47	0	1	8980
Work: Marginally Employed	0.08	0.27	0	1	8980
Work: Part-Time	0.17	0.38	0	1	8980
Work: Full-Time	0.06	0.24	0	1	8980
Moved During Observation Period	0.06	0.24	0	1	8980
Act. ECC usage	0.24	0.43	0	1	8508
<b>County Characteristics</b>					
ECC Ratio	22.48	9.12	1.01	47.10	8980
GDP	37.53	17.26	14.05	184.14	8980
Unemployment Rate	6.40	3.01	1.25	20.65	8980
Fertility	1.46	0.14	1.01	2.06	8980
Interview Year	2012	3.45	2006	2019	8980
Interview Month	5.44	2.50	1	12	8980

*Notes:* Table reports mean values, standard deviations, min. and max. values and the number of observations for all outcome variables, individual characteristics, and county characteristics.

the full effect of the expansion of early childcare is important as, in addition to the direct effects of childcare use on maternal health, there may be indirect effects on mothers whose children are not enrolled. An example of this is spillovers of infectious events from ECC centers to non-enrolled children through their interactions with enrolled peers within the family, on playgrounds, or in mother-child groups, subsequently spreading to the mothers of non-enrolled children.

We leverage the nationwide expansion in childcare availability, quantified by the ECC ratio at the county level, as a source of exogenous variation (for a discussion see Section 6.1). This methodology aligns with prior research investigating the impact of increased ECC availability on maternal labor supply (Müller and Wrohlich, 2020), children’s development (Felfe and Lalive, 2018), and children’s health (Barschkett, 2022).

To estimate the effect of the ECC availability on maternal health, we employ the following regression model:

$$Y_{it} = \beta Ratio_{ct} + \gamma X_{it} + \sigma Z_{ct} + \alpha_c + \lambda_t + \mu_{it} \quad (1)$$

$Y_{it}$  represents the health outcome of interest for mother  $i$  at time  $t$ . As our main outcome, we use mother’s self-assessed general health, ranging from 1 (bad) to 5 (very good). As additional outcomes, we examine effects on more detailed indicators of physical and mental health, mother’s satisfaction with her health, and whether the mother expresses concern about their child’s health.

In all models, we control for county-fixed effects  $\alpha_c$ , in order to control for time-invariant county characteristics which might be associated with the regional early childcare expansion. Moreover, we include a vector of covariates  $X_{it}$  consisting of individual-specific characteristics such as the mother’s age, the child’s age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, an indicator for cohabiting with a partner, and a categorical variable indicating no employment, marginal employment, part-time and full-time employment. The vector  $Z_{ct}$  includes county-level controls, such as the GDP per capita, the unemployment rate, and the fertility rate. In addition,  $\lambda_t$  incorporates dummy variables for the survey years and months. Lastly,  $Ratio_{ct}$  corresponds to the ECC ratio of the county  $c$  in year  $t$ . Since the models use county-level childcare ratios as main explanatory variable, standard errors are clustered on the county level.<sup>9</sup>

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<sup>9</sup>However, using robust standard errors or standard errors clustered on the state level does not change our results (see Appendix Table B8, Column (9) and (10))

Our parameter of interest,  $\beta$ , measures the effect of increased childcare availability on maternal self-assessed health conditional on maternal characteristics (like education and migration background) but also conditional on working status and the number of children. Since decisions regarding work and family planning might themselves be influenced by increased childcare availability (see, e.g., Müller and Wrohlich, 2020; Bauernschuster et al., 2016), we also conduct specifications where we exclude these variables (see Appendix Table B8, Column (6)) or even remove all individual and county controls (see Appendix Table B8, Column (5)). Interestingly, our effect remains very similar, suggesting that the effect of increased childcare availability on maternal health does not primarily run through increased employment or increased fertility (in Section 5.3 we investigate the channels in detail).

Instead of county-fixed effects, we could also use individual-fixed effects. In Column (15) of Appendix Table B8, we apply such a model, and show that our results on self-assessed health are very similar. Using individual-fixed effects offers the advantage of controlling for time-invariant unobserved individual characteristics, which could bias our results if they are correlated with both maternal health and the early childcare ratio conditional on explanatory variables. Although it seems unlikely that mothers directly influence the local ECC ratio, there is a possibility that maternal characteristics correlate with local childcare ratios if mothers self-select into counties with faster or slower early childcare expansion. In Section 6.2 we show that our results are robust to two robustness checks accounting for potential selection. Thus, we choose the county-fixed-effects model, as analyzing the more detailed health outcomes would not be feasible otherwise due to sample size constraints.<sup>10</sup> Additionally, this approach enables us to examine heterogeneous effects more broadly.

Furthermore, we decide against a random-effects model (RE) instead of the fixed-effects model, as a Hausman test strongly rejects the null hypothesis of non-systematic differences between FE and RE, which cannot be explained by missing variation in our explanatory variables within counties.<sup>11</sup> However, RE as well as simple OLS confirm our

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<sup>10</sup>We can only observe the health components for 31% of mothers more than once.

<sup>11</sup>In light of this concern, we also refrain from employing multi-level models, despite the nested structure of our data. Nevertheless, running two-level hierarchical models with random intercepts and/or random slopes shows smaller but still significant negative effects of local childcare availability on maternal health. However, an intra-class correlation close to zero on the county level, suggests only a limited need for multi-level modeling at all. Further results are available upon request.

negative and significant effect on maternal health (see Appendix Table B8, Column (14) and (13)).<sup>12</sup>

## 5. Results

In this section, we report on the effects of increased availability of early childcare on mothers' self-assessed health and various indicators of mothers' physical and mental health. In addition, we explore the impact on mothers' health satisfaction and investigate potential channels through which increased childcare availability may influence maternal health.

### 5.1. Main Results

We find a highly statistically significant negative effect of the local childcare availability on mothers' self-assessed health status. Specifically, an increase in a county's childcare availability by 10 percentage points decreases mothers' self-assessed health by about 0.173 points ( $p = 0.008$ ) on a scale from one to five (see Table 2, Column (1)).<sup>13</sup> This corresponds to a decrease of 18% of a standard deviation in SAH for a one standard deviation increase in the ECC ratio. Since early childcare availability in West Germany increased in total about 22 percentage points from 2006 to 2019, this effect seems also quantitatively noteworthy. To address the categorical character of the self-assessed health outcome, we additionally estimate an ordered logit model (see Table 2, Column (2)). Furthermore, we estimate a linear probability model using a dummy variable indicating good or very good health instead of the categorical health variable (see Table 2, Column (3)). Both models confirm the highly statistically significant negative effect of childcare availability on maternal health.

Examining the results of the ordered logit model in more detail, we find positive marginal effects of early childcare availability on the probabilities to report lower levels of self-assessed health (bad, poor, and satisfactory) and negative marginal effects on the probabilities to report higher levels (good and very good) of self-assessed health. All marginal effects are statistically significant at the 1%-level, except for the impact on bad health, which is significant at the 5%-level. Effects on poor and good health are moderate in size, whereas the largest effects exist for satisfactory health and very good health (see Appendix Table A1).<sup>14</sup> This suggests the negative effect of childcare availability on self-

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<sup>12</sup>Here, "simple OLS" refers to models without any county- or individual-fixed effects. This holds for specifications with and without time dummies.

<sup>13</sup>For the coefficients on control variables, see Column (1) of Appendix Table B2.

<sup>14</sup>This also holds if we apply a RE-Ologit-model using STATA's *xtologit*-command instead.



assessed health to be predominantly driven by shifts away from very good health and towards satisfactory health.

Table 2: Main Effect: Self-Assessed Health

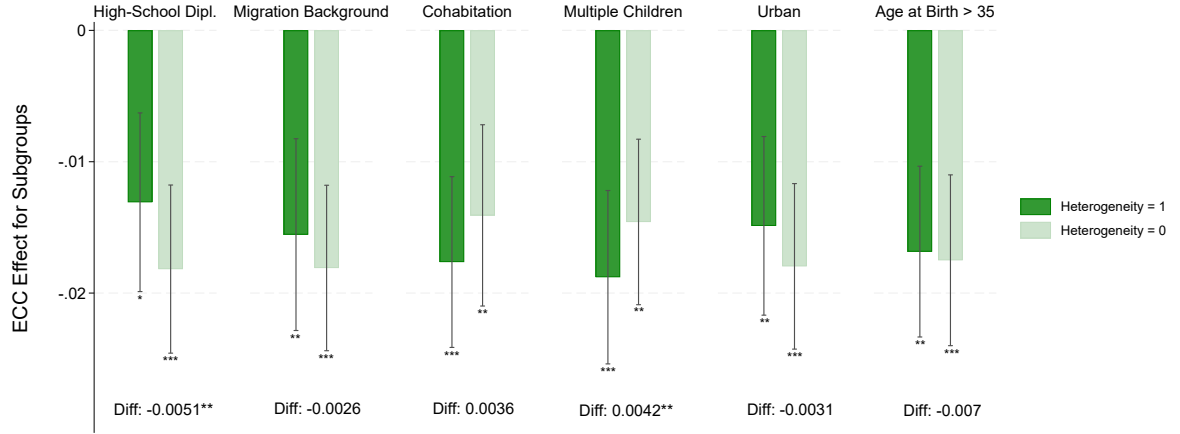
	Self-Assessed Health		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
Childcare coverage	-0.0173*** (0.0065)	-0.0399*** (0.0150)	-0.0093*** (0.0027)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
<b>(Within)-<math>R^2</math></b>	0.036	0.042	0.016
N	8980	8980	8980

*Notes:* Table shows effects of increased childcare availability on mothers' self-assessed general health. The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome variable is a dummy taking a value of one if mother's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Further, we investigate whether the effect of increased early childcare availability differs for specific subgroups. We start by evaluating whether the effect differs by child age. Specifically, we interact the ECC ratio with a categorical variable for the age of the child (0-6, 7-12, 13-18, 19-24, 25-30, 31-36 months). As Appendix Figure A1 shows, the marginal effects for all these age groups vary only little and are all statistically significant at least at the 5%-level. We also see no differences in the effects between the gender of the child or children's health at childbirth (indicated by pre-term birth, low birth weight or being born by C-section; see Appendix Table A2).

Additionally, we investigate whether the effect varies by socioeconomic characteristics of mothers. In particular, we are interested in the heterogeneous effects of maternal education (having a university entrance degree), migration background (being born in a foreign country), cohabiting, having multiple children, and living in rather urban areas (Place of residence  $> 50.000$  inhabitants). Results in Figure 2 show no statistically sig-

Figure 2: Heterogeneous Effects of ECC Availability on Maternal Health



*Notes:* The figure shows heterogeneous effects of the ECC availability on maternal self-assessed health for different subgroups estimated by interaction terms. The first subgroups refer to maternal education: The dark (light) green bar shows the effect for mothers with (without) a university entrance degree (Abitur). The second subgroups refer to the migration background of mothers: The dark (light) green bar shows the effect for mothers who were (not) born in a foreign country. The third subgroups refer to cohabitation: The dark (light) green bar shows the effect for mothers who live together with their partner (who live alone). The fourth subgroups refer to the number of children: The dark (light) green bar shows the effect for mothers who have multiple children (who have only one child). The fifth subgroups refer to the mothers' place of residence: The dark (light) green bar shows the effect for mothers who live in an urban area (rural area, < 50.000 inhabitants). The sixth subgroups are based on the mothers' age at childbirth: The dark (light) green bar shows the effect for mothers who were older than 35 years (35 years or younger) at childbirth. Error bars show robust standard errors. Significance levels: \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

nificant differences between mothers with and without a migration background, urban and rural residents, as well as cohabiting and non-cohabiting mothers. It is important to note that the group of non-cohabiting mothers is quite small, which may contribute to a lack of statistical significance. On the other hand, mothers with a university entrance degree experience a negative, but statistically significantly smaller effect of early childcare on SAH than mothers without a university entrance degree. Finally, we explore whether the effects differ by the number of children mothers have, possibly due to spillover effects between siblings which could infect each other (Daysal et al., 2021; Pruckner et al., 2021). We observe stronger negative health effects on mothers who have more than one child. Further analyses show that this is driven by mothers who have other children aged older than five years.

## 5.2. Further Health Outcomes

In addition to the annually available self-assessed general health status, the SOEP gathers more comprehensive health information every other year, which allows us to investigate in more detail which health domains are affected by the childcare expansion. First, we estimate the effects on the two indices provided by the SOEP for physical and mental health (for more information, see Section 3.2 and Nübling et al. (2006)). Second, we estimate the effects on the components of the indices, reflecting different domains of maternal health (see Section 3.2). In particular, we measure effects on mothers' physical functioning (climbing steps and lifting objects), physical role (limitations in daily activities due to physical health problems), bodily pain, vitality, emotional role (limitations in daily activities due to mental health problems), mental health (feeling balanced, depressed), social functioning (reduced social activities due to health problems), and the general health status.

Table 3: Physical and Mental Health

	Components									
	Index	Index	Physical	Role	Bodily	Vitality	Role	Mental	Social	General
	Physical	Mental	Functioning	Physical	Pain		Emotional	Health	Functioning	Health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Childcare Coverage	-0.1612* (0.0902)	-0.1625 (0.1197)	-0.1757* (0.0917)	-0.1464 (0.1196)	-0.0796 (0.1116)	-0.1137 (0.1209)	-0.1845* (0.1038)	-0.1431 (0.1198)	-0.2149* (0.1105)	-0.2900*** (0.0969)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within- $R^2$	0.041	0.036	0.039	0.024	0.042	0.0189	0.040	0.047	0.026	0.047
N	2557	2557	2557	2557	2557	2557	2557	2557	2557	2557

*Notes:* Table shows effects of increased childcare availability on different domains of physical and mental health. All outcome variables range from 0 to 100, and are standardized to a mean of 50 and a standard deviation of 10 in the full SOEP sample. Higher values indicate better health. Column (1) and Column (2) show effects on the physical and mental health indices, which consist of the (weighted) variables that follow in the table (see Section 3.2 and Appendix Section Appendix D for details). In Column (3) the outcome variable is mother's physical functioning (possibility to climb steps and lift objects). In Column (4) the outcome variable is mother's physical role (limitations in daily activities due to physical health problems). In Column (5) the outcome variable is the frequency of experiencing severe physical pain. In Column (6) the outcome variable is the frequency of feeling energetic. In Column (7) the outcome variable is the emotional role of mothers (limitations in daily activities due to emotional or mental health problems). In Column (8) the outcome variable is mother's mental health (frequency of feeling down and frequency of feeling calm). In Column (9) the outcome variable is whether (and how often) the mother had to reduce social activities due to health problems. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Starting with the indices, we find a statistically significant negative effect of an increase in early childcare availability on mothers' overall physical health. More precisely, the index for physical health decreases by 21% of a standard deviation if the early childcare coverage rate increases by 10 percentage points (see Table 3, Column (1)). Turning to the mental health index, we find an effect of similar size, which however is not statistically significant (see Table 3, Column (2)).

Regarding the components of the indices, significant effects are observed for four out of eight health domains. However, all coefficients exhibit a negative sign, indicating that, if anything, health is deteriorating in the other domains as well. We find a significant negative effect of the early childcare expansion on mothers' physical functioning, which pertains to activities such as climbing stairs, lifting objects or needing mobility in daily life (see Table 3, Column (3)). As we will elaborate in Section 5.3, one driver of our effect could be spillover effects between children and mothers, particularly concerning infections and respiratory diseases. Given that these diseases often lead to decreased physical strength, they could account for the observed adverse effects on physical functioning. Additionally, we observe a significant decline in mothers' emotional role, which describes whether the mother achieved less or carried out tasks less thoroughly than usual due to mental health or emotional problems (see Table 3, Column (7)). As Column (9) of Table 3 shows, the early childcare expansion also affects mothers' social functioning, as they are more likely to report having to reduce social activities (with friends, acquaintances, or relatives) due to physical or mental health problems. Finally, Column (10) of Table 3 documents that mothers rate their overall health more poorly with an increase in the early childcare ratio. This mirrors the findings in Table 2, albeit transferred to a different scale and standardized, showing a consistent decline in self-assessed health even within this smaller subset of our data.<sup>15</sup>

Interestingly, the SOEP also offers insights into mothers' satisfaction with their health. Consistent with the negative impacts observed on mothers' overall self-assessed health and across various health domains, we find that the expansion of ECC decreases mothers' satisfaction with their health. Specifically, maternal satisfaction with health decreases by 0.238 points on a one to ten scale (equivalent to 15% of a standard deviation) if the early childcare availability increases by 10 percentage points (see Appendix Table A3, Column (1)). However, this negative effect on satisfaction with health does not translate into a reduction in satisfaction with life in general (see Appendix Table A3, Column (2)).

### 5.3. Channels

An open question remains through what channels the increased availability of early childcare affects maternal health. A highly plausible explanation for the observed effects

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<sup>15</sup>In four years (2013, 2015, 2017, 2019), mothers were additionally asked whether a doctor had ever diagnosed them with depression, migraine, high blood pressure, or back pain. We find no effects on these outcomes. However, this could be due to sample size issues ( $N = 1790$ ). We also find positive but insignificant effects on maternal weight, specifically a reduction in the probabilities of being overweight or underweight.

on physical health involves spillover effects between children and mothers, particularly focusing on infections. As Barschkett (2022) shows, the increased childcare availability in Germany leads to more respiratory diseases and infections among young children. This could in turn lead to more respiratory diseases and infections in mothers. Several pieces of evidence are in line with this argument: When estimating the effects of childcare availability on physical health separately for working and non-working mothers, we see that the effects are smaller for working mothers (although the differences are not always significant, see Appendix Table A4), which could support the argument since working mothers are arguably more immunized through their work than non-working mothers.<sup>16</sup> However, this result should be interpreted with caution, as the working status is likely to be endogenous with regard to childcare availability. Similarly, we find no effects of increased childcare availability on the health of mothers' partners (see Section 7), who are also likely to be better immunized, since the majority of them are working (83%). Furthermore, although we lack a variable directly measuring child health, we have information about whether mothers worry about their children's health. Consistent with the argument of the decline in maternal health being driven by a decline in child health due to childcare, we find that an increase in early childcare availability by 10 percentage points significantly increases worries about child health by about 0.104 points on a scale from 1 to 4, reflecting a change of about 12% of a standard deviation (see Appendix Table A3, Column (3)).<sup>17</sup> Finally, a recent working paper by Barschkett and Bosque-Mercader (2023) documents that the expansion of early childcare in Germany has indeed led to an increase in diagnosed infections and respiratory diseases in mothers.

Referring to the adverse effects on mental health, other mechanisms could be at play. The availability of childcare provides mothers with the opportunity to increase their working hours (Müller and Wrohlich, 2020; Hermes et al., 2022), resulting in a dual responsibility of balancing both childcare and work commitments. This could potentially alter mothers' stress levels and thus lead to poorer mental health. If we measure effects separately for the subsamples of working and non-working mothers, we see that the effects on mental health are stronger for non-working mothers (see Appendix Table A4). However, this is not necessarily evidence contradicting the double burden explanation, as many non-working mothers are likely to be in transition to work, e.g. looking for a job. Another way to consider the stress level of mothers is by examining the quality of their sleep,

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<sup>16</sup>We also observe the same pattern for mothers' self-assessed general health.

<sup>17</sup>This result also holds when running an ordered logit model addressing the categorical nature of the variable.

which we assess by number of hours slept per night, satisfaction with sleep, and reporting a (diagnosed) sleep disorder. However, we observe no effect on any of these outcomes (see Appendix Table A5).

A further explanation for the negative effects of maternal mental health could be that the decision to entrust a child to a childcare center at a young age can be emotionally challenging, especially in gender-conservative environments. If we estimate our effects separately for conservative and less-conservative counties we find stronger effects for gender-conservative counties (see Appendix Table A6). We define a county as gender-conservative if the share of respondents agreeing to the statement “It harms children under 3 years if the mother works” is larger than the median in West Germany.<sup>18</sup>

Regarding both health domains, an additional channel of the negative effects could be increased fertility. Indeed, Bauernschuster et al. (2016) show, that an expansion of early childcare in Germany led to an increase in fertility. Given the high burden of pregnancy on maternal health, this may partly explain the negative effects we observed on maternal health. However, rerunning the analysis excluding mothers with changes in the reported number of children living in the same household shows similar results for maternal self-assessed health, as well as for the mental and physical health domains.<sup>19</sup>

Another possibility to control for this channel would be to include a control variable for the pregnancy status of the mother. While the SOEP does not provide a panel variable on the pregnancy status, we can leverage information from a cross-sectional variable of the mother-child dataset that indicates if and when a mother participated in a SOEP interview while being pregnant with a respective child. When included in the regression analyses on self-assessed health, we find that the coefficients and their standard errors remain identical (see Appendix Table A7). Additionally, we only see minor changes in magnitude and no changes in significance when we include the pregnancy status of the mother in the analysis of physical and mental health (see Appendix Table A8).

Overall, accounting for potential fertility effects by changes in the number of children in the household or controlling for the pregnancy status does not change our results for self-assessed health. Therefore, it seems that our results are not driven by fertility effects of the childcare expansion. Interestingly, pregnancy itself has a negative and statistically

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<sup>18</sup>While the mean age of mothers and children does not differ between these two groups, the share of children in childcare is about 50% higher in the less conservative group. We see these differences when using interaction terms or estimating the effect in the two subsamples separately.

<sup>19</sup>We have data on the number of children in the year following the interview for 82% of the sample. Our results also do not change if we only drop those observations with an observable increase in the number of children.

significant effect on overall physical health, physical functioning, physical role, bodily pain, and social functioning. With about 40% up to 56% of a standard deviation, these effects seem also quite sizeable. At the same time, pregnancy does not seem to exert a significant effect on self-assessed health (see Appendix Table A7). This may indicate that women evaluate their overall health status in the context of pregnancy and therefore rather independent of their pregnancy status.

## 6. Identifying Assumptions and Robustness Checks

In the following, we discuss our identifying assumptions and conduct a variety of robustness checks.

### 6.1. *Exogeneity of Childcare Expansion*

One of our main identifying assumptions is the exogeneity of our main explanatory variable, the early childcare ratio, especially with regard to maternal health. As discussed in Section 2, the local expansion of early childcare only imperfectly follows government projections of future demand due to a number of constraints and exogenous shocks, such as the complex and somewhat unpredictable time requirements for operating and building permits, delays in the construction of facilities, and, most importantly, an enormous shortage of childcare workers. Beyond this argumentative approach based on observational evidence, we investigate the relationship between the counties' early childcare ratios and key county-specific characteristics.<sup>20</sup> As explanatory variables we include the counties' unemployment ratio, average age of inhabitants, share of female inhabitants, population density, GDP per capita, fertility rate, and share of foreigners. In addition, to control for health outcomes, we include the life expectancy, and number of hospital beds per capita in the counties. Regardless of whether we regress the local childcare ratio of respective years on same-year values or their first or second lags, we only observe significant effects for average age, female population share, population density, fertility, and the share of foreigners, while our models explain around 50 percent of the variation in local childcare availability.<sup>21</sup>

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<sup>20</sup>We use one observation for every West German county and year from 2006 to 2019 and again run a fixed-effects model including year dummies.

<sup>21</sup>Under a loss of observations, we also run a model including the average property prices and the tax revenue per capita reflecting the counties' public budget. While the results differ only marginally, both of these measures are also statistically insignificant. This seems noteworthy as both, childcare as well as public hospitals, are at least partly funded by local budgets in Germany. Results are available upon request.

While it already seems argumentatively unreasonable, the insignificant coefficients for life expectancy and hospital bed density also speak against local health or healthcare as drivers for childcare expansion (see Appendix Table B1, Columns (1) to (3)). Using the SOEP data we can additionally create two other proxies for maternal health: the county-level means of self-assessed health and of the number of doctoral visits for females between 20 and 40 years of age. For both variables as well as their same-year values and first lags, all coefficients are far from being statistically significant (see Appendix Table B1, Columns (4) to (11)). Thus, our tests provide evidence that the expansion of early childcare is indeed exogenous to regional maternal health.<sup>22</sup>

## 6.2. Selection

Another threat to our identification strategy might be self-selection of mothers into counties with specific ECC expansion rates. We address this issue in several ways: First, all our regressions control for a range of county-level and, more importantly, individual-level characteristics, of which especially migration and educational status are likely to be key determinants of movement. Second, excluding mothers who moved between counties during our observation period does not change our results (see Appendix Table B8, Column (12)). Third, since we have information on whether mothers still live at the place of their childhood<sup>23</sup>, we can measure effects separately for mothers who stayed there and mothers who moved. Notably, the individual characteristics of movers and stayers are largely similar, with the (expected) exception of migration background, which is much higher in the movers' sample. Regarding county characteristics, mothers seem to move to counties with higher GDP, presumably due to employment opportunities, although the ECC ratio only slightly differs between the moving and staying samples (see Appendix Table B4). Estimating our ECC effects on maternal health separately in these two subsamples (or using an interaction term), confirms the negative effect of the early childcare expansion on maternal health. If anything, the effect is higher in the sample of mothers, who stayed at their place of childhood (see Appendix Table B3).

Besides this kind of self-selection, there may also be selection issues related to the large group of refugees who migrated to Germany during the last years of our observation period. This might be the case if authorities allocated refugee families with young children

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<sup>22</sup>As a robustness check, we run a version of our main model including all of the mentioned county characteristics. Independently of whether we use the same year, first, or second lag values of the county characteristics, we get similar results (coefficients for ECC ratio ranging from -0.0171 to -0.0141, all of which are at least statistically significant at the 5% level; see Appendix Table B2, Column (2) to (4)).

<sup>23</sup>Defined as the place where they lived until the age of 15.



to counties with better ECC availability due to integration reasons. Excluding mothers with a refugee background even slightly increases our estimate (see Appendix Table B8, Column (11)).

### 6.3. Placebo checks

To ensure that we are measuring the effect of the ECC expansion instead of confounding trends, we conduct two placebo analyses. As a first placebo check, we rerun our analysis for women without children in West Germany between the ages of 20 and 40.<sup>24</sup> The expansion of childcare should therefore not directly affect these women. Indeed, the results show a quantitatively very small and insignificant effect of the local childcare availability on the self-assessed health of childless women (see Appendix Table B5).

As a second placebo check, we rerun our analysis for mothers with children between 37 and 120 months (i.e. the typical age for kindergarten and elementary school) who do not have any children under the age of 36 months. These mothers are unlikely to be affected by the early childcare expansions, as their children are already too old to be eligible for early childcare. Moreover, as over 90% of children aged three years and older already attend childcare (kindergarten), they are also likely to be less susceptible to spillover effects from younger children of other mothers. In line, the effect for mothers with older children is close to zero and not statistically significant (see Appendix Table B6). This shows that the ECC expansion only affects mothers with children in early childcare age, which is an additional piece of evidence that we indeed measure the effects of the increased early childcare availability instead of confounding trends.

### 6.4. County-Regions

So far, we analyzed early childcare availability on the level of legally defined counties. However, it seems reasonable to also test our results on the level of so-called county regions where small-sized district-free towns below 100,000 inhabitants get integrated into surrounding bigger counties (see Appendix Figure B1).

This is useful for two reasons. First, it addresses the problem of the smallest counties with only few observations which could be prone to individual outliers. Second, it also seems spatially reasonable to treat these regions as common entities due to their high degree of geographical proximity<sup>25</sup> and integration in terms of public institutions, economy,

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<sup>24</sup>As 90% of our mothers belong to this age group.

<sup>25</sup>Many of these district-free towns are enclaves within a single surrounding county. This is due to historical reasons. In the late 20th and early 21st centuries, many smaller counties were merged to today's counties, while the district-free cities refrained from merging.

and labor markets.<sup>26</sup> Rerunning our main model using the county-region ECC ratio as our main explanatory variable, we get results that only differ slightly in magnitude and significance (see Appendix Table B7).<sup>27</sup>

### 6.5. Further Robustness Checks

**Leave-One-Out Analyses:** To check whether our results are driven by one particular federal state or one particular observation year, we conduct leave-one-out analyses. Except for the coefficient for the exclusion of North Rhine-Westphalia (p-value: 0.078), Germany’s most populous state, all of the estimated coefficients are statistically significant at the 5%-level. Coefficients range from -0.011 to -0.021, with the majority between -0.016 and -0.019 (see Appendix Figures B2 and B3).<sup>28</sup>

**Change in Control Variables:** As contemporaneously introduced state-level policies could confound our effects of the ECC expansion, we run an analysis in which we control for state-year fixed effects. This does not change our result (see Appendix Table B8, Column (3)). Furthermore, our results are also robust when allowing for county-specific linear time-trends (see Appendix Table B8, Column (4)), which further isolates the exogenous shocks from the overall local increase in childcare.

As some of the effect of early childcare availability on maternal health could run through picking up work or fertility decisions, we run one specification of the model in which we exclude all potentially endogenous controls (number of children in the household, maternal cohabitation, and working status). Interestingly, our estimate remains very similar (see Appendix Table B8, Column (6)), which suggests that our effect can be less explained by working and fertility decisions.<sup>29</sup>

**Childminder:** Despite not being a threat for identification, it could be that some of our effect of childcare availability is explained by a parallel increase in childminder availability.

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<sup>26</sup>Some examples of this are the similar naming of many of these districts, the location of the surrounding counties’ councils inside the district-free towns, joint employment and family benefits agencies, collaboration in the (inpatient) healthcare sector, joint electoral districts for federal and state elections or the location of large employers on the outskirts of the towns and thus close to the county borders.

<sup>27</sup>In this analysis, we use county-region FE, county-region controls and cluster the standard errors on the county-region level.

<sup>28</sup>Since the period from 2007 to 2014 saw the largest expansion of childcare, we further examine the effects during this period of high intensity. The effect of the ECC ratio on maternal health is even larger in this period (see Appendix Table B8, Column (2)).

<sup>29</sup>Excluding all individual and county controls or extending the set of control variables by squared terms of mother and child’s age and household income does also not change our results (see Appendix Table B8, Column (5), (7) and (8)).

Including a control variable for the proportion of children under the age of 3 cared for by childminders does not change our results. Furthermore, the coefficient for the childminder ratio, although negative and of similar magnitude, does not reach statistical significance (see Appendix Table B9).<sup>30</sup>

## 7. Effects on Mothers' Partners and Intra-Household Inequalities

Since the increase in the availability of early childcare has an impact on the whole family, we also examine the effects on the health of the mothers' partners.<sup>31</sup> Using the same empirical approach as before, we find no effect on partners' self-assessed health (see Appendix Table C1). We also find no effect of increased childcare availability on the various physical and mental health domains for partners (see Appendix Table C2).

Several factors may contribute to the differential impact on mothers compared with their partners. First, the burden of care is often disproportionately borne by mothers, even when they return to work, which might explain why we observe negative effects on mothers' health but not on their partners. In addition, the physical demands of pregnancy and childbirth may make mothers more vulnerable to illness in the early childhood years. In addition, as the majority of partners are employed (83%), they are likely to be more immunized through social contacts at work, potentially making them less susceptible to infectious diseases.

In addition to estimating the average effect on mothers and partners separately, we can also estimate effects on intra-household differences in self-assessed health.<sup>32</sup> As Appendix Table C3 shows, the local childcare availability significantly increases the health gap (which we define as partners' health score minus maternal health score), with a coefficient of 0.0185. This implies that an increase in local childcare availability by 10 percentage points leads to a rise in the intra-household health gap by about 0.185, which corresponds to roughly 17% of a standard deviation.<sup>33</sup> The coefficient's magnitude aligns with our prior findings suggesting a similar underlying mechanism at play within households. Furthermore, this result also provides support for the robustness of the negative

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<sup>30</sup>We have to restrict our observation period to 2007-2019 due to the absence of 2006 data on childminder services.

<sup>31</sup>Note that 99.8% of partners are male.

<sup>32</sup>In this analysis we control for age and employment status of both parents, their migration background, educational attainment, interview months, as well as the household's taxable income, number of children, and the child's age. Additionally, we again include county-level controls for GDP, fertility, and unemployment, along with year and county-fixed effects.

<sup>33</sup>Using a dummy variable indicating that mothers have worse SAH than their partner as an outcome variable leads to similar results (see Appendix Table C3)

effect found on maternal health when an outcome variable is used that can account for joint shocks to the health of both parents, such as deaths of family members.

Investigating such kind of gender equality is interesting, as a large strand of literature shows that the arrival of children largely increases gender inequality in paid and unpaid work (see, e.g., Kuziemko et al., 2018; Kleven et al., 2019; Andresen and Nix, 2022a,b) as well as in health (Ahammer et al., 2023). Our analysis provides evidence that a family policy which successfully increases gender equality in some domains (e.g., work), may simultaneously decrease it in other domains (at least in the short run).

## 8. Childcare Usage

We suspect the overall effect of early childcare availability on maternal health to consist of both, impacts on mothers who have not (yet) enrolled their child in early childcare, as well as on those who are actually utilizing it. One way to explore the relationship between the actual usage of early childcare and maternal health is to apply a fixed effects instrumental variable (FEIV) regression. Conducting a FEIV model<sup>34</sup> shows a highly significant effect of local childcare availability on the probability of actual childcare usage on the first stage and a statistically significant negative effect of actual childcare usage on the second stage (see Appendix Table A9). However, the magnitude of the effect on the second stage seems implausibly large. In light of a notable amount of predicted probabilities on the first stage below zero, we also run a model using a logit instead of a linear model on the first stage to ensure predicted probabilities on the unit interval. Afterwards, we use the predicted probabilities as instruments in a 2SLS estimation (see Wooldridge 2010, p. 623). Doing so, the second stage coefficient of the probit specification looks more plausible, reflecting approximately the same size as of an increase of 10 percentage points in the FE model, and is significant at the 5%-level.

However, we refrain from interpreting the results of this estimation in detail as we suspect two problems. First, even though our F-statistic is greater than 10, computing effective F-Statistics following Montiel and Pflueger (2013) suggests at least minor problems regarding the degree of reliability of these FEIV results. More importantly, we

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<sup>34</sup>We again include county-fixed effects and exploit the exogenous variation in early childcare availability. On the first stage, we regress the actual childcare usage status on the local early childcare ratio and the same set of controls as in the FE estimation and predict the probability of early childcare usage. On the second stage, we regress maternal self-assessed health on this predicted probability. In order to allow the relationship between child age and childcare use to be non-linear and make jumps at certain points, e.g. at the threshold for legal entitlement, we use child age as a categorical instead of a continuous variable. Alternatively, including child age as second polynomial, leads to similar results.

suspect a potential violation of the IV assumptions, namely the exclusion restriction, as the availability of childcare may affect maternal health not only through the actual use of childcare. First, infectious events in childcare settings may spill over to the non-enrolled group through contact with enrolled children (e.g., on playgrounds). Second, the availability of early childcare affects the effort and planning certainty to secure a childcare slot, which could reduce maternal stress even before the child is enrolled in childcare. Third, peer and employer expectations to secure an ECC slot (early) may actually increase maternal stress during this decision and transition period. Overall, the FEIV specification supports the intuition of a positive effect of local childcare availability on actual use, as well as a negative effect of actual childcare use on maternal health.<sup>35</sup> Interestingly, running the same FEIV models for fathers' health yields similar results on the first stage, while we find no effect of actual ECC usage on fathers' health.

## 9. Conclusion

We provide evidence on the causal effects of increased early childcare availability in Germany for children younger than three years on maternal health. We find that a 10 percentage point increase in the availability of childcare decreases mothers' self-assessed health by 0.173 points on a one to five scale (19% of a standard deviation). Further analyses reveal that mothers experience negative effects in both domains of health, physical and mental health. Increased childcare availability decreases their physical functioning and increases their mental and emotional problems. Furthermore, mothers are more likely to report that they have to reduce their social activities due to health problems. They are also less satisfied with their health in general and worry more about the health of their child. Interestingly, we find no effect of the childcare expansion on the health of mothers' partners.

Given the inherent risks to maternal health associated with pregnancy and childbirth, and the central role of maternal health in child development, it is important to examine how family policies affect maternal health. While several papers examine how parental leave policies affect maternal health (Buetikofer et al., 2023; Chuard, 2023; Ahammer et al., 2023), evidence on the effects of universal childcare on maternal health is scarce. Our results show a negative impact of a large expansion of childcare in Germany on maternal health. As we expect a notable share of our overall effect on mothers' self-

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<sup>35</sup>Both effects also hold if we include no controls besides child age as well as if we use the weekly hours of ECC usage instead of a dummy for overall ECC enrollment.

assessed health stemming from the spread of infections and respiratory illnesses from children to mothers, it is likely that this is a short-term effect, as mothers might become more immunized over time with the child in childcare. Nevertheless, acknowledging this effect is crucial, as it could represent a barrier that influences labor market participation of mothers. In addition, we cannot rule out that part of our effect is driven by the double burden of childcare and employment (search), which should be investigated in the future. Overall, our findings emphasize the importance of assistance offers for mothers, disease control in childcare facilities as well as sensibility regarding maternal health resilience and the need for workplace flexibility.

Despite the evidence of negative impact on maternal health, there is substantial evidence that childcare expansions benefit a wide range of outcomes for both mothers and children. These include maternal labor supply (Müller and Wrohlich, 2020), fertility rates (Bauernschuster et al., 2016), child development (Felfe and Lalive, 2018), preventing child maltreatment (Sandner et al., 2020), and the promotion of equal opportunities for children (Felfe and Lalive, 2018; Cornelissen et al., 2018). Therefore, expanding early childcare services further should remain a top priority for policymakers to promote gender equality in paid (and unpaid) work and to reduce educational inequalities among children from different socioeconomic backgrounds. However, these improvements seem to come with unintended costs regarding the health of mothers and increased gender inequalities in health. In order to secure the well-being of mothers and families, it seems crucial to investigate the specific factors driving these negative effects on maternal health.

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# Appendix

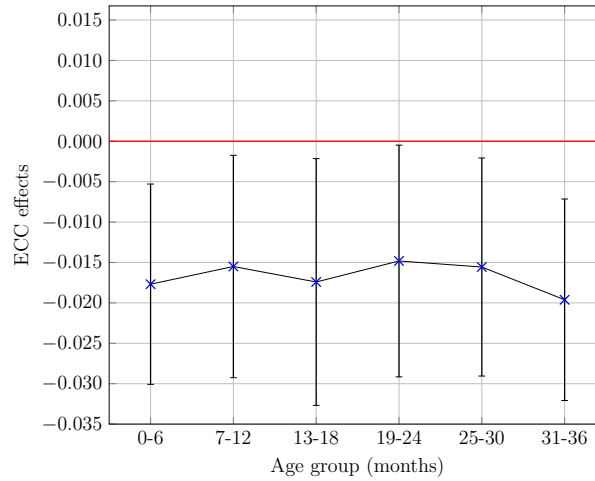
## Appendix A. Further Results

Table A1: Ordered Logit: Marginal Effects of ECC availability on SAH

SAH: Marginal effects	
Category 1: Bad	0.0004** (0.0002)
Category 2: Poor	0.0028*** (0.0011)
Category 3: Satisfactory	0.0049*** (0.0018)
Category 4: Good	-0.0022*** (0.0008)
Category 5: Very Good	-0.0059*** (0.0022)
County FE	Yes
Time FE	Yes
Covariates	Yes
<b>N</b>	8980

*Notes:* Table shows marginal effects of the ordered logit model (see Column (2) of Table 2) for the five categories of self-assessed health. \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Figure A1: Marginal Effects of Childcare Availability on SAH by Age of the Child



*Notes:* The figure shows the marginal effects of the ECC expansion on maternal self-assessed health separately for different age groups of children. The bars show the 95% confidence interval.

Table A2: Heterogeneity by Child Characteristics

	SAH: Heterogeneity			
	(1)	(2)	(3)	(4)
Childcare coverage	-0.0173*** (0.0065)	-0.0174** (0.0075)	-0.0188** (0.0075)	-0.0159** (0.0078)
Childcare coverage × Child is female	0.0000 (0.0019)			
Childcare coverage × Pre-Term Birth (<37 weeks)		0.0021 (0.0039)		
Childcare coverage × Low Birth Weight (<2500 grams)			0.0061 (0.0049)	
Childcare coverage × C-Section				0.0027 (0.0024)
County FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes
Within- $R^2$	0.036	0.036	0.037	0.040
N	8980	7836	7964	7917

*Notes:* Table shows heterogeneous treatment effects on mothers' self assessed health for different subgroups, based on FE models using interactions. We report heterogeneity on various child characteristics: child gender (Column (1)), pre-term birth (Column (2)), low birth weight (Column (3)), and C-Section (Column (4)). The childcare expansion effect in the first row shows the effect for the subgroup of children to which the respective heterogeneity does not apply (e.g., those mothers with male children). All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A3: Satisfaction with Health/Life and Worries about Child Health

	Satisfaction with Health	Satisfaction with Life	Worries about Child's Health
	Categorical (1-10)	Categorical (1-10)	Categorical (1-4)
	(1)	(2)	(3)
Childcare coverage	-0.0238* (0.0131)	-0.0101 (0.0090)	0.0105** (0.0053)
Covariates	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Within- $R^2$	0.033	0.052	0.025
N	8966	8979	8716

*Notes:* Table shows effects of increased childcare availability on mothers' satisfaction with their health and life, and worries about their children's health. All models are estimated using STATA's *xtreg*-command. In Column (1) and Column (2), the outcome is mothers' satisfaction with their health and life on a scale from 1 (completely dissatisfied) to 10 (completely satisfied). In Column (3), the outcome reflects how much the mother agrees with the statement: I am worried about my child's health (on a scale from 1 (disagree completely) to 4 (agree completely)). All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A4: Heterogeneity Working

	Components									
	Index Physical	Index Mental	Physical Functioning	Role Physical	Bodily Pain	Vitality	Role Emotional	Mental Health	Social Functioning	General Health
Childcare Coverage	-0.1812*	-0.1893	-0.1965**	-0.1778	-0.1151	-0.1388	-0.2250**	-0.1544	-0.2400**	-0.2926***
	(0.0928)	(0.1198)	(0.0885)	(0.1241)	(0.1150)	(0.1224)	(0.1054)	(0.1195)	(0.1085)	(0.0949)
Childcare Coverage × Working	0.0525	0.0735	0.0536*	0.0795**	0.0939**	0.0703	0.1054**	0.0354	0.0672	0.0146
	(0.0305)	(0.0481)	(0.0312)	(0.0379)	(0.0379)	(0.0430)	(0.0450)	(0.0471)	(0.0421)	(0.0420)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within- $R^2$	0.041	0.035	0.040	0.025	0.043	0.018	0.041	0.045	0.027	0.044
N	2557	2557	2557	2557	2557	2557	2557	2557	2557	2557

*Notes:* Table shows effects of increased childcare availability on different domains of physical and mental health interacted with the working status. All outcome variables range from 0 to 100, and are standardized to a mean of 50 and a standard deviation of 10. Higher values indicate better health. Column (1) and Column (2) show effects on the physical and mental health indices, which consist of the (weighted) variables that follow in the table (see Section 3.2 and Appendix Section Appendix D for details). In Column (3) the outcome variable is mother's physical functioning (possibility to climb steps and lift objects). In Column (4) the outcome variable is mother's physical role (limitations in daily activities due to physical health problems). In Column (5) the outcome variable is the frequency of experiencing severe physical pain. In Column (6) the outcome variable is the frequency of feeling energetic. In Column (7) the outcome variable is the emotional role of mothers (limitations in daily activities due to emotional or mental health problems). In Column (8) the outcome variable is mother's mental health (frequency of feeling down and frequency of feeling calm). In Column (9) the outcome variable is whether (and how often) the mother had to reduce social activities due to health problems. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A5: Sleep

	Hours Sleep (per Day)	Satisfaction with Sleep	Sleeping Disorder
	Continuous (1)	Categorical (1-10) (2)	Dummy (3)
Childcare coverage	-0.0049	-0.0156	0.0029
	(0.0103)	(0.0191)	(0.0031)
Covariates	Yes	Yes	Yes
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Within- $R^2$	0.049	0.039	0.017
N	6392	7763	1563

*Notes:* Table shows effects of increased childcare availability on outcomes related to sleep. All models are estimated using STATA's *xtreg*-command. In Column (1), the outcome variable indicates mothers' daily hours of sleep. In Column (2), the outcome variable is mothers' satisfaction with sleep on a scale from 1 (completely dissatisfied) to 10 (completely satisfied). In Column (3), the outcome variable is a dummy taking a value of one if the mother has or had a diagnosed sleeping disorder. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A6: Heterogeneity: Gender Norms in Counties

	<b>Self-Assessed Health</b>	
	Gender-Conservative Counties	Gender-Liberal Counties
	Categorical (1-5) (1)	Categorical (1-5) (2)
Childcare coverage	-0.0189* (0.0102)	-0.0153** (0.0077)
County FE	Yes	Yes
Time FE	Yes	Yes
Covariates	Yes	Yes
<b>Within-<math>R^2</math></b>	0.045	0.035
N	4541	4364

*Notes:* Table shows effects of increased childcare availability on mothers' self assessed health. All models are estimated using STATA's *xtreg*-command. In both Columns, the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). The sample in Column (1) consists of gender-conservative counties, the sample in Column (2) includes all gender-liberal counties. Counties are considered as gender-conservative (gender-liberal) if the share of respondents agreeing to the statement "It harms children under 3 years if the mother works" is larger (smaller) than the median in West Germany in 2012. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A7: SAH-Effects with Control for Pregnancy Status

	Self-Assessed Health		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
Childcare coverage	-0.0173*** (0.0064)	-0.0399*** (0.0150)	-0.0093*** (0.0027)
Pregnancy Dummy	-0.0103 (0.0421)	-0.0250 (0.0936)	-0.0018 (0.0225)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes, incl. pregnancy	Yes, incl. pregnancy	Yes, incl. pregnancy
(Within)- $R^2$	0.036	0.042	0.024
N	8980	8980	8980

*Notes:* Table shows effects of increased childcare availability on mothers' self assessed general health when controlling for the pregnancy status of the mother. The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if mother's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and survey month. Additionally, we control for the pregnancy status of the mother. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A8: Physical and Mental Health of Mothers: Pregnancy Control

	Components									
	Index Physical	Index Mental	Physical Functioning	Role Physical	Bodily Pain	Vitality	Role Emotional	Mental Health	Social Functioning	General Health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Childcare Coverage	-0.1610* (0.0916)	-0.1625 (0.1197)	-0.1755* (0.0929)	-0.1460 (0.1206)	-0.0794 (0.1122)	-0.1136 (0.1215)	-0.1844* (0.1036)	-0.1431 (0.1197)	-0.2147* (0.1109)	-0.2900*** (0.0968)
Pregnancy Dummy	-3.5646*** (0.0782)	-0.1762 (0.7310)	-3.0310*** (0.7923)	-5.7429*** (0.9693)	-3.1201*** (0.8588)	-1.3833 (0.8900)	-0.9755 (0.8356)	0.4051 (0.7953)	-2.0822** (0.8037)	0.3591 (0.7745)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within- $R^2$	0.054	0.036	0.050	0.047	0.049	0.020	0.040	0.047	0.030	0.047
N	2557	2557	2557	2557	2557	2557	2557	2557	2557	2557

*Notes:* Table shows effects of increased childcare availability on different domains of physical and mental health when controlling for the pregnancy status. All outcome variables range from 0 to 100, and are standardized to a mean of 50 and a standard deviation of 10. Higher values indicate better health. Column (1) and Column (2) show effects on the physical and mental health indices, which consist of the (weighted) variables that follow in the table (see Section 3.2 and Appendix Section Appendix D for details). In Column (3) the outcome variable is mother's physical functioning (possibility to climb steps and lift objects). In Column (4) the outcome variable is mother's physical role (limitations in daily activities due to physical health problems). In Column (5) the outcome variable is the frequency of experiencing severe physical pain. In Column (6) the outcome variable is the frequency of feeling energetic. In Column (7) the outcome variable is the emotional role of mothers (limitations in daily activities due to emotional or mental health problems). In Column (8) the outcome variable is mother's mental health (frequency of feeling down and frequency of feeling calm). In Column (9) the outcome variable is whether (and how often) the mother had to reduce social activities due to health problems. All models are estimated using STATA's *xtreg*-command with county-level and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table A9: FEIV - SAH of Mothers

<b>FEIV: Self-assessed health</b>				
	First Stage (1)	Second Stage (2)	First Stage (3)	Second Stage (4)
ECC ratio	0.0088*** (0.0024)		0.0841*** (0.0215)	
ECC usage		-2.0602** (0.9408)		-0.2015** (0.1007)
1st stage	Linear		Logit	
Covariates	Yes		Yes	
Age control children	Categorical		Categorical	
Time FE	Yes		Yes	
SE	clustered		clustered	
N	8508		7866	

*Notes:* Table shows FEIV-estimates, when using the early childcare availability as an instrument for actual early childcare usage. On the first stage, we regress the actual childcare usage status on the local early childcare ratio and the same set of controls as in the FE. On the second stage, we regress maternal self-assessed health on this predicted probability. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age (categorical), number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .



## Appendix B. Robustness

Table B1: Determinants of ECC Availability

	ECC ratio			ECC ratio				ECC ratio			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
SAH females								-0.0481 (0.1368)	-0.0625 (0.1220)	-0.0761 (0.1378)	-0.0661 (0.1215)
Doc. visits females				0.1857 (0.2341)	0.2639 (0.2066)	0.1703 (0.2318)	0.2041 (0.2144)				
Hosp. beds	-0.0724 (0.1029)	-0.0817 (0.1025)	-0.1203 (0.1204)		-0.0811 (0.1151)		-0.1196 (0.1404)		-0.0812 (0.1140)		-0.1193 (0.1394)
Life exp.	-0.1726 (0.2615)	-0.3838 (0.2476)	-0.3659 (0.2389)		-0.2147 (0.2675)		-0.3799 (0.2507)		-0.2171 (0.2680)		-0.3830 (0.2512)
Unempl. rate	-0.3216* (0.1838)	-0.2027 (0.1515)	-0.2680* (0.1409)		-0.3315* (0.1897)		-0.2151 (0.1556)		-0.3303* (0.1898)		-0.2121 (0.1554)
Avg. age	1.0483*** (0.2400)	0.9390*** (0.2366)	0.7353*** (0.2396)		0.9825*** (0.2338)		0.8733*** (0.2333)		0.9789*** (0.2339)		0.8723*** (0.2333)
Female pop. share	1.2065** (0.4896)	1.1982** (0.4930)	1.2428*** (0.4720)		1.3015*** (0.4715)		1.3513*** (0.4745)		1.3020*** (0.4720)		1.3500*** (0.4749)
Pop. density	0.0088** (0.0039)	0.0098** (0.0039)	0.0076** (0.0033)		0.0087** (0.0039)		0.0096** (0.0039)		0.0087** (0.0039)		0.0096** (0.0039)
GDP	-0.0144 (0.0265)	-0.0237 (0.0291)	-0.0364 (0.0301)		-0.0148 (0.0263)		-0.0235 (0.0289)		-0.0148 (0.0263)		-0.0235 (0.0288)
Fertility	-5.2745*** (0.9269)	-4.7711*** (0.9598)	-2.4606*** (0.9249)		-5.5285*** (0.9458)		-4.8780*** (0.9620)		-5.5351*** (0.9427)		-4.8910*** (0.9605)
Share Foreign.	-0.3597*** (0.1059)	-0.3505*** (0.1110)	-0.3115*** (0.1141)		-0.3593*** (0.1022)		-0.3623*** (0.1078)		-0.3589*** (0.1023)		-0.3618*** (0.1078)
Expl. variables	no lag	first lag	second lag	no lag	no lag	first lag	first lag	no lag	no lag	first lag	first lag
Within- $R^2$	0.924	0.923	0.909	0.917	0.925	0.917	0.924	0.917	0.925	0.917	0.924
N	4519	4517	4192	4399	4368	4399	4368	4399	4366	4399	4366

Notes: Table shows effects of key county-level characteristics on counties' ECC ratios. Columns (1), (4), (5), (8) and (9) use same-year values of the county-level characteristics, Columns (2), (6), (7), (10) and (11) use first lags, and Column (3) uses a second lag. Doc. visits of females and SAH females reflect the counties' mean values for doctoral visits (in the last three months) and self-assessed health of females between the age of 20 and 40 years. All regressions include county- as well as year-fixed effects. \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table B2: SAH of Mothers - Extended Set of County Controls

	Self-Assessed Health			
	(1)	(2)	(3)	(4)
Childcare coverage	-0.0173*** (0.0064)	-0.0171** (0.0067)	-0.0141** (0.0067)	-0.0148** (0.0070)
Age mother (years)	-0.0130*** (0.0025)	-0.0128*** (0.0025)	-0.0132*** (0.0025)	-0.0133*** (0.0026)
Age child (months)	-0.0032*** (0.0009)	-0.0032*** (0.0009)	-0.0033*** (0.0009)	-0.0033*** (0.0009)
HS Diploma	0.2144*** (0.0271)	0.2144*** (0.0271)	0.2133*** (0.0273)	0.2183*** (0.0274)
Cohabiting	0.1835*** (0.0444)	0.1851*** (0.0443)	0.1858*** (0.0443)	0.1948** (0.0445)
Migr. Background	0.1059*** (0.0292)	0.1081*** (0.0294)	0.1058*** (0.0293)	0.1050*** (0.0292)
Number kids	-0.0177 (0.0111)	-0.0178 (0.0110)	-0.0171 (0.0110)	-0.0186* (0.0110)
Work: Marg. Time	0.0551 (0.0350)	0.0569 (0.0352)	0.0567 (0.0346)	0.0612* (0.0356)
Work: Parttime	0.0661** (0.0296)	0.0666** (0.0298)	0.0659** (0.0295)	0.0588* (0.0302)
Work: Fulltime	0.0502 (0.0495)	0.0495 (0.0499)	0.0462 (0.0501)	0.0275 (0.0527)
Unempl. rate	0.0178 (0.0200)	0.0104 (0.0219)	0.0096 (0.0168)	0.0187 (0.0169)
GDP	0.0029 (0.0042)	0.0045 (0.0046)	0.0059 (0.0041)	0.0014 (0.0063)
Fertility	-0.405** (0.2333)	-0.4844** (0.2321)	0.1275 (0.2278)	-0.0185 (0.2356)
Avg. age		-0.0258 (0.0364)	-0.0245 (0.0299)	-0.0334 (0.0315)
Female pop. share		0.1024 (0.0783)	0.0329 (0.0729)	0.0223 (0.1010)
Pop. density		-0.0006 (0.0004)	-0.0003 (0.0003)	-0.0006** (0.0003)
Foreigners		0.0119 (0.0185)	0.0045 (0.0170)	0.0008 (0.0214)
Hosp. beds		-0.0405 (0.0254)	0.0096 (0.0254)	-0.0138 (0.0264)
Life exp.		0.0298 (0.0642)	0.0221 (0.0667)	0.0973 (0.0664)
County controls	No lag	No lag	First lag	Second lag
Within- $R^2$	0.036	0.037	0.037	0.037
N	8980	8946	8952	8681

*Notes:* Table shows effects of increased childcare availability on mothers' self assessed general health including a larger set of county-level controls. The outcome variable is self-assessed health measured on a scale from 1 (bad) to 5 (very good). We add the following county-level controls in this regression: average age of the population, share of females, population density, share of foreigners, number of hospital beds and average life expectancy in the county, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table B3: SAH of Mothers - Selection

	Self-Assessed Health		
	Interacted (1)	Subsample: Mover (2)	Subsample: Stayer (3)
Childcare coverage	-0.0191*** (0.0068)	-0.0181** (0.0090)	-0.0302**** (0.0110)
Childcare coverage $\times$ Stayer	-0.0028 (0.0025)		
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
(Within)- $R^2$	0.030	0.029	0.042
N	7752	4892	2860

*Notes:* Table shows effects of increased childcare availability on mothers' self assessed general health for mothers who stayed in the place of their childhood (defined as the place where they lived until the age of 15) and for mothers who moved. In Column (1) we estimate the effect using a interaction term, in Columns (2) and (3) we estimate the effects in the two subsamples. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table B4: Sample Characteristics for Stayers and Movers

	Stayers		Movers	
	Mean	SD	Mean	SD
Self-Assessed Health (SAH)	3.72	0.88	3.75	0.89
Age Mother (in years)	32.70	5.64	33.85	5.36
Age Child (in months)	20.44	11.82	20.91	11.64
Number Children	2.03	1.05	2.17	1.14
Cohabiting	0.91	0.29	0.94	0.24
HS Diploma	0.28	0.45	0.29	0.46
Migration Background	0.06	0.24	0.40	0.49
Work: Marginally Employed	0.09	0.29	0.08	0.27
Work: Part-Time	0.18	0.39	0.19	0.39
Work: Full-Time	0.06	0.24	0.06	0.25
Act. ECC Usage	0.22	0.42	0.25	0.43
ECC Ratio	21.30	9.38	22.69	8.70
GDP	34.14	13.37	39.28	19.21
Unemployment Rate	6.65	3.24	6.26	2.82
Fertility	1.46	0.13	1.46	0.13
Interview Year	2012.07	3.25	2012.47	3.20
Interview Month	4.98	2.23	5.28	2.13
N	2860		4892	

*Notes:* Table reports mean values and standard deviations for the sample of mothers who stayed in the place of their childhood (defined as the place where they lived until the age of 15) and for the sample of mothers who moved.

Table B5: Placebo: Women Without Children

	Placebo: Self-Assessed Health (No Children)		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
<b>Childcare coverage</b>	-0.0031 (0.0041)	-0.0055 (0.0090)	-0.0013 (0.0021)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
(Within)- $R^2$	0.029	0.038	0.017
N	16815	16815	16815

*Notes:* Table shows estimates of a placebo check, in which we measure the effects of increased childcare availability on health of women without children. We restrict the sample to women which are in a similar age range as our mothers (20-40 years). The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if women's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: woman's age, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and survey month. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table B6: Placebo: Mothers with Older Children

	Placebo: Self-Assessed Health (Older Children)		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
<b>Childcare coverage</b>	-0.0013 (0.0059)	-0.0057 (0.0128)	-0.0029 (0.0030)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
(Within)- $R^2$	0.043	0.040	0.031
N	9753	9753	9753

*Notes:* Table shows estimates of a placebo check, in which we measure the effects of increased childcare availability on health of mothers with older children. Children are between 37 to 120 months old (kindergarden or elementary school age). In case of multiple observations per mother and year, the observation for the youngest child within the age group is selected. Importantly, mothers have no child below 36 months of age. The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if women's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, child's age, number of children in the household, indicators for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment), cohabiting with the partner, and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

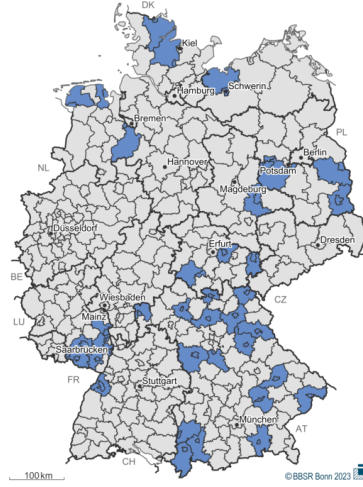


Figure B1: German Counties and County Regions

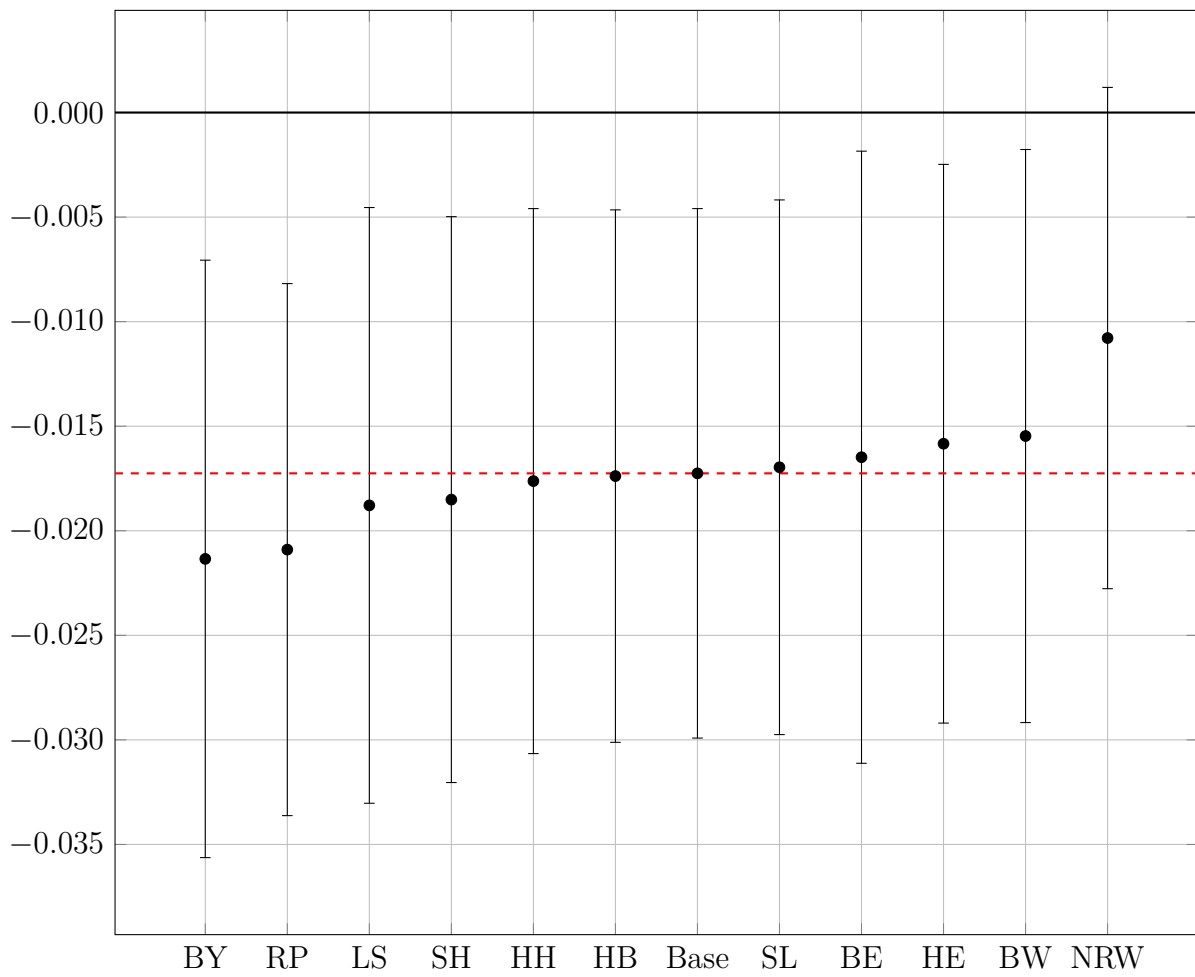
*Notes:* The blue colored areas reflect the so-called county regions where small district-free cities are grouped together with their surrounding county. Source: INKAR (BBSR).

Table B7: County-Region Analysis: SAH of Mothers

	Self-Assessed Health		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
<b>Childcare coverage</b>	-0.0163** (0.0067)	-0.0383** (0.0156)	-0.0098*** (0.0028)
County-region FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
(Within)- $R^2$	0.036	0.040	0.024
N	8980	8980	8980

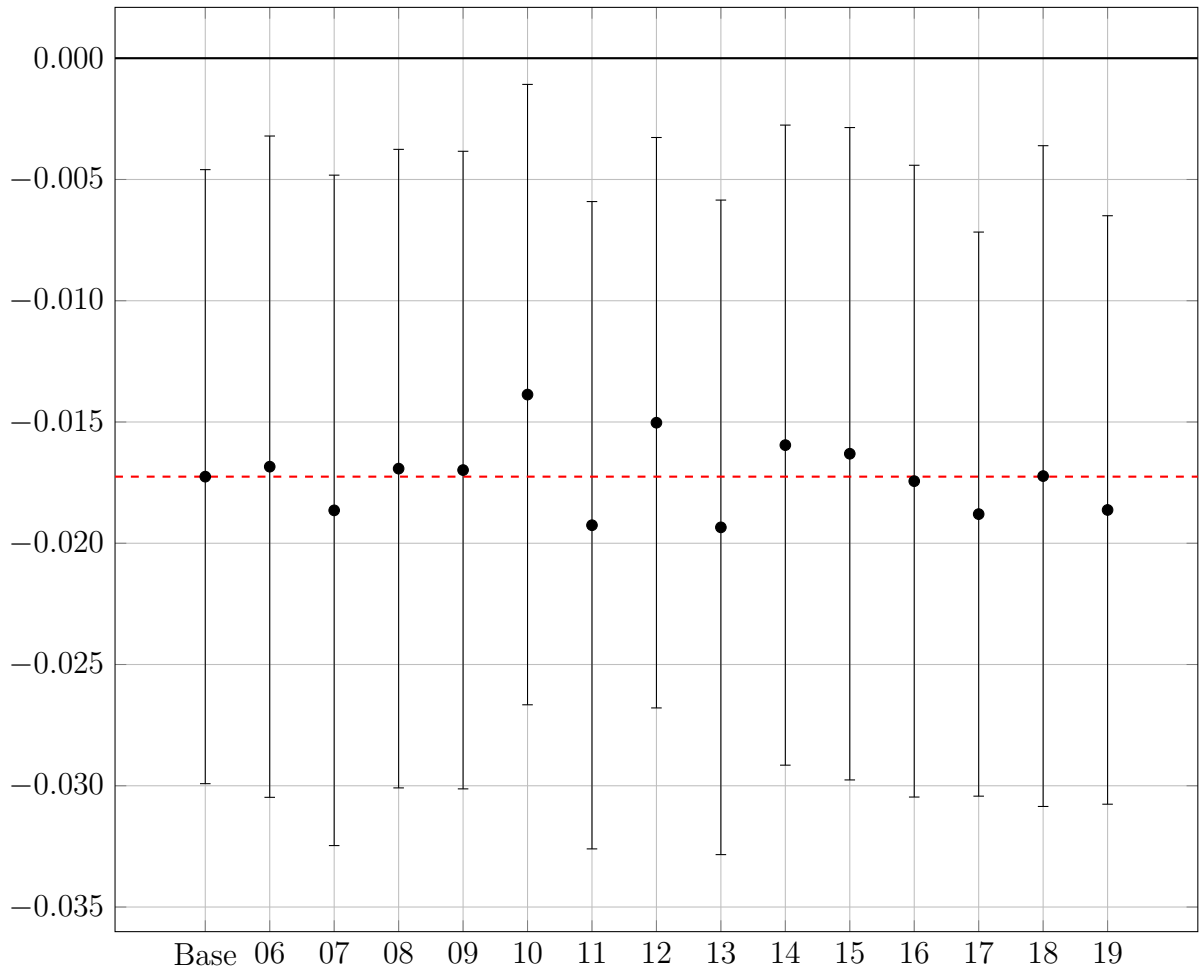
*Notes:* Table shows effects of increased childcare availability on mothers' self assessed general health. In this analysis, we use the county-regions' childcare availability instead of the counties' childcare availability. The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if mother's self assessed health is good or very good. All models include county-region and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and survey month. Furthermore, they include a vector of county-region-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county-region level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Figure B2: Leave One Out: Federal States



*Notes:* The figure shows the coefficients of the ECC expansion on maternal self-assessed health as each federal state is individually excluded from the analysis. The bars show the 95% confidence interval.

Figure B3: Leave One Out: Observation Years



*Notes:* The figure shows the coefficients of the ECC expansion on maternal self-assessed health as each observation period is individually excluded from the analysis. The bars show the 95% confidence interval.

Table B8: Robustness Checks

	Observation period		Control variables					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Childcare coverage	-0.0167*** (0.0059)	-0.0210** (0.0090)	-0.0219** (0.0088)	-0.0255*** (0.0069)	-0.0148*** (0.0056)	-0.0174*** (0.0065)	-0.0173*** (0.0064)	-0.0184*** (0.0063)
Observation period	2006-2020	2007-2014	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019
Excluded	-	-	-	-	-	-	-	-
Covariates	All	All	All	All	None	Reduced set	All + Age squared	All + HH income
Year Control	Dummies	Dummies	Year X State	County-Trend	Dummies	Dummies	Dummies	Dummies
Month Control	Dummies	Dummies	Dummies	Dummies	None	Dummies	Dummies	Dummies
FE	County	County	County	County	County	County	County	County
SE	clustered	clustered	clustered	clustered	clustered	clustered	clustered	clustered
(Within)- $R^2$	0.037	0.026	0.049	0.077	0.001	0.032	0.039	0.041
N	9354	6048	8980	8980	9112	8981	8980	8552

	SE		Exclusions		Other Specifications			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Childcare coverage	-0.0173*** (0.0064)	-0.0173** (0.0078)	-0.0193*** (0.0058)	-0.0166** (0.0068)	-0.0054** (0.0025)	-0.0054** (0.0025)	-0.0107* (0.0065)	-0.0199** (0.0097)
Observation period	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019	2006-2019
Excluded	-	-	Refugees	Movers	-	-	-	Movers
Covariates	All	All	All	All	All + Add. County	All + Add. County	All	All
Year Control	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies
Month Control	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies	Dummies
FE	County	County	County	County	None	County RE	Individual	Individual
SE	robust	state-clust.	clustered	clustered	clustered	clustered	robust	clustered
(Within)- $R^2$	0.036	0.036	0.028	0.036	0.044	0.044	0.038	0.042
N	8980	8980	8085	8413	8921	8921	8980	8413

Notes: Table shows various robustness checks. In Column (1) and (2), we vary the observation period (include 2020, or focus on the high expansion period). In Columns (3)-(8) we vary the set of controls. In Column (3), we include state-year interactions. In Column (4), we include county-year interactions. In Column (5), we exclude all individual and county controls (including only county-FE and year-FE). In Column (6), we only include control variables which cannot be affected by the childcare expansion (i.e., we exclude the number of children in the household, maternal cohabitation and working status). In Column (7), we add squared terms for the age of the child and the mother to our usual set of controls. In Column (8), we add the household income to our usual set of controls. In Column (9), we use robust instead of clustered standard errors. In Column (10), we use standard errors which are clustered on the state level. In Column (11), we exclude mothers with a refugee background. In Column (12), we exclude mothers who moved between counties during our observation period. Column (13) shows the OLS-estimate without controlling for county-fixed effects. In Column (14), we apply a random-effects model instead of a fixed-effects model. In Columns (15) and (16), we use individual-fixed effects instead of county-fixed effect and again exclude mothers who moved between counties during our observation period. \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table B9: SAH Mothers: Childminder Control

	Self-Assessed Health		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear (1)	Ordered Logit (2)	Linear Probability (3)
Childcare coverage	-0.0131** (0.0066)	-0.0311** (0.0156)	-0.0085*** (0.0030)
Childminder coverage	-0.0124 (0.0128)	-0.0288 (0.0294)	-0.0003 (0.0054)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes, incl. childminder	Yes, incl. childminder	Yes, incl. childminder
(Within)- $R^2$	0.038	0.044	0.026
N	8671	8671	8671

Notes: Table shows effects of increased childcare availability on mothers' self assessed general health when controlling for the local childminder availability. The models in Column (1) and Column (3) are estimated using STATA's *xtreg* command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if mother's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and survey month. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita and the local childminder availability. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .



## Appendix C. Partner

Table C1: Partner: Self-Assessed Health

	Partners' Self-Assessed Health		
	Categorical (1-5)	Categorical (1-5)	Dummy: (Very) Good Health
	Linear	Ordered Logit	Linear Probability
	(1)	(2)	(3)
<b>Childcare coverage</b>	-0.0011 (0.0087)	-0.0001 (0.0203)	0.0016 (0.0038)
County FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Covariates	Yes	Yes	Yes
(Within)- $R^2$	0.066	0.061	0.039
N	7020	7020	7020

*Notes:* Table shows effects of increased childcare availability on mothers' partners' self assessed general health. The models in Column (1) and Column (3) are estimated using STATA's *xtreg*-command, the model in Column (2) is an Ordered Logit Model. In Column (1) and Column (2), the outcome is self-assessed health measured on a scale from 1 (bad) to 5 (very good). In Column (3), the outcome takes a value of one if partner's self assessed health is good or very good. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and survey month. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table C2: Partner: Health Components

	Components									
	Index Physical	Index Mental	Physical Functioning	Role Physical	Bodily Pain	Vitality	Role Emotional	Mental Health	Social Functioning	General Health
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Childcare Coverage	0.0035 (0.0919)	-0.0698 (0.0915)	-0.0440 (0.0777)	0.0493 (0.1042)	-0.1239 (0.1011)	-0.1429 (0.1101)	-0.0741 (0.0904)	-0.1064 (0.1064)	0.0922 (0.0853)	-0.0461 (0.1054)
County FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Within- $R^2$	0.054	0.038	0.045	0.031	0.036	0.039	0.039	0.040	0.037	0.085
N	2240	2240	2240	2240	2240	2240	2240	2240	2240	2240

*Notes:* Table shows effects of increased childcare availability on partners' physical and mental health. All outcome variables range from 0 to 100, and are standardized to a mean of 50 and a standard deviation of 10. Higher values indicate better health. Column (1) and Column (2) show effects on the physical and mental health indices, which consist of the (weighted) variables that follow in the table (see Section 3.2 and Appendix Section Appendix D for details). In Column (3) the outcome variable is mother's physical functioning (possibility to climb steps and lift objects). In Column (4) the outcome variable is mother's physical role (limitations in daily activities due to physical health problems). In Column (5) the outcome variable is the frequency of experiencing severe physical pain. In Column (6) the outcome variable is the frequency of feeling energetic. In Column (7) the outcome variable is the emotional role of mothers (limitations in daily activities due to emotional or mental health problems). In Column (8) the outcome variable is mother's mental health (frequency of feeling down and frequency of feeling calm). In Column (9) the outcome variable is whether (and how often) the mother had to reduce social activities due to health problems. All models are estimated using STATA's *xtreg*-command and include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: mother's age, the child's age, the number of children in the household, an indicator for having a high school diploma (Abitur), migration background, employment status (no employment, marginal employment, part-time and full-time employment) and dummies for the survey months. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

Table C3: Intra-Household Gap in SAH

	Intra-Household Gap in Health Partner Health - Mother Health (1)	Dummy Mother in Worse Health than Partner (2)
Childcare coverage	0.0185** (0.0076)	0.0098*** (0.0031)
County FE	Yes	Yes
Time FE	Yes	Yes
Covariates	Yes	Yes
Within- $R^2$	0.023	0.016
N	6178	6178

*Notes:* Table shows effects of increased childcare availability on the intra-household gap in self assessed general health. All models are estimated using STATA's *xtreg*-command. In Column (1), the outcome variable is the intra-household gap in health, defined by the health status of the partner minus the health status of the mother. In Column (2), the outcome variable is a dummy taking the value of one if mother's self assessed health is worse than partner's self-assessed health. All models include county- and year-fixed effects. Additionally, they include a vector of individual-level covariates: age and employment status of both parents, their migration background, educational attainment, interview month, as well as the household's taxable income, number of children, and the child's age. Furthermore, they include a vector of county-level covariates: fertility rate, unemployment rate, and GDP per capita. Standard errors are clustered on the county level, \*  $p < .10$ , \*\*  $p < .05$ , \*\*\*  $p < .01$ .

## Appendix D. Exact Wording of Questions

### ***Self-assessed general health:***

This is our main outcome variable.

*Question:* How would you describe your current state of health?

*Answer Categories:* 1 (Bad) , 2 (Poor), 3 (Satisfactory), 4 (Good) , 5 (Very good)

Additionally, it is the outcome variable in Column (10) of Table 3. Importantly, in this analysis the variable is transferred to a different scale (0-100) and standardized to a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

### ***Physical functioning:***

This is our outcome variable in Column (3) of Table 3, derived from responses to two questions. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question 1:* If you have to climb stairs, that is, walk up several flights of stairs: Does your health condition affect you a lot, a little or not at all when you do this?

*Answer Categories:* 1 (A lot), 2 (A little), 3 (Not at all)

*Question 2:* And what about other strenuous activities in everyday life, for example, when you have to lift something heavy or need mobility: Does this affect your health strongly, a little or not at all?

*Answer Categories:* 1 (A lot), 2 (A little), 3 (Not at all)

### ***Role physical:***

This is our outcome variable in Column (4) of Table 3, derived from responses to two questions. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question 1:* Please think about the last four weeks. During this time, how often did you feel that due to physical health problems you achieved less than you wanted to at work or in everyday activities?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

*Question 2:* Please think about the last four weeks. During this time, how often did you feel that due to physical health problems you were limited in some way at work or in everyday activities?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

***Bodily pain:.***

This is our outcome variable in Column (5) of Table 3. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question:* Please think about the last four weeks. During this time, how often did you have severe physical pain?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

***Vitality:.***

This is our outcome variable in Column (6) of Table 3. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question:* Please think about the last four weeks. During this time, how often did you feel energetic?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

***Role emotional:.***

This is our outcome variable in Column (7) of Table 3, derived from responses to two questions. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question 1:* Please think about the last four weeks. During this time, how often did you feel that due to mental health or emotional problems you achieved less than you wanted to at work or in everyday activities?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

*Question 2:* Please think about the last four weeks. During this time, how often did you feel that due to mental health or emotional problems you carried out your work or everyday tasks less thoroughly than usual?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

***Mental health:***

This is our outcome variable in Column (8) of Table 3, derived from responses to two questions. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question 1:* Please think about the last four weeks. During this time, how often did you feel down and gloomy?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

*Question 2:* Please think about the last four weeks. During this time, how often did you feel calm and relaxed?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)

***Social functioning:***

This is our outcome variable in Column (9) of Table 3. The variable is standardized in a way that it ranges from 0 to 100, with a mean of 50 and a standard deviation of 10 (in the full SOEP sample). Higher values indicate better health.

*Question:* Please think about the last four weeks. During this time, how often did you feel that due to physical or mental health problems you were limited socially, that is, in contact with friends, acquaintances, or relatives?

*Answer Categories:* 1 (Greatly), 2 (Often), 3 (Sometimes) , 4 (Almost Never) , 5 (Never)