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The parental care burden of child disability

Authors: Lara Bister[1,2,3]*, Nicoletta Balbo[3], Danilo Bolano[4]

[1] Research Group Health and Social Inequality, WZB Berlin Social Science Center, Germany
[2] Einstein Center Population Diversity, Germany
[3] Dondena Center for Research on Social Dynamics and Public Policy, University Bocconi, Italy
[4] University of Florence, Italy

* Corresponding author: Lara Bister, lara.bister@wzb.eu

Abstract

Children with a disability require a greater level of care, which may profoundly affect the lives of their parents as their primary caregivers. However, empirical evidence to quantify the parental care burden of child disability remains scarce. This study aims to uncover the extent to which a child's disability affects the parental care burden by investigating fathers' and mothers' time spent on housework and childcare. Exploiting data from the German Socio-Economic Panel (SOEP) and applying propensity-score matching, we compare the individual time fathers and mothers spend on parental care for children with and without a disability, as well as the division of parental care time within couples. Our findings indicate a parental care burden of child disability of an additional 19 minutes per day for fathers and 26 minutes per day for mothers. This extra burden is most significant for mothers of children with a disability aged 0 to 2, with 1 hour and 25 minutes per day. Furthermore, the parental care burden is particularly pronounced in fathers of later birth cohorts, and parents with a lower educational attainment level, with multiple children, or residing in West Germany. While the parental care burden of child disability is disproportionally higher for mothers than fathers, we find no evidence for an association with the division of parental care time within couples. Our study is the first to provide quantitative evidence for the increased parental care burden of child disability from a population perspective, potentially explaining adverse spillover effects on family dynamics and all family members' wellbeing and health.

Keywords: child disability, parental care burden, division of unpaid labor, Germany

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Introduction

The disability of a child has multiple and profound impacts on the lives of their parents. Existing research has shown that parents of children with a disability are more likely to experience worse mental and physical health (Balbo & Bolano, 2024), higher distress and financial costs (Bourke-Taylor et al., 2014; Gallagher & Hannigan, 2014; Majnemer et al., 2012; Stabile & Allin, 2012), lower job satisfaction (Watt & Wagner, 2013), labor market inactivity (Wondemu et al., 2022), and divorce (Loft, 2011), thus also single-parenthood (Cohen & Petrescu-Prahova, 2006). Many of these studies suggest that one of the main drivers of these adverse outcomes is the increased parental care burden of the child's disability. However, empirical investigations into the extent of this excess parental care burden of child disability remain scarce.

Children with a disability typically require more care, which parents try to provide by devoting more time to them. Yet, this time is inevitably taken away from parents' leisure, work, and couple and family time, and parents may compromize on their recreational time or personal activities, while also prioritizing the care over their labor and other family commitments (Luijkx, Van Der Putten, et al., 2017). As a result, parents may experience increased care strain, leading to higher emotional and economic stress and lower individual wellbeing. Consequently, time emerges as one of the most critical yet scarce resources for these parents. Despite its crucial implications for multiple life domains of the parents and other family members, the role of time remains an understudied dimension in the study of parents with children with a disability. Understanding the actual time burden of child disability would profoundly enhance the understanding of the parental care burden and reveal essential mechanisms of spillovers on family dynamics and all family members' wellbeing and health.

The existing literature on child disability and parental care lacks, however, a detailed assessment of how much time parents of a child with a disability spend on childcare and related activities, particularly compared to parents of children without disabilities. A few studies have already explored how caring for a fragile child, for example with a chronic illness or disability, generally shapes parents' engagement in housework and childcare (Turner-Henson et al., 1992), either by focusing on parental gender specialization within the household (Dyer et al., 2009; Olsson & Hwang, 2006; Warfield, 2005) or on parents' employment trajectories (Gibbins et al., 2012; Hovén et al., 2013; Lindahl Norberg et al., 2017; Mader et al., 2016; Pelletier & Bona, 2015; Roser et al., 2019). All these studies unambiguously show a maternal care and a paternal employment specialization in families with children with a disability. However, insights into the parental care burden of child disability remain scarce. Just a handful of studies (Brust et al. 1992; Luijkx, van der Putten, et al. 2017) have quantified the parental care burden of child disability by measuring

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parents' actual daily time spent on caregiving activities. While these studies provide important insights into parents' significantly increased care burden of having a child with disability, they rely on convenience and small samples and tend to focus on specific types of child disability (Brust et al., 1992; Luijkx, van der Putten, et al., 2017). The generalizability of these findings and, therefore, the empirical evidence of a parental care burden of child disability and its magnitude remains consequently debatable.

The present study aims to expand this latter, and still very scattered, strand of research by comprehensively investigating the parental care burden associated with child disability using a time-use framework and a population approach, thereby identifying a more universal—and not disability-specific—association between child disability and parental care burden. The goal is to provide generalizable findings for this population. We do so by analyzing the time fathers and mothers spend on housework and childcare, comparing parents with and without a child with a disability, both in general and by the age of the child with disability. Our approach allows us to address the first research question: *To what extent does the parental care burden differ between parents with and without a child with a disability, for fathers and mothers, respectively?*

In addition, we aim to understand whether there are factors that can buffer or exacerbate the increased care burden of parents having a child with disability. Therefore, we want to address a second research question: *How does the parental care burden of child disability vary along socio-demographic and cultural factors, for fathers and mothers respectively?* To do so, we explore the heterogeneity of the parental care burden of child disability. Specifically, we investigate, first, the roles of parents' educational background and the number of children in the household as factors influencing the resources available to parents (e.g., financial means to outsource the housework and childcare and time). Second, parents' cohort and geographical area (i.e., East *versus* West Germany) to examine how cultural differences in parenting styles, gendered division of unpaid labor, and perceptions and levels of inclusion of people with a disability in society shape parental care burden.

Furthermore, we focus on the division of the parental care burden for a child with a disability within parent couples, aiming to address a third research question: *To what extent does the division of the parental care burden within a parent couple differ when a child has a disability?* The scattered existing research suggests an exacerbation of gender specialization, with mothers taking the lion's share of childcare responsibilities (Simmerman et al., 2001). However, the exceptionally high parental caring demands for a child with a disability may exceed mothers' resources and—combined with the evidence on stronger family bonds in families with a child

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with a disability (Risdal & Singer, 2004)—could lead to a more equal distribution of caregiving responsibilities between parents.

Our study substantially contributes to the understanding of the parental care burden of child disability by addressing these crucial dimensions and by quantifying the lived parental care burden of child disability using a time-use framework and a population approach. Thereby, our study bridges the gap in the limited and scarce literature on child disability by offering a potential explanation for the adverse spillover effects of child disability on family members, particularly fathers and mothers.

Our findings clearly confirm an increased parental care burden of child disability. Specifically, fathers spend 19 additional minutes per day on housework and childcare and mothers 26 extra minutes per day. This additional parental care burden is particularly pronounced among mothers caring for a younger child with a disability aged 0 to 2 with an extra 1 hour and 25 minutes per day spent on housework and childcare. Furthermore, the parental care burden of child disability is particularly pronounced for fathers of younger birth cohorts, and both fathers and mothers with a lower educational attainment level, having multiple children, or residing in West Germany. The division of the parental care responsibilities between partners, however, barely differs between parents with a child with a disability and those without.

Our paper proceeds as follows: we first build on existing literature on child frailty and parental care work to elaborate on the mechanisms explaining the association between child disability and the parental care burden. We then describe our methodological approach, i.e. the data, measurements and analytical strategy used. In the subsequent section, we present our findings, which we then discuss and conclude in the final section.

Theoretical background

There is an extensive body of literature on parents' domestic and caregiving responsibilities, which mainly shows a gender-unequal division of labor, with mothers primarily responsible for housework and childcare (Mannino & Deutsch, 2007; Yoshida, 2012). This literature also highlights the difficulties that mothers experience in reconciling family and work, which often results in mothers either exiting or reducing their participation in the labor force by taking part-time jobs (Gornick & Meyers, 2008). Some studies have also analyzed parents' emotional perception of their caregiving time: As both men and women have increased their labor market participation, also in terms of hours worked during the past decades, parents increasingly experience a "time squeeze" (Milkie et al., 2004), meaning an increased pressure of reconciling

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all activities and responsibilities. As children with a disability typically require more care and time devoted to them (Luijkx, Van Der Putten, et al., 2017), this might increase the reconciliation pressure that parents experience. However, while extensive research has explored gendered caregiving roles in families with children broadly, relatively few have examined how child illness or disability affects parental care work.

The impact of child disability on the parental care burden

Despite its societal relevance, the study of the impact of child disability on family members remains an underexplored area of research. Across the European Union, approximately 4 percent of individuals under age 16 have a disability, i.e., one in every 25 children, so more than 3.5 million children have some form of disability (Eurostat, 2023). Child disability not only affects children's daily activities but also the ones of their families in myriad ways (Balbo & Bolano, 2024). Parents, who are the primary caregivers in post-industrial societies, are likely to be most affected. The disability of a child imposes significant emotional and economic costs on parents (Bourke-Taylor et al., 2014; Gallagher & Hannigan, 2014; Majnemer et al., 2012; Stabile & Allin, 2012). The mental and physical health of these parents is often compromized, particularly for mothers who report higher levels of stress and lower wellbeing (Shahali et al., 2024). In terms of family dynamics, parents of children with disability are also more likely to experience marital or partnership strain, divorce, and a lower probability of having additional children (MacInnes, 2008; Muller et al., 2020).

Only a few studies have investigated how having a child with a disability—or a comparable health strain like a chronic illness—affects the division of parental labor, focusing on two areas: first, high levels of gender specialization in caregiving; and second, negative labor market consequences for parents, particularly mothers. First, mothers of children with a disability often act as "experts" in managing their child's condition (Turner-Henson et al., 1992) and assume primary responsibility for daily medical treatments (Quittner et al., 1992). Fathers, in contrast, tend to be less involved in both hands-on caregiving and medical treatment (Chesler & Barbarin, 1987) and instead engage in more instrumental tasks (Gallo, 1991; Keller & Nicolls, 1990). This dynamic may exacerbate existing gender inequalities in unpaid housework and caregiving. Second, the increased care burden has direct negative consequences for parents' employment and labor market outcomes (Gibbins et al., 2012; Hovén et al., 2013; Lindahl Norberg et al., 2017; Mader et al., 2016), particularly for mothers. Studies show that mothers of children with a disability are more likely to withdraw from the labor market (Cidav et al., 2012; Parish et al., 2004). In some cases, fathers also experience labor market disruptions, though to a lesser extent (Wondemu et al., 2022).

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While previous studies acknowledge that increased caregiving responsibilities resulting from child disability contribute to these adverse outcomes, few have systematically quantified the additional parental care burden. This study aims to provide a detailed analysis of the parental care burden of fathers and mothers with a child with a disability, applying a time-use framework and a population approach. Following the existing literature, we expect to find that both mothers and fathers of children with a disability spend significantly more time on housework and childcare compared to parents of children without a disability. Given that housework and childcare remain highly gendered and respective tasks tend to be carried out by mothers (England, 2010), we further hypothesize a larger parental care burden of child disability in mothers than in fathers.

Beyond gender, other factors may also shape the extent of the parental care burden of child disability. We identified two main categories of relevant factors: first, socioeconomic resources and time constraints, and second, cultural differences. Regarding the first group of factors, socioeconomic resources determine parents' possibilities to utilize additional support with housework and childcare. Existing research shows that fathers' and mothers' levels of education, a well-established measure of socioeconomic status, are relevant factors shaping the amount of time parents spend on childcare (Gupta et al., 2021; LaBriola & Schneider, 2021). This gap might be further broadened when caring for a child with a disability, meaning that parents with fewer socioeconomic resources and more financial constraints cannot afford such relief, as they have fewer possibilities to outsource housework and childcare. We therefore expect parents of a lower socioeconomic status to carry a greater parental care burden of child disability than parents of a higher socioeconomic status, which is likely even larger for mothers than for fathers (LaBriola & Schneider, 2021). In addition, the family size may affect the amount of time parents have at their disposal, in turn shaping the magnitude of the parental care burden of child disability. Families with multiple care-dependent children may experience a sort of ceiling effect, where the overall time spent on childcare is already high, limiting the additional impact of a child with a disability. On the other hand, larger families are likely to be highly selective in terms of religious values and/or family preferences. They may adhere to more traditional and specialized gender roles, with mothers not active on the labor market and entirely devoted to the care of their children. We therefore aim to explore the heterogenous effect of the number of care-dependent children present in the household.

As far as the second category of factors is concerned, cultural differences in gender roles and care-work norms, as well as the established formal support culture in childcare, may shape parents' housework and childcare behavior. Prior research, for example, suggests greater

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involvement in childcare activities among younger, highly educated fathers (Sullivan et al., 2014) than among older generations. We therefore assume a larger parental care burden of child disability in fathers of later birth cohorts, as they are generally more engaged in childcare and thus potentially more aware of the importance of addressing their special needs in case of a child with a disability. The role of cultural factors shaping the parental care burden of child disability is potentially also visible in the regional differences between East and West Germany. To this day, women's employment rates are higher in East Germany, and attitudes towards women's labor market participation have been persistently egalitarian as compared to West Germany (Zoch, 2021). Subsequently, the childcare system in East Germany is also generally considered more effective and comprehensive than that in West Germany (Zoch, 2020), likely also for children with special needs. Next to that, there is some interesting evidence suggesting that East and West Germany, starting in the 1960s, have been characterized by two different strategies of parental empowerment in cases of child disability: a more individualist system in the East, and a more collective one in the West. Individual petitions of parents with children with a disability in East Germany have been proven to be even more effective than collective actions in West Germany (Rössel, 2024) when it comes to improving the treatment of children with a disability and their families. Moreover, strong intensive mothering norms prevail in West Germany, which place strong social expectations on mothers to devote themselves to their child's upbringing (Diabaté & Beringer, 2018). The intensive mothering norms could be even more pronounced for children with a disability due to the increased care they require (Cronin, 2004). Subsequently, we suggest that the parental care burden of child disability is greater for mothers and fathers in West than in East Germany.

The impact of child disability on the division of the parental care burden within the household

Despite the increasing labor force participation of women, the division of housework and childcare remains unequal and highly gendered, with women continuing to bear the majority of the burden of domestic and childcare responsibilities (Bianchi & Milkie, 2010; Milkie et al., 2009; Offer & Schneider, 2011; Raley et al., 2012; Yeung et al., 2001). More broadly, scholars have highlighted evidence of a stalled gender revolution, in which the division of household labor remains unequal between partners (England, 2010). Many studies have examined the persistence of such differences and some potential mechanisms behind this unequal division of unpaid labor, for example, mothers' gatekeeping of fathers' involvement in care (Bianchi & Milkie, 2010) or the increasing contributions of younger, more highly educated fathers to childcare and domestic tasks (Sullivan et al., 2014). What remains understudied is how having a child with a disability might shape the division of housework and childcare between partners.

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Existing studies provide mixed evidence. Some studies suggest a further intensifying gendered role specialization, where mothers of children with disability take on more childcare duties assuming primary responsibility for childcare, and becoming "experts" in managing the child's condition (Turner-Henson et al., 1992), while fathers focus more on paid employment (Dyer et al., 2009; Olsson & Hwang, 2006; Warfield, 2005). Conversely, other studies emphasize the presence of stronger family bonds, affection, and loyalty in couples with a child with a disability (Risdal & Singer, 2004), which may suggest that fathers in these families may become more engaged in caregiving, resulting in a more equal division of domestic and care labor in these households. Given these opposing mechanisms, we postulate two alternative hypotheses: Having a child with a disability may equalize or exacerbate the gender inequality in the division of the parental care burden within parents.

Methods

Data and sample

We used data from the German Socio-Economic Panel (SOEP) study (Liebig et al., 2019), a nationally representative longitudinal survey of households in Germany. Conducted annually since 1984, the SOEP includes more than 25,000 respondents from nearly 15,000 households. The SOEP contains detailed personal, social, and economic information for all household members aged 16 and older (collected through the longitudinal PL "Individual questionnaire" module). Since 2003, the SOEP has also gathered information on children born from 2000 onward through age-specific "Mother & Child" and "Parent" questionnaires (in the longitudinal module 'BIOAGEL' "Generated biographical information" until SOEP version 38 (2022)). We used the detailed information on children's health available in the BIOAGEL module to determine children's disability status, which serves as the independent variable in our study.

We restricted our sample to SOEP respondents who participated in the study between 2000 and 2019 and who were parents. Additionally, we included only respondents who participated in the SOEP module BIOAGEL, meaning that they had at least one child born in 2000 or later and had completed the child health questionnaire in BIOAGEL at least once. Furthermore, we included only respondents who provided time-use information on household and childcare tasks (the dependent variable in our study) and had complete socio-demographic data on gender, birth year, employment status, highest educational attainment and combined partnership and cohabitation status. For a detailed overview of the sample selection, see Figure S1.

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Table 1: Descriptive statistics of sample characteristics for the full sample and the child disability sample for fathers and mothers, respectively.

	Fathers (n = 2,342 respondents)				**Mothers (n = 4,492 respondents)**			
Sample	Total		Child disability		Total		Child disability	
Observations (N / person-years)	15,792		4,891		32,976		11,857	
Characteristics	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Child with a disability (ref.: none)	0.34	0.47	1.00	0.00	0.34	0.47	1.00	0.00
Age of child with a disability								
0 to 2 years	–	–	0.20	0.40	–	–	0.20	0.40
3 to 6 years	–	–	0.41	0.49	–	–	0.41	0.49
7 to 10 years	–	–	0.38	0.49	–	–	0.39	0.49
Time spent on housework and childcare (hours)	3.59	3.20	3.76	3.38	10.54	6.60	10.67	6.42
Mother's share (percent)*	–	–	–	–	0.75	0.16	0.76	0.15
Birth year	1973.40	7.16	1972.66	6.59	1976.87	7.16	1976.08	6.47
Employment status:								
Not employed	0.13	0.33	0.09	0.29	0.42	0.49	0.37	0.48
Full-time employed	0.80	0.40	0.83	0.37	0.15	0.35	0.14	0.34
Part-time employed	0.07	0.26	0.07	0.26	0.44	0.50	0.49	0.50
Highest education:								
No or primary	0.05	0.22	0.03	0.17	0.05	0.22	0.03	0.17
Secondary	0.50	0.50	0.47	0.50	0.53	0.50	0.52	0.50
Tertiary, non-academic	0.16	0.37	0.17	0.38	0.17	0.37	0.18	0.38
Tertiary academic	0.29	0.45	0.33	0.47	0.26	0.44	0.27	0.45
Partnership status:								
(Legally) partnered	0.86	0.35	0.88	0.33	0.70	0.46	0.70	0.46
Separated, divorced or widowed and cohabiting with a new partner	0.02	0.14	0.02	0.15	0.03	0.17	0.03	0.17
Separated, divorced or widowed and not cohabiting with a new partner	0.01	0.12	0.01	0.10	0.09	0.29	0.10	0.30
Single and cohabiting with a partner	0.09	0.29	0.08	0.28	0.09	0.29	0.08	0.27
Single and not cohabiting with a partner	0.01	0.12	0.01	0.09	0.09	0.29	0.09	0.29
Age of youngest child in household	4.99	3.85	5.72	3.62	4.71	3.83	5.18	3.69
Number of children in household	2.20	1.12	2.41	1.15	2.11	1.10	2.32	1.12
Age diagnosis of child with a disability								
0 to 2 years	–	–	0.57	0.50	–	–	0.57	0.49
3 to 6 years	–	–	0.40	0.49	–	–	0.39	0.49
7 to 10 years	–	–	0.03	0.49	–	–	0.04	0.19
Region of household residence:								
East Germany	0.19	0.39	0.18	0.39	0.22	0.41	0.20	0.40
West Germany	0.81	0.39	0.82	0.39	0.78	0.41	0.80	0.40

*Note: Descriptive statistics (mean and standard deviation (SD)) of sample characteristics for the full sample and the child disability sample for fathers and mothers, respectively. Annotation * refers to the subsample of mothers with available time use information for their partners. See Table S1 for complete descriptive statistics. [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own sample selection.]*

Our final sample consisted of 2,342 fathers observed over 15,641 person-years and 4,492 mothers observed over 32,733 person-years. Table 1 describes the main sample. To analyze the division of the parental care burden of child disability within parent couples of different genders, i.e., fathers and mothers in a relationship, we consider a subsample of 1,507 mothers observed over 10,881 person-years for whom information on the partner's, i.e., the father's, time spent on housework and childcare was available in the data.

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Variables

Our **main dependent variable** is the **parental care time**, which we constructed in two versions: first as an individual-level continuous variable of the number of hours per day spent on *housework and childcare*, and second, as a couple-level continuous variable of the *mother's share* of the couple's total hours per day spent on *housework and childcare* in percent to study how child disability impacts the inequal division of unpaid labor between parents. We retrieved the underlying information from the PL module in the SOEP survey. Each respondent reports individually their time (in whole hours) spent on a typical weekday, Saturday and Sunday on housework and childcare, by answering the following questions: "*How many hours do you spend on a [typical weekday/Saturday/Sunday] doing housework (*washing/cooking/cleaning*)?*" and "*How many hours do you spend on a [typical weekday/Saturday/Sunday] doing childcare?*".

To calculate the total parental care burden, we combined both sources to capture all time dedicated to childcare, including time directly captured in the childcare and housework survey question. Therefore, we first averaged the reported hours for housework and childcare across weekdays, Saturday and Sunday for each respondent. We then combined these two averages to obtain a single continuous variable representing the total daily hours spent on housework and childcare for each respondent. As for the analysis within couples, we first summed up the reported hours of fathers and mothers within the same parent-couple (if both were available) and then computed the mother's share of parental care burden in percent to obtain a continuous variable representing the mother's share of the couple's total daily hours spent on housework and childcare.

Our **main independent variable** is **child disability**, which we operationalized as a binary indicator of whether a respondent has a co-resident child who was ever diagnosed with a disability between the ages of zero and 15. Since the SOEP does not include a specific variable on child disability, we determined each child's disability status by combining information on any diagnoses of physical or intellectual disability between ages 0 and 2 (survey question: "*Has your child been diagnosed as having a physical/intellectual disability?*") and diagnoses of vision, hearing, motor or other impairments between ages 2 and 15 (survey question: "*Has your child been diagnosed as having a vision/hearing/motor skill/any other impairment, disorder or disability?*") from the BIOAGEL module. All information coming from the BIOAGEL module is (self-)reported by the parents, and the provision of information on child health is voluntary. We classified a child as having a disability if the parent reported any of the included diagnoses (i.e., physical/intellectual disability at the child's age of 0 to 2 or vision/hearing/motor skill/any other impairment, disorder or disability at the child's age of 2 to 15, see Table S2) at least once in any

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survey wave. Since the information on the child's health status is not reported for each child in every wave, we restricted our variable to diagnoses associated with non-temporary impairments presumably present from birth. In our sample, 34.53 percent (SD=47.55; n=2,067 parent respondents (n=646 fathers, n=1,421 mothers) observed over 16,703 person-years) reported having at least one child with a disability. We assessed the robustness of our results to different operationalizations of child disability in a sensitivity analysis (see Results section).

We also considered the following **socio-demographic characteristics** of the parents and their households in our primary analyses: the SOEP survey year (continuous), the parent's birth year (see Sullivan et al., 2014), their employment status (not employed, full-time employed, part-time employed), their highest educational attainment (no formal education or lower than secondary, secondary, post-secondary, tertiary and higher education) (see Gupta et al., 2021 and LaBriola and Schneider, 2021), their combined partnership and cohabitation status (legally partnered and cohabiting, separated/divorced/widowed and not cohabiting, single and not cohabiting, separated/divorced/widowed and cohabiting, single and cohabiting) (see Pepin et al., 2018), the age of the youngest child in the household, the total number of children in the household, and the household region of residence in East or West Germany (Rössel, 2024; Zoch, 2021).

Analytical strategy

For our main analysis, we estimated the parental care burden of child disability by comparing parents who had at least one co-residing child with a disability with their counterparts who had no co-residing child with a disability. Using pooled data from multiple survey waves per respondent, we applied Propensity Score Matching (PSM) to estimate the Average Treatment Effect on the Treated (ATET) and investigate the parental care burden associated with child disability.

PSM constitutes a method which aims to reduce confounding and selection bias in observational studies by creating comparable treatment and control groups based on observable characteristics. Therefore, a propensity score, i.e., the conditional probability of receiving treatment, is computed for each observation based on observed covariates and used to balance the distribution of covariates between the treatment and control groups (Austin, 2011; Baser, 2007). Given evidence of the often non-random distribution of child disability across family contexts (Amilon et al., 2024; Simkiss et al., 2011), we sought to account for systematic differences in pre-existing characteristics between parents with and without a child with a disability by applying PSM. We, however, would like to note that PSM produces causal estimates only under the assumption of conditional independence (i.e., selection on observables) and

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common support, meaning that treatment assignment is as good as random once all relevant confounders are controlled for (Austin, 2011). Since this assumption is unlikely to hold in our analyses, the estimated ATET should not be interpreted as a causal effect. Instead, in our context, the ATET indicates systematic differences in outcomes between parents with specific characteristics who receive the "treatment", i.e., have a child with a disability, and a matched comparison group, thus reflecting associations rather than causal impacts.

Specifically, the PSM enabled us to compare parents' time spent on housework and childcare between parents with a child with a disability (i.e., our treatment group) and parents without a child with a disability (i.e., our control group). Therefore, observations in the treatment group were matched to at least five of their most similar counterparts in the control group (i.e., nearest-neighbor matching). We matched observations in the treatment group with those in the control group on the parents' birth year, their employment status, their highest educational attainment, their combined partnership and cohabitation status, the age of the youngest child in the household and the total number of children in the household (see *Variables* section for further details). Because we considered multiple observations per parent, we also included the survey year as a matching variable and used robust standard errors. All our PSM analyses achieved an optimal balancing efficiency between the treatment and the control groups (see Table S3), confirming the validity of our approach.

To answer our research questions, we estimated the ATET of child disability on the parental care burden for fathers, mothers and mothers with available partner information, i.e., complete parent couples, separately. The ATET presents the effect of child disability only for parents who have a child with a disability, i.e., are part of the treatment group. We further computed predicted hours spent on housework and childcare using weighted linear regression. The linear regression models estimated the association between having a child with a disability (reference: not having a child with a disability). The reported hours spent on housework and childcare, controlling for all variables used in the PSM, with clustered standard errors and observations weighted using the propensity scores from the respective PSM analysis.

We first present the ATET for the entire father and mother samples, respectively. Then, we show the predicted hours spent on housework and childcare for fathers and mothers with a child with a disability at ages 0 to 2, 3 to 6 or 7 to 10, and for those without a child with a disability, based on a weighted linear regression analysis. For the latter analysis, we introduced a categorical variation of the initial main independent variable, child disability, indicating the age of the youngest co-resident child with a disability. For the heterogeneity in the parental care burden of child disability, we present stratified ATET estimations by the parents' highest educational

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attainment (two groups: secondary and lower education; post-secondary and higher education), the parents' birth cohort (four groups: born before 1970; 1970–74; 1975–79; 1880–84), the number of children in the household (three groups: one child; two children; three or more children), and the household region of residence (two groups: East Germany; West Germany. For each stratified analysis, we removed the corresponding matching variable from the PSM model. To uncover whether the disability of a child exacerbates or reduces the gender unequal division of unpaid labor, we present the predicted mother's share in percent of the total parental care burden within the parent couple for a subsample of mothers with available partner information, i.e., complete parent couples, based on the weighted linear regression analysis. To facilitate interpretation of our results, all hour estimates are presented in a worded time format (hours and minutes).

We performed several sensitivity analyses to assess the robustness of our dependent variable, parental care time, and our main independent variable, child disability, as well as to explore the role of age at diagnosis of child disability. First, we assessed the robustness of our results to the specification of the dependent variable, parental care burden, which we initially defined as the total hours spent on housework and childcare for each parent individually. We considered an alternative specification of the parental care burden as parents' individual time spent on childcare. We then explored whether the parental care burden associated with child disability differed across these two specifications, housework and childcare combined (original analysis) and childcare (modified analysis).

Second, we evaluated the robustness of our results to an alternative operationalization of the main independent variable of child disability. While we relied on a diagnosis-based measure of child disability in our original analyses, we measured child disability as the presence of a limitation of the child in our alternative operationalization. We based this measure on the parents' reporting of any limitation of their child at the age of 6 (survey question: "*Is your child in any way limited to the same things that most children of their age can do*?", available in the SOEP BIOAGEL module). Although this measure is highly subjective to the parents' perception of their child's limitations, it also reflects a highly relevant aspect of child disability: the actual limitations which a child with a disability experiences. This measure is a valid alternative operationalization of the diagnosis-based specification of our main independent variable, child disability, and it has the advantage of likely incorporating parents' evaluations of the severity of the child's disability. Moreover, a limitation-based measure of child disability closely aligns with the Global Limitation Activity Index (GALI), a well-established proxy for a long-term disability status used in survey data

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(Van Oyen et al., 2018). We classified the child's limitation status for each year from birth onwards, even though the variable was only reported at age 6.

Finally, as an extension to the analysis of the different ages of the child with a disability, we further explored the role of the child's age at the diagnosis of the child's disability. We therefore estimated the predicted hours for housework and childcare by the child's diagnosis age for only fathers and mothers having a child with a disability.

Results

Descriptive results

Table 2 presents the mean difference in time spent on housework and childcare between parents with and without a child with a disability, estimated using two-sample t-tests. The results indicate a significantly larger parental care burden of child disability (at a statistical significance level of 5%). Fathers with a child with a disability spend, on average, 15 additional minutes per day on housework and childcare (0.25 hours) compared to those without a child with a disability. The difference for mothers is slightly smaller: mothers with a child with a disability spend, on average, 13 additional minutes per day (0.21 hours) compared to those without a child with a disability. When examining the division of the parental care burden between parents, we find that the mother's share of the total parental care burden is one percentage point higher for mothers with a child with a disability (0.68 percentage points) compared to those without a child with a disability.

Table 2: Mean difference in time for housework and childcare by child disability for fathers, mothers and the mother's share (t-test).

Difference by child disability for	Respondents (n)	Person-years (N)	Mean	SE	95% CI Lower	95% CI Upper	p-value
Fathers (hours)	2,342	15,792	0.25	0.06	0.14	0.36	0.0000
Mothers (hours)	4,492	32,976	0.21	0.08	0.06	0.36	0.0050
Mother's share (percentage points)	1,507	11,017	0.68	0.34	0.02	1.34	0.0422

Note: Two-sample t-test results on the difference in time for housework and childcare by child disability for mothers (hours), fathers (hours) and mother's share of the total time within a couple (in percentage points). [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own analysis.]

Multivariate regression models

The overall parental care burden of child disability

Figure 1 shows the effect of having a child with a disability on parental care burden for fathers and mothers. Having a child with a disability generally means a significantly larger parental care burden for parents. Fathers spend 19 additional minutes on housework and childcare per day (0.31 hours), and mothers 26 extra minutes per day (0.43 hours), respectively, compared to their

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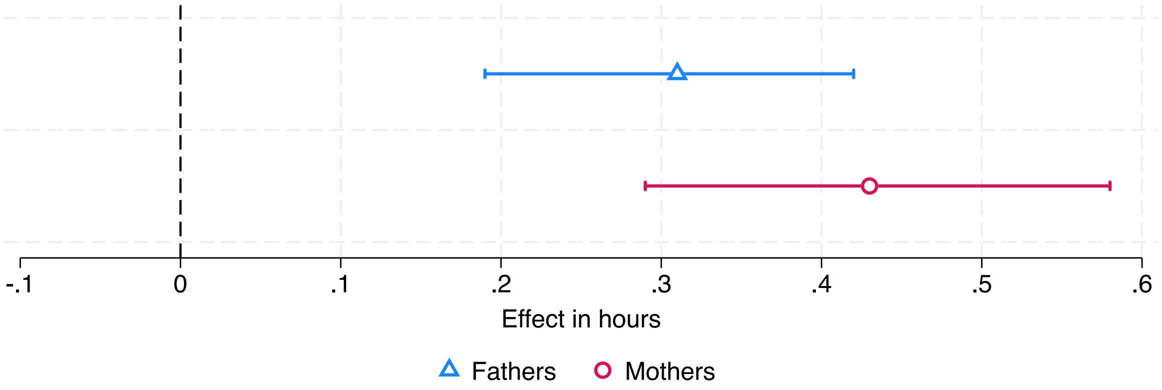
counterparts without a child with a disability. We also estimated the predicted total time spent on housework and childcare tasks per day for parents having a child with a disability and those without a child with a disability. The parental care time is for fathers 3 hours and 49 minutes per day (3.49 hours) without a child with a disability and 4 hours and 16 minutes per day (4.27 hours) with a child with a disability, and for mothers 10 hours and 32 minutes per day (10.32 hours) without a child with a disability and 11 hours and 3 minutes per day (10.63 hours) with a child with a disability.

Figure 1: Average treatment effect of having a child with a disability on time for housework and childcare for fathers and mothers, respectively.



Note: The average treatment effect of having a child with a disability on housework and childcare time (in hours) is estimated for fathers (N=15,792, n=2,342) and mothers (N=32,976, n=4,492), respectively. The estimates represent the average treatment effect on the treated (ATET), computed using propensity score matching (five nearest-neighbor matching with cluster-robust standard errors). Matching variables include survey year, working status, partnership and cohabitation status, year of birth, highest educational attainment, number of children in the household and the age of the youngest child in the household. See Table S4 for model estimates. [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own analysis.]

Figure 2 shows the predicted hours of housework and childcare for fathers and mothers with and without a child with a disability at ages 0 to 2, 3 to 6 and 7 to 10. Fathers having no child with a disability show an average parental care time of 3 hours and 34 minutes per day (3.56 hours), while fathers having a child with a disability show an elevated average daily parental care time, which slightly decreases with the age of the child: 3 hours and 59 minutes per day at the child's age of 0 to 2 (3.97 hours), 3 hours and 55 minutes per day at the child's age of 3 to 6 (3.91 hours), and 3 hours and 51 minutes per day at the child's age of 7 to 10 (3.85 hours). Mothers without a child with a disability show an average parental care time of 10 hours and 23 minutes per day (10.38 hours), while mothers with a child with a disability show a strongly elevated average daily parental care time. However, mothers' predicted parental care time at the child's age of 0 to 2 constitutes the most significant number with 11 hours and 58 minutes (11.97 hours) and clearly stands out from the predicted parental care time of 10 hours and 41 minutes at the child's age of 3 to 6 (10.68 hours) and of 10 hours and 50 minutes the child's age of 7 to 10 (10.82 hours).

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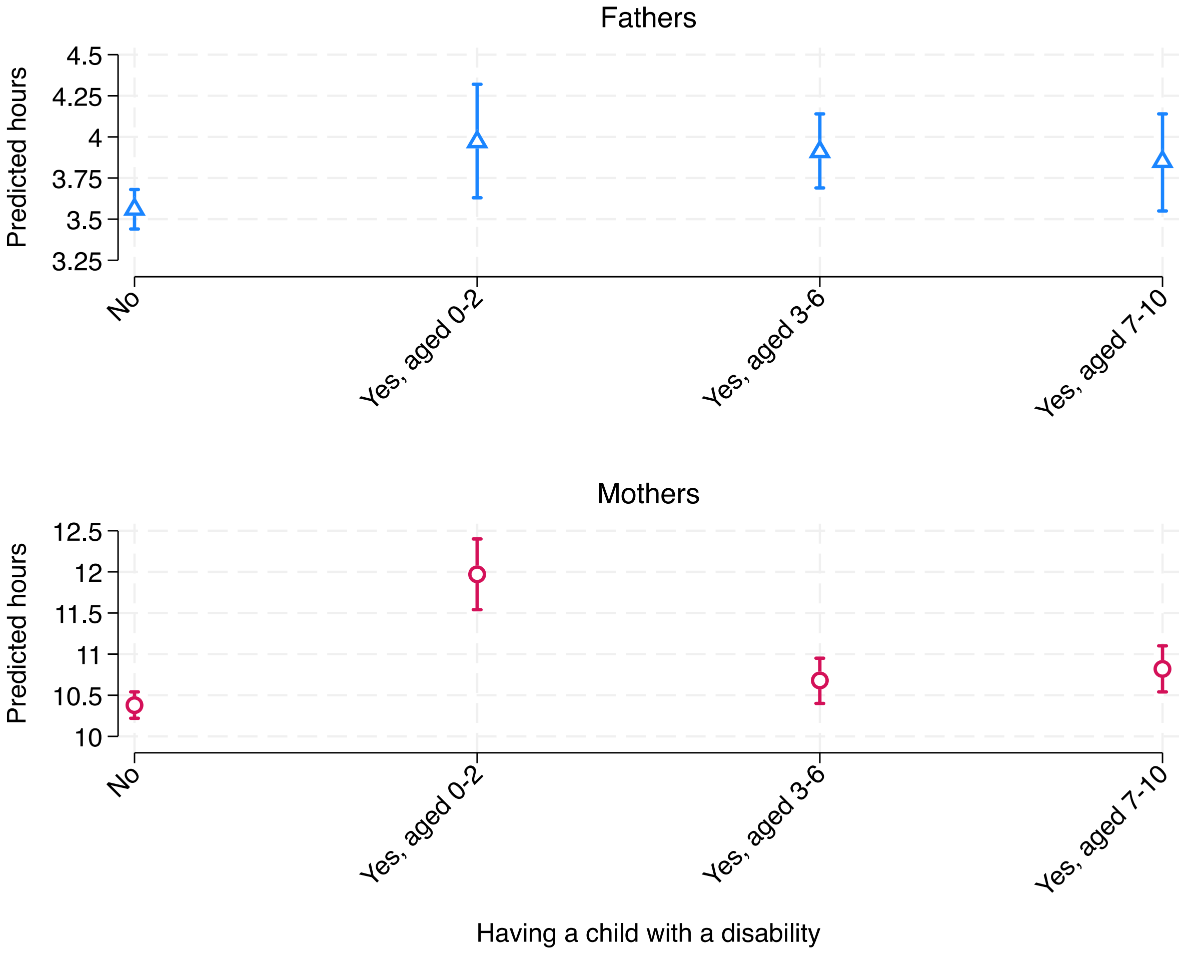
Figure 2: Predicted hours for housework and childcare for having no child with a disability and a child with a disability at different ages of this child for fathers and mothers, respectively.



Note: The predicted hours for housework and childcare for having no child with a disability and a child with a disability at ages 0 to 2, 3 to 6 and 7 to 10 are estimated based on linear regression models controlled for survey year, working status, partnership and cohabitation status, year of birth, highest educational attainment, number of children in the household and the age of the youngest child in the household with cluster-robust standard errors and weighted for the probability of having a child with a disability for fathers (N=2,724, n=646) and mothers (N=6,779, n=1,420), respectively. The reference group (i.e., parents without children with a disability) pools parents of children across different ages. See Tables S4, S5 and S6 for model estimates and predictions. [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own analysis.]

Stratification of the parental care burden of child disability

Figure 3 illustrates different heterogeneous effects of having a child with a disability on fathers' and mothers' time spent on housework and childcare, stratified by parents' highest level of education, their birth cohort, the number of children in the household, and the household region of residence in East Germany or West Germany.

Educational differences. We found a statistically significant parental care burden of child disability across all educational strata in fathers and mothers. Parents with a lower educational attainment show, however, a generally larger parental care burden of child disability than those with a higher educational attainment. Specifically, the additional parental care burden for lower-

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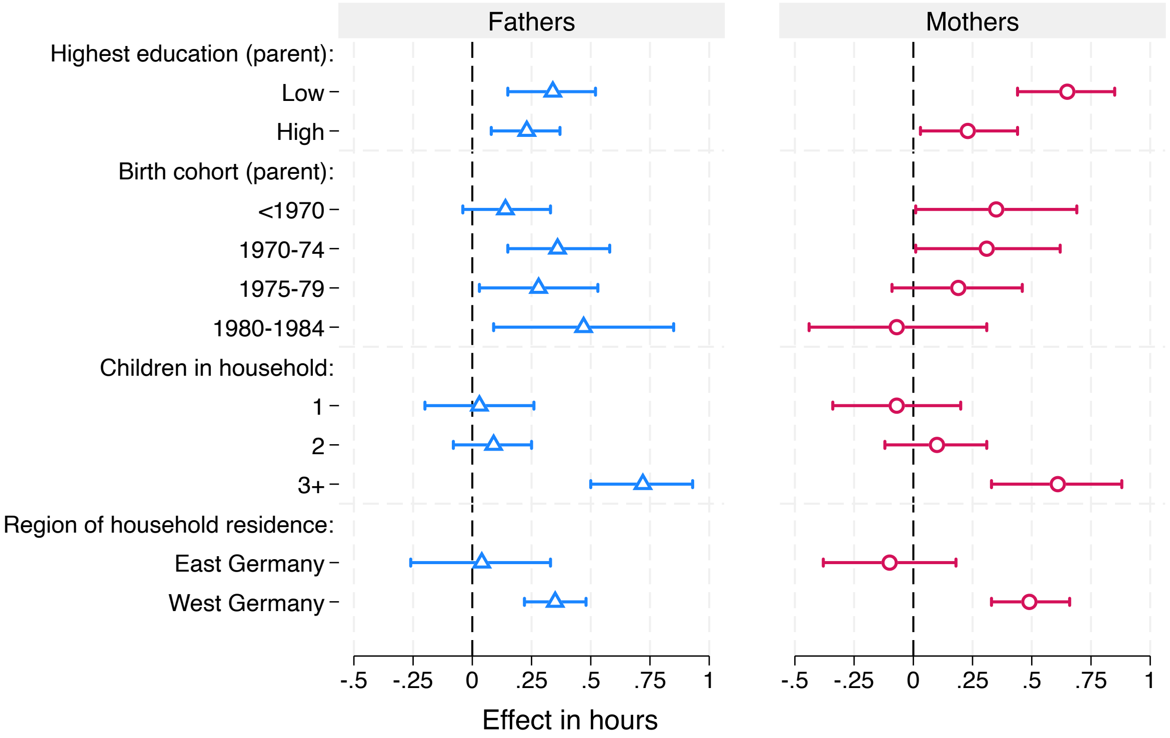
educated fathers is 20 minutes per day (0.34 hours), while it is only 24 minutes per day for higher-educated fathers (0.23 hours). Among mothers, the gap is even more pronounced. The additional parental care burden for lower educated mothers is 39 minutes per day (0.65 hours), while it is only 14 minutes per day for higher-educated mothers (0.23 hours).

Cohort differences. Our results indicate an overall increase in the parental care burden associated with child disability with younger birth cohorts in fathers, from only nine additional minutes per day for fathers born before 1970 (0.14 hours) up to 28 additional minutes per day for fathers born in 1980–84 (0.47 hours). Opposing this trend, the parental care burden of child disability in mothers consistently decreases with younger birth cohorts, ranging from 21 additional minutes per day for mothers born before 1970 (0.35 hours) to 4 minutes less per day for mothers born in 1980–84 (-0.07 hours). Yet, estimates for fathers are not statistically significant in the oldest birth cohort born before 1970, and the ones for mothers are only slightly statistically significant in the same cohort (p=0.044).

Figure 3: Heterogeneity in the average treatment effect of having a child with a disability on housework and childcare time for fathers and mothers, respectively, and stratified by the parents' education, their birth cohort, the number of children in the household and the household region of residence in East or West Germany.



Note: Heterogeneity in the average treatment effect of having a child with a disability on housework and childcare time (in hours) estimated for fathers and mothers, respectively, and stratified by the parents' highest education, their birth cohort, the number of children in the household, the household residence in East or West Germany and the type of residence region as urban or rural. All estimates come from separate models and show the average treatment effect on the treated (ATET) computed with propensity score matching (using the five nearest neighbors). Matching variables include survey year, working status, combined partnership and cohabitation status, year of birth (except for the birth cohort stratification), highest educational attainment (except for the education stratification), number of

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children in the household (except for the stratification by children in the household) and the age of the youngest child in the household. See Table S4 for model estimates. [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own analysis.]

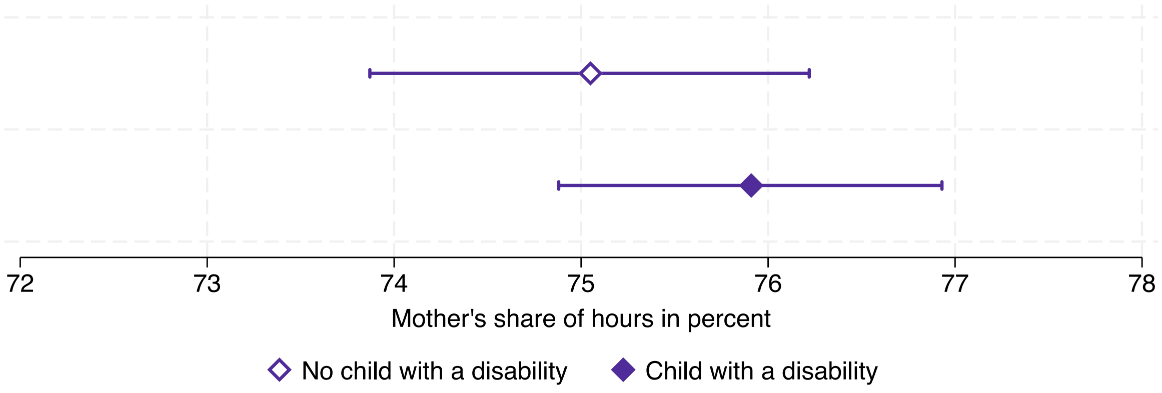
Number of children in the household. We found an overall increase in the parental care burden of child disability with the number of children in the household for fathers and mothers, with the most significant gap between having two and three or more children. Fathers spend an additional two minutes per day (0.03 hours) if they have one child, five minutes per day (0.09 hours) if they have two children, and 43 minutes per day (0.72 hours) if they have three or more children. Mothers spend four minutes less per day (-0.07 hours) if they have one child, six additional minutes per day (0.10 hours) if they have two children, and 37 additional minutes per day (0.61 hours) if they have three or more children. Yet, the estimates were statistically significant only for fathers and mothers with three or more children (p<0.001).

Regional differences. Our findings indicate a larger parental care burden of child disability in parents in West Germany and a lower, yet not statistically significant burden for mothers in East Germany. Fathers having a child with a disability in East Germany spend two additional minutes per day (0.04 hours), and in West Germany 21 extra minutes per day (0.35 hours). In comparison, mothers in East Germany spend six minutes less per day (-0.10 hours), and in West Germany, 30 additional minutes per day (0.49 hours).

Differences in the allocation of the parental care burden among parents

Figure 3 plots the predicted mother's share of the total parental time spent on housework and childcare by child disability status. For parent couples having a child with a disability, the mothers' share is predicted to be slightly higher at 75.91 percent than for those not having a child with a disability, with 75.05 percent. The difference is only 0.86 percentage points, relatively minor and not statistically significant (SD=0.78; 95%CI: -0.67, 2.39).

Figure 4: Predicted mother's share of total parental time for housework and childcare with and without having a child with a disability.



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Note: Mother's predicted share of the total parental time for housework and childcare with and without having a child with a disability (N=11,017, n=1,507). Estimates show linear predictions from a weighted regression model with cluster standard errors. Weights derived from the Propensity Score Matching (matched on survey year, mother's working status, combined partnership and cohabitation status, year of birth and highest educational attainment, number of children in the household and the age of the youngest child in the household, using the five nearest neighbors and cluster-robust standard errors). See Tables S4, S5 and S6 for model estimates. [Data source: German Socio-Economic Panel (SOEP) (Liebig et al., 2019), own analysis.]

Sensitivity analyses

We performed several sensitivity analyses to assess the robustness of our results to different measures of our main variables of interest. First, we considered an alternative specification of the parental care burden as parents' individual time spent on childcare only. We observed no difference in the associations between child disability and fathers' and mothers' parental care burden with this specification (see Figure S2), supporting the robustness of our main dependent variable's measurement. Second, we used an alternative operationalization of child disability as the presence of a limitation of the child. 5.28% of the parents in our sample (SD=22.37; n=505 parent respondents (n=188 fathers, n=317 mothers) observed over 3,566 person-years) reported having at least one child with a limitation. Although the overlap between our original and this alternative operationalization was only 13.09%, the observed parental care burden associated with child limitation was equal for both parents, as was the one with child disability in our initial analysis (see Figure S3). The association between child limitation and parents' time spent on housework and childcare was seven additional minutes per day for fathers (0.11 hours vs. 0.31 hours in the initial analysis) and 35 additional minutes per day (0.57 hours vs. 0.43 hours in the initial analysis) for mothers. We therefore evaluate our operationalization of child disability as robust towards different operationalization alternatives. Finally, as the analysis of the various ages of the child with a disability revealed heterogeneous effects on at least the parental care burden for mothers (see Figure 2), we further explored the role of the child's age at the diagnosis of the child disability. We therefore estimated the predicted hours for housework and childcare by the child's diagnosis age for only fathers and mothers of children with a disability (see Figure S4). We did not find any significant difference in the parental care burden by the child's diagnosis age: fathers spent between 3.9 (for diagnosis age 7 to 10) and 4.15 hours per day (for diagnosis age 3 to 6) and mothers between 11.7 (for diagnosis age 0 to 2) and 12.0 hours per day (for diagnosis age 3 to 6). We therefore conclude that the age of diagnosis does not significantly impact the observed parental care burden of child disability.

Discussion and Conclusions

This study examined the parental care burden of child disability. Our findings show that both fathers and mothers experience a statistically significant increase in parental care burden when having a child with a disability, with the burden especially pronounced among mothers. Specifically, we found an additional parental care burden of 19 minutes per day for fathers and of 26 minutes per day for mothers. The parental care burden was most pronounced among mothers of children with a disability aged 0 to 2, who reported an additional 1 hour and 25 minutes per day. To put these figures into perspective, we performed an exercise to estimate the weekly, monthly and yearly additional parental care time: the estimated parental care burden translates into approximately 2 and 3 additional hours per week, and 4 and 6 additional days of parental care per year, respectively, for fathers and mothers. Heterogeneity analyses revealed that particularly parents with a lower level of educational attainment, fathers of younger birth cohorts, and parents with multiple children are particularly affected by the additional parental care burden associated with child disability. In addition, we found no evidence of such a burden for parents in East Germany, whereas it was clearly observed in West Germany. While the parental care burden of child disability was disproportionately higher for mothers, the division of the parental care burden between fathers and mothers did not differ between couples with and without a child with a disability.

Our main finding that child disability imposes a pronounced parental care burden, especially on mothers, is in line with prior research and supports our hypotheses rooted in the literature on gendered division of domestic labor. Mothers disproportionately assume the bulk of domestic and caregiving responsibilities (Mannino & Deutsch, 2007; Yoshida, 2012), and these unequal patterns appear to persist and intensify in the context of disability (Luijkx et al., 2017). Our results also support the conceptualization of mothers as "experts" in managing a child's condition (Turner-Henson et al., 1992), highlighting how their specialized knowledge can become an additional burden. This may also help explain the labor market withdrawals and deteriorating wellbeing previously documented for mothers of children with a disability (Cidav et al. 2012; Gornick and Meyers 2008; Shahali et al. 2024). Fathers, by contrast, exhibited a relatively stable parental care burden across the child's age range, consistent with theoretical expectations of their more limited engagement in hands-on caregiving and managing the child's condition (Turner-Henson et al., 1992), and focus on instrumental tasks (Keller and Nicolls, 1990; Gallo, 1991).

Despite the increased care demands, mothers' parental care time exceeds that of fathers by far. Nonetheless, we find no evidence that disability either exacerbates or reduces gender inequality in caregiving within couples. Instead, the persistence of the mother's share of care time suggests a continuation of established gender roles, even in the face of additional need. In this sense, our findings align with the "stalled gender revolution" framework (England, 2010), in which care

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responsibilities remain entrenched along gendered lines. However, the stable division may also reflect more egalitarian attitudes and behaviors among younger cohorts of fathers. As hypothesized, we find that fathers of younger birth cohorts, those likely influenced by changing social norms and increased recognition of shared parenting, experience a larger parental care burden. This finding aligns with earlier theoretical assumptions about the cultural shift toward more engaged fatherhood (Dyer et al., 2009; Sullivan et al., 2014) and supports our idea that life-course and generational change influence caregiving practices.

Our findings on regional heterogeneity further underscore the critical role of cultural and institutional factors. As expected, the parental care burden of child disability is observed in West Germany only, where intensive mothering norms (Diabaté and Beringer, 2018) and less comprehensive public childcare systems (Zoch, 2020) may increase parental responsibilities, particularly for mothers. In contrast, the absence of such a burden in East Germany supports our theoretical framework that more collectivist caregiving arrangements and a stronger childcare infrastructure can buffer the adverse consequences of child disability for parental care time.

Similarly, the theorized role of socioeconomic resources is confirmed by our empirical findings: lower-educated parents, especially mothers, experience a significantly higher care burden. This finding aligns with research showing that limited financial and social resources constrain access to additional support or the outsourcing of childcare and housework responsibilities (Gupta et al., 2021; LaBriola & Schneider, 2021), intensifying the stress experienced by less advantaged families. The lack of sufficient instrumental and institutional support can further amplify the demands placed on parents with a child with a disability, ultimately challenging their own wellbeing and that of their family. Our evidence supports the view that caregiving burdens intersect with gender and social stratification, reinforcing inequalities. The observed educational gradient in the parental care burden associated with child disability highlights the need for intersectional and targeted interventions to support these families and prevent further disadvantages resulting from the additional parental care burden. Lastly, our analysis of families with multiple children confirms the expectation of a potential ceiling effect, where already high care demands limit the marginal impact of an additional child with a disability. At the same time, larger families may adhere to more traditional gender roles, which could explain why mothers continue to carry the bulk of the burden, consistent with our discussion of family structures and role norms.

The data and methods utilized in our study offer both strengths and limitations. A key aspect is the measurement of child disability, operationalized as a binary indicator based on health care diagnoses indicated by the parents. This approach provides valuable insights and partially

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reflects an objective measure of health status, i.e., medical diagnoses. However, it relies on health care seeking and diagnosis in the first place, and on voluntary reporting in the second, which may introduce bias or inconsistencies in disability classifications. Although our methodological approach adjusts at least somewhat for the selection on observables and confounding, we cannot guarantee that we capture all parents with a child with increased care demands due to a disability. We therefore assume that we underestimate the parental care burden of child disability. Moreover, the combination of various diagnoses across different age ranges and the subjective nature of disability diagnoses may compromise the reliability and generalizability of the findings. These concerns were addressed in a sensitivity analysis, in which we repeated our analyses using a measure of parent-reported perceived child limitation relative to peers. While the overlap between children with a diagnosed impairment and those with a parent-perceived limitation was only about 13 percent, the results remained similar. Consequently, parents carry the burden of their children with increased care and support needs, irrespective of the existence of an official diagnosis, which confirms our initial findings and suggests the robustness of our operationalization. Nonetheless, we would like to emphasize that our conclusions remain partly contingent on the measurement choices, highlighting the need for more consistent and comprehensive definitions of child disability in survey data. Similarly, self-reported time-use data raises concerns about accuracy and social desirability bias, particularly when reporting sensitive issues such as childcare involvement or a child's health. Subsequently, we cannot exclude the possibility of misreporting in our variables of interest. However, we tested the robustness of our findings to alternative operationalizations and found them stable. Furthermore, while the overall sample size is commendable, the subsample used to analyze the division of the parental care burden is relatively small and likely selective, potentially limiting statistical power and the depth of insights into gendered dynamics in the parental care burden associated with child disability. The small sample could hinder the ability to draw robust conclusions about the division of the parental care burden of child disability, ultimately impacting the nuanced understanding of how child disability influences the dynamics in a couple's division of daily care responsibilities. Controlling for parents' health after the child's birth may be highly endogenous with the child's health status. At the same time, the SOEP provides only limited, irregular health data since the 2000s, with no baseline health information and scarce disability measures. Finally, restricting the observation period to 2000 to 2019 excludes the unprecedented impact of the COVID-19 pandemic, which substantially increased parents' time spent on care and their burden (Huebener et al., 2021). As a result, the findings reflect pre-pandemic conditions and may not capture the heightened strains parents

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experienced from 2020 onward. We nevertheless acknowledge the immense challenges faced by all parents during the pandemic closures, especially those caring for children with increased care needs, who carried a heavy burden.

In conclusion, this study highlights the substantial and gendered parental care burden associated with having a child with a disability. Our findings underscore the persistence of social stratification in caregiving responsibilities and the unequal distribution of time, a critical and limited resource. The pronounced burden among lower-educated parents signals the urgent need for targeted interventions to provide adequate support and resources to families facing these challenges, ultimately aiming to promote the wellbeing of both parents and children with disabilities. The differences between East and West Germany reveal the importance of cultural and institutional settings in shaping these dynamics, offering valuable insight into where policy interventions may be most effective. Future research should further explore how different welfare regimes, disability types, and levels of severity interact with parental care demands and how institutional support can buffer these effects. Longitudinal studies may also provide deeper insight into how caregiving burdens evolve and affect family wellbeing, labor market outcomes, and inter-household inequalities.

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Author contributions (CRediT)

Lara Bister: Methodology; Validation; Formal analysis; Investigation; Data curation; Writing – Original Draft; Writing – Review & Editing; Visualisation

Nicoletta Balbo: Conceptualisation; Methodology; Writing – Original Draft; Writing – Review & Editing; Project administration; Funding acquisition

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Danilo Bolano: Conceptualisation; Methodology; Validation; Formal analysis; Writing – Review & Editing; Supervision

Conflict of interest

The authors have no conflict of interest to declare.

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