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The Long-Term Impact of Paid Parental Leave on Maternal Health and Subjective Well-Being

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CESifo *Working Paper No. 10308*

The Long-Term Impact of Paid Parental Leave on Maternal Health and Subjective Well-Being

Abstract

This paper studies the long-term impact of a paid parental leave reform in former East Germany in 1986 on maternal physical and mental health and subjective well-being. The reform extended paid leave for first-time mothers by six months to a maximum of twelve months. I use representative survey data from the German Socio-Economic Panel and a difference-in-differences design in a quasi-experimental setting. Results show that the effects of the reform were negligible on maternal long-term physical and mental health and subjective well-being. There is weak, but not robust, evidence for increased satisfaction with household activities, income, and work.

JEL-Codes: I120, J130, J160.

Keywords: social policy, parental leave, mental health, physical health, subjective well-being.

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1 Introduction

Paid parental leave is a common tool for women giving birth to children and caring for them without fearing losing their job. It also makes it simpler for mothers to find a new job after a break related to childbirth. The lack of paid parental leave or having no guarantee that a mother can return to her previous employer is considered a *"family barrier"* (Waldfogel 1998, p. 508). Such a barrier prevents women with children from succeeding in their job equally well as women without children or men (Waldfogel 1998). It is a policy tool implemented in almost all OECD countries at the national level, except for the U.S. (OECD 2018). However, allowing mothers to cope with family and working life is not the sole argument in favor of job-protected paid parental leave policies. Policymakers introduced parental leave to allow mothers to spend more time with their infants without losing financial independence or attachment to the labor market and to promote maternal and child health (International Labour Office 2010).

Previous studies suggest that introducing or extending parental leave might have achieved the targets of parental leave policies. For example, studies showed positive and sometimes causal impacts of parental leave on a delay in return-to-work behavior and the time a mother spends with her infant postpartum (e.g., Baker and Milligan 2008b; Dustmann and Schoenberg 2012; Carneiro et al. 2015; Hewitt et al. 2017; Guertzgen and Hank 2018; Albagli and Rau 2019; Canaan 2022). There are also studies showing that parental leave impacts maternal health in the short term (Chatterji and Markowitz 2005; Beuchert et al. 2012 and 2016; Hewitt et al. 2017; Guertzgen and Hank 2018; Albagli and Rau 2019; Lee et al. 2020; Chuard 2023) and, less frequent, in the long term (Avendano et al. 2015; Guertzgen and Hank 2018; Buetikofer et al. 2021; Chuard 2023). There is also a broad literature concluding that parental leave has positive effects on a child's health both in the short (Ruhm 2000; Berger et al. 2005; Rossin 2011; Stearns 2015; Lichtman-Sadot and Bell 2017; Bullinger 2019) and long term (Carneiro et al. 2015; Danzer et al. 2020; Fabel 2021).[1]

However, there are many debates on parental leave policies. Often, opponents are concerned about the maternal labor market position, financial situation, and gender equality aspects. Parental leave might worsen female labor market positions and wages, as (a long) time away from work lowers labor market attachment and wages due to human capital depreciation (Albrecht et al. 1999; Anderson et al. 2002; Spivey 2005; Schoenberg and Ludsteck 2014; Rossin-Slater 2018). Longer paid leave schemes are exceptionally costly for employers who

[1] Another large strand of the literature finds significant effects of parental leave reforms on non-cognitive and cognitive skills as well as labor market outcomes of children (Dustmann and Schoenberg 2012; Carneiro et al. 2015; Danzer and Lavy 2017; Albagli and Rau 2018; Danzer et al. 2020; Canaan 2022).

might hesitate to employ women of child-bearing age or offer them lower wages than men (Gruber 1994; Ruhm 1998; Schoenberg and Ludsteck 2014). As policymakers primarily target these policies at mothers, this might also impact gender roles via a further reinforcement of the social norm that it is mainly the task of women to raise children.[2] It might also increase the workload of fathers, who then have even less time for their children (Canaan 2022).

In a country comparison, the duration, degree of job protection, and wage replacement rates vary significantly: Most OECD countries grant around 52 weeks of paid leave. Very generous in terms of length are Estonia, Hungary, Slovakia, and Finland, who grant more than 150 weeks of total leave to mothers. Eight OECD countries grant the leave-taking parent a full-pay equivalent in the first year of parental leave. In contrast, there is no federally-funded paid leave for mothers in the U.S.: On the federal level, there are twelve weeks of unpaid leave for mothers at the most (OECD 2018).[3] As leave schemes around the globe are diverse, more research is needed to fully understand how they impact mothers, children, and families. Research focusing on the impacts of parental leave reforms on affected mothers is exceptionally scarce in two fields: subjective well-being effects and long-term health effects of parental leave reforms with medium-long durations (i.e., one year of leave). Furthermore, are there positive consequences of paid parental leave in societies with a well-established childcare system for very young children? I.e., where mothers were encouraged to participate in the labor market in full-time jobs, but who were still responsible for almost all household work?

Therefore, the research question focuses if an extension of paid parental leave from six to twelve months affects long-term maternal health and subjective well-being. For this purpose, I use a parental leave reform of former East Germany from May 1986.[4] The reform introduced one year of leave for all first-time mothers. It was announced unexpectedly and offered job-protected leave with a wage-replacement rate between 70 and 90% (Kreyenfeld 2004). In the historical setting of former East Germany, there was almost no maternal self-selection into the labor market and into taking paid leave: Female labor market participation rate was 86% in 1989, excluding trainees and university students (Obertreis 1986; Winkler 1990). Full-time employment was as high as 75% for women of working age and 85% for mothers (Israel and Kerz-Rühling 2008). Furthermore, in the late 1980s, up to 95% of mothers used the new paid leave (Hoeckner 1995). Therefore, the setting in this study is favorable, as many prior papers

[2] Paternal leave policies have been in place in many countries recently. Nevertheless, the share of fathers taking leave and their leave durations are much smaller than those of mothers (see Korsgren and van Lent 2022).
[3] In the U.S., roughly half the working force cannot afford unpaid leave (Lee 2020). Although no federal program exists, some states provide paid leave benefits (OECD 2018).
[4] Heisig and Zierow (2019) also studied this reform but looked at the long-term outcomes of affected children. The estimation strategy in this paper is closely related to their study.

struggle with severe maternal self-selection and thus lack a precise counterfactual scenario. No precise counterfactual scenario might bias the universal validity of results. Some previous studies face the problem that only a few women and mothers were employed before the government implemented any (paid) parental leave. Thus, after giving birth to a child, the situation changed only for a small selective group of mothers. Results are then only valid for this specific group.

The main contribution of this study is to add to the very sparse literature on the effects of paid parental leave on subjective well-being, as this is the first study to examine the long-term effects of maternal parental leave on her subjective well-being.[5] Long-term studies are desirable because subjective well-being is increasingly seen as essential for measuring living conditions in a welfare state (Kahneman and Krueger 2006; Clark et al. 2008; Diener 2009; Deaton and Stone 2013; Benjamin et al. 2019; Frijters et al. 2020). Previous studies hint that parental leave might have long-term effects on affected children's subjective well-being (Heisig and Zierow 2019; Houmark et al. 2022). Also, paternal leave might have long-term effects on fathers' and mothers' subjective well-being (Korsgren and van Lent 2022). However, studies on the long-term effects of a mother's parental leave on affected mothers are missing. If paid leave promotes subjective well-being for a larger population group in the long run, this could be very important for policymakers.

This study is the first paper that causally analyzes paid leave's long-term effects on maternal health with a generous pre-reform leave length. It contributes to the scarce literature studying the effects of paid parental leave with a medium-long duration (i.e., one year) on long-term maternal physical and mental health.[6] Long-term studies so far look at shorter (Buetikofer 2021) or longer (Guertzgen and Hank 2018; Chuard 2023) leave lengths, but not medium-long[7] lengths of about one year. As medium-long leave is most common in recent economies, research should focus more on it. Both theoretical models and previous literature suggest the most beneficial health and well-being effects of not too short and not too long paid leave (see chapter 2). This study does not focus on objective effects on mothers' labor market outcomes, such as labor market participation or wage. The reason is that women's labor market attachment was already very high in the former GDR before the reform; thus, no sizable average changes might

[5] So far, three studies have analyzed short-term leave effects (Pezzini 2005; D'Addio et al. 2014; Maeder 2014).
[6] This paper is closely related to Baker and Milligan (2008a) and Beuchert et al. (2016), who look at leave extensions from six to twelve months, but on short-term outcomes.
[7] Avendano et al. (2015) examine many European reforms – including medium-long leave. However, they do not differ between reform's leave lengths and use an indicator of leave length*wage replacement rate.

appear, especially in the long term. Instead, this study includes work satisfaction and satisfaction with income.

The causal effect is isolated in this study by applying a difference-in-differences (DiD) approach. It exploits the fact that the reform only targeted first-time mothers.[8] The paper compares the outcomes of mothers with an only child born between 1982 to 1989 before and after the reform. The control group contains mothers with at least two children and a second child born in the same time interval. Representative survey data from the German Socio-Economic Panel (SOEP) of mothers who gave birth to a child in the GDR is applied. This study uses the availability of many survey waves to circumvent bias due to short-term changes in observed well-being and health (e.g., death of relatives, severe illness). Outcomes are measured up to 37 years after the respective birth.

Results suggest negligible effects of extending paid parental leave from six to twelve months. In the context of (former) East Germany, extending already generous paid parental leave yields no further substantial increase in health benefits for affected mothers. Thus, the results corroborate previous studies on extending generous paid leave and its (short-term) effects on health (Baker and Milligan 2008a; Beuchert et al. 2016).

In terms of subjective well-being, this study finds weak evidence for increased satisfaction with household activities, income, and work of affected mothers. Throughout a range of robustness checks, the effects stay negligible, suggesting a solid attachment to the labor market of mothers in the former GDR.

The remainder of this study is as follows: Chapter 2 describes the theoretical background and previous literature. Chapter 3 informs about the social and economic background of former East Germany in the 1970s and 1980s and the reform used. Chapter 4 describes the empirical approach, chapter 5 the data set, and chapter 6 shows descriptive statistics. In chapter 7, the results of the analysis are introduced. Chapter 8 discusses them and concludes.

2 Theoretical background and related literature

Maternal time allocation and well-being of mother and child

Theoretically, the effect of paid parental leave on maternal (and child) health and subjective well-being is unclear. According to the household production model of Becker (1965) and the production of health model of Grossman (1972), working mothers maximize their utility function, which includes their and their child's health and well-being. Market goods

[8] Mothers with more than one child have been eligible since 1976. Thus, regarding the eligibility to take paid parental leave, everything stayed the same for them in 1986.

and time both produce health and subjective well-being. As mothers have a limited budget of time, the optimal quantities of her own and her child's health demanded by the mother depend on the marginal utilities and shadow price (Chatterji and Markowitz 2005). A working mother's time divides between work at the labor market, work at home, and time spent to maximize her and her child's mental and physical health and well-being. If she re-enters the labor market postpartum, the opportunity costs of time for child care and leisure time increase. Thus, the shadow prices of her health and well-being increase, suggesting a decrease in her health and well-being (Chatterji and Markowitz 2005). However, if labor market work enhances maternal (mental) health as well (Grzywacz and Bass 2003; Brook et al. 2008; Zagefka et al. 2021), there might be a "cut-off" length of leave that still yields positive effects. Thus, as health and well-being improve with time and market goods, the effect of paid parental leave on health and well-being is unclear. The sole income effect through paid work on the labor market suggests an increase in (the demand for) health and well-being. The combined effects, however, depend on the relative time intensity of the health and well-being production functions and the wage replacement rate of leave (Chatterji and Markowitz 2005).

Previous empirical studies support the theoretic assumptions regarding time allocation and maternal and child health. Mothers who re-enter the labor market early face more physical and mental health restrictions than mothers who recover longer (Gjerdingen et al. 1993; McGovern et al. 1997; Chatterji et al. 2013; Dagher et al. 2014). After giving birth, roughly 13-25% of women face mental health issues such as post-partum blues/depression or other psychiatric disorders, including depression and anxiety. Posttraumatic stress disorders and many physical health problems are common (O'Hara and Swain 1996; Wisner et al. 2002; Brockington 2004; Cheng and Li 2008; Vesga-López et al. 2008; Pearlstein et al. 2009). Having at least one episode of depression increases the risk of developing major depression or other psychiatric disorders in later life (O'Hara and Swain 1996; Wisner et al. 2002; Vesga-López et al. 2008; Pearlstein et al. 2009). Mental health restrictions are an enormous challenge for the global health system: Depression is the second largest cause of years of disability (Ferrari et al. 2013). It affects up to 44% of the world's population (WHO 2017), and its costs are a significant economic burden in developed economies such as the U.S. (Greenberg et al. 2003) and the European Union (Andlin-Sobocki et al. 2005; Olesen et al. 2012).

Besides mental and physical health, women face other challenges after giving birth, as the new role as a mother might be difficult to cope with (Mercer 1985; McGovern et al. 1997). Research shows that mothers who re-enter the labor market sooner face more problems with adapting to the mother role (McGovern et al. 1997; Chatterji et al. 2013). The interaction style

and quality of mother-infant interaction were found to correlate with antenatal and postnatal depressive symptoms of mothers (Clark et al. 1997; Wisner et al. 2002; Binda et al. 2019) and maternity leave lengths (Clark et al. 1997). The quality of the mother-infant relationship influences the infant regarding attachment, early interactions, and cognitive functioning (Murray and Cooper 1996; Brockington 2004). Disorders in the mother-infant relationship concern 10 to 25% of mothers referred to a psychiatrist (Brockington 1996). However, if no role conflicts exist and new mothers adapt, this fosters well-being by boosting identification sources and self-esteem (Grzywacz and Bass 2003; Brook et al. 2008; Zagefka et al. 2021).

Thus, previous literature shows positive effects of a later re-entry into the labor market on maternal mental and physical health and well-being, which can positively influence the infant's health (Ruhm 2000; Rossin 2011; Stearns 2015; Bullinger 2019).

Parental leave and maternal health

Studies on parental leave reforms frequently confirm that a later re-entry into the labor market positively affects maternal mental and physical health. However, often they show a turning point, where positive effects diminish or invert into adverse effects.[9] For short-term effects, Chatterji and Markowitz (2005, 2012) analyze the introduction of twelve weeks of unpaid maternity leave in the U.S. As maternal leave durations vary in their sample[10], they can show that maternity leave affects health dependent on leave lengths. They apply an instrumental variables (IV)-approach by using state-level labor market conditions and state-level maternal leave policies as instruments. The likelihood of clinical depression and outpatient visits during the first six months after childbirth is almost unaffected. Mothers absent for more than eight weeks reported better overall health, and mothers absent for more than twelve weeks reported fewer depressive symptoms a few months postpartum. Baker and Milligan (2008a) analyze an increase in paid maternity leave from 25 weeks to 50 weeks in Canada with a wage replacement rate of up to 55%. The authors find a significant increase in mothers' time absent from work but no impact on self-reported health, depression, and other postpartum health issues up to two years after giving birth.

Dagher et al. (2014) apply an IV approach to eligible mothers in Minnesota for a maximum of 52 weeks of paid leave with partial wage replacement since 1997. They find a hump-shaped relationship between leave duration and short-term postpartum depression with a minimum probability at 26 weeks and a small positive association with physical health.

[9] For a summary of studies that analyze parental leave reform effects, see Table A.1.
[10] For example, they differ between returning to work six to eight, eight to twelve, or later than twelve weeks postpartum.

Beuchert et al. (2016) study a reform in Denmark in 2002. Before, mothers were entitled to 24 weeks with complete income replacement and 52 weeks with a replacement rate of 60%. After the reform, mothers became eligible for 46 weeks of paid leave with complete income replacement. The reform increased maternal health up to five years after childbirth in terms of fewer inpatient and outpatient hospital admissions, but other outcomes (emergency department visits, antidepressant prescriptions) were unaffected. Beneficial effects are more pronounced for low- than for high-resource families. Hewitt et al. (2017) analyze the effects of a reform in 2011 in Australia that introduced 18 weeks of paid leave at a minimum wage rate. Before, mothers were eligible for twelve months of unpaid leave. They find minor positive effects on maternal mental and physical health one year postpartum. Mandal (2018) shows negative effects of a return to work within twelve weeks after giving birth on short-term mental health for mothers in the U.S. However, this effect was alleviated when mothers took paid leave. Women who returned to work within 36 weeks after giving birth had better mental health scores than mothers who returned within twelve weeks. Albagli and Rau (2019) study a paid maternity leave increase from twelve to 24 weeks in 2011 in Chile with complete income replacement. They find a significant reduction in stress up to one year later. Lee et al. (2020) study California's paid parental leave reform of 2004, which introduced six weeks of paid leave with a wage replacement rate of 55% (no job protection). Before the reform, twelve weeks of unpaid leave after birth was granted. They show increases in self-rated health and decreases in psychological distress, the likelihood of being overweight, and alcohol consumption.

Besides papers on the short term, few studies concentrate on long-term health effects. In a country comparison across Europe, Avendano et al. (2015) find small and positive long-term effects of more generous leave (indicator: length*wage replacement rate) on mental health in mothers roughly 25 years after giving birth to their first child. Guertzgen and Hank (2018) investigate the effects of a paid leave expansion from eight to 24 months with a wage replacement rate of roughly 33% in former West Germany in 1979. Up to 30 years after childbirth, mothers were more frequently absent from work for more than six weeks. They reason that mothers with worse pre-reform health reenter the labor market due to the reform. They find no effects on maternal health.

Buetikofer et al. (2021) estimate the long-term health effects of a reform in 1977 in Norway and six subsequent expansions between 1987 and 1992. Before, mothers were eligible for twelve weeks of unpaid leave. After that, they could apply for four months of paid – with complete income replacement – and twelve months of unpaid leave. The reform improved maternal body mass index (BMI), blood pressure, pain, mental health, and health-promoting

behaviors (exercising, no smoking). They find diminishing returns to leave lengths: extending paid leave by two or more weeks had less robust effects. Chuard (2023) analyzes the long-term health effects of three subsequent reforms in Austria from 1990 to 2000 on various physical and mental health measures (among them outpatient costs, medication, days of hospitalization, mental disorders, and circulatory system diseases). Results suggest a hump-shaped relationship between leave length and health effects and adverse health effects for exceptionally long parental leave lengths (~2.5 years). However, long leave spells might benefit low-SES mothers, mothers of girls, and mothers with unhealthy babies. She also suggests that health effects accumulate over time.

The following concludes from the literature: a) Health benefits are most considerable for short (but not too short) and medium-long leave lengths (this might be applied to subjective well-being as well). b) If leave lengths are too long, health effects might turn negative. c) Health effects might accumulate over time. d) Expanding leave from an already generous level yields more negligible (or no) effects than introducing parental leave. There is not enough literature on subjective well-being effects to conclude apparent effects. For this study on long-term effects on subjective well-being and health, arguments a) and c) suggest that positive effects on maternal mental and physical health can be expected, possibly on subjective well-being as well. However, argument d) suggests only minor or no results, as the studied reform extends parental leave from an already generous leave length.

Parental leave and subjective well-being

Literature on the effects of parental leave reforms on subjective well-being is scarce.[11] Pezzini (2005) finds negligible short-term effects of reforms between 1975 and 1998 in twelve European countries. D'Addio et al. (2014) analyze various reforms from (West) Germany between 1984 and 2008 and Great Britain between 1973 and 2007. By applying a DiD analysis and an IV approach, they find positive effects on life satisfaction in Germany up to six months after delivery. They show a decrease in life satisfaction for leave lengths longer than 16 months, suggesting that effects on life satisfaction might follow a hump-shaped pattern. Effects for Great Britain are relatively similar but somewhat smaller in size.

Maeder (2014) studies a change in leave benefits in Germany in 2007. Prior to the reform, mothers received 300€ for 24 months or 450€ for 12 months per child. After the reform, they were able to take paid parental leave of up to 14 months with a 67% wage replacement rate. There are no statistically significant overall effects up to 5.5 years after giving birth for

[11] See Table A.2 for a summary of previous studies.

Maeder (2014) studies a change in leave benefits in Germany in 2007. Before the reform, mothers received 300€ for 24 months or 450€ for 12 months per child. After the reform, they could take paid parental leave of up to 14 months with a 67% wage replacement rate. There are no statistically significant overall effects up to 5.5 years after giving birth for various satisfaction variables (life, school, training/job, friends/social network, family). However, she finds an increase in life, school/job, and family satisfaction for mothers having a partner with high- or medium-level education, and an increase in school/job and family satisfaction for West German mothers. For East German mothers, results suggest decreased satisfaction with the social network. These differences might stem from varying preferences of West and East German women about working or staying at home as a mother, originating in different historical backgrounds. However, as preferences change over time in these terms, studying effects in the setting of the former GDR and contemporary East Germany might also interest western societies.

3 Family policies in the GDR in 1950-1989 and the parental leave reform of 1986

The government of the GDR tried to increase female labor market participation due to a significant decrease in population size in the 1960s. Many policies – e.g., the law on maternity and child protection (1950), the family code (1965), and the law on abortion (1972) – were introduced to promote the independence of women and mothers. As a result, both married women and mothers increasingly entered higher education and the labor market. Center-based care was expanded vastly (Obertreis 1986).[12] As a result, female labor market participation increased to 83.8% in 1979 and 85.8% in 1989 (Winkler 1990). Up to 75% of women and 85% of mothers were employed full-time (Höckner 1995; Israel and Kerz-Rühling 2008). However, domestic work was not divided between men and women, doubling the workload of the latter ("second shift"), which was an enormous physical and mental burden for women (Helwig 1988). In the late 1960s, fertility plunged. The government tried to counteract with various policies to increase fertility in the 1970s and 1980s.[13] One of the measures was one year of job-protected, paid parental leave with a wage replacement rate between 70 and 90% – depending on the mother's sickness allowance – for mothers who already had at least one child on the 27th

[12] More than 80% of all infants and toddlers attended formal center-based care in 1986 (Statistisches Jahrbuch der DDR 1988), and up to 90% of all newborn to three–year–old children attended full-day center-based care in the late 1980s (Helwig 1987; Zwiener 1994; Braun and Klein 1995).

[13] For example, child benefits, birth grants, and interest-free loans for marriage were introduced and extended to higher age limits and sums. Mothers became eligible for reduced working hours, extra holidays, and paid child sick leave. Also, policymakers extended paid maternity leave (100% wage replacement rate) to 18 weeks in 1972 and 26 weeks in 1976. Single first-time mothers were eligible for paid parental leave if no childcare place was available. Mothers with three or more children became eligible for 1.5 years of paid leave in 1984 (Kreyenfeld 2004).

of May 1976 (Kreyenfeld 2004). After its introduction, short-term fertility increased temporarily (Buettner and Lutz 1990; Conrad et al.1996).

Family policies were expanded to counteract the further decreasing fertility in the early 1980s (Buettner and Lutz 1990; Conrad et al. 1996). The studied reform in this paper is the reform of 1986 when paid parental leave was expanded to all mothers starting with the 1st of May. The reform was announced in mid-April on short notice (Helwig 1988). Therefore, mothers could not adjust their child's birth date to be born after the reform. Also, there was no fertility response after the reform (Buettner and Lutz 1990; Conrad et al. 1996). Before the reform, first-time mothers were the only group not eligible for one year of paid leave (Braun and Klein 1995). The most common pre-reform scenario for them was full-time (or part-time) employment and a maximum of six months of fully paid maternity leave (Winkler 1990).[14] In contrast, studies exploiting reforms in other countries lack a precise pre-reform scenario of mothers. Some mothers were housewives, many were employed part-time, and others were employed full-time. Since only a particular share of mothers would have been in the labor market without the reform, the post-reform framework has changed only for a selective group of mothers. In this case, effects are measured only for this self-selected sub-group of mothers.

Considering the eligibility for paid leave, all mothers with children younger than one year by the 1st of May 1986 were eligible. The eligibility criterium implies that first-time mothers with a child born in the second half of 1985 were partly eligible. For example, if a child aged ten months on the 1st of May, their mother could apply for two months of paid leave. However, it is unlikely that mothers who already returned to their workplace after the end of maternity leave (i.e., mothers with children born before November 1985) used the additional paid parental leave. Thus, treated are mothers who gave birth in November 1985 or later. Mothers with children born in 1985 or the first months of 1986 might have already gained a childcare place and decided when to return to work. In these cases, mothers might have kept the childcare place and returned to work.

Regarding take-up rates, there was little to no self-selection, as in the late 1980s, up to 95% of mothers used paid leave (Hoeckner 1995). Data also shows that in 1988, only 1% of children under one year attended childcare – another hint that most mothers used the entire parental leave duration (Israel and Kerz-Rühling 2008).

[14] They were eligible for one year of unpaid leave. However, mothers rarely used unpaid leave, as most mothers could not afford it, and the socialist regime expected women to participate in the labor market (Kreyenfeld 2004).

4 Empirical approach

This study uses a difference-in-differences approach to investigate whether the reform of 1986 had long-term impacts on maternal health and subjective well-being. The eligibility criterium for being a first-time mother is exploited in a quasi-experimental setting to causally identify the effect of the shift in leave duration. An essential condition is that a pre-reform common trend must exist in the treatment and control groups' outcomes. Common trends are likely, as other family policies targeted at mothers were absent in the observed time frame. Because the data does not contain if and how long a mother used paid leave, this study estimates an intention-to-treat effect.

The treatment group consists of first-time mothers who gave birth to their only child in January 1986 or later in former East Germany to ensure she was first eligible for the entire duration and second was still on maternity leave. The restriction to mothers with an only child is necessary, as mothers in the treatment group must be distinguishable from mothers in the control group. The control group contains mothers with two (or more) children, where the second child was born between 1982 and 1989, and mothers with only one child born between 1982 and May 1985 (see Figure 1).

Using other control groups is problematic: First, using mothers in West Germany as a control group is impossible as there were several changes in family policies in the studied period. For example, parental leave was extended from six to ten months in 1986 and to twelve months in 1988 (Kreyenfeld 2004). Second, using fathers might also be prone to errors, as they were also eligible to take paid parental leave – but they rarely used it (Helwig 1988). However, they might have been indirectly targeted through the reform by their wives/partners: If mothers were healthier and happier after the reform, this might indirectly influence their partners.

Figure 1:
Classification of mothers in the analysis

	Birth of child in 1982-1985	Birth of child in 1986-1989
Mother with two or more children	Not subject to reform N = 420	Not subject to reform N = 437
Mother of an only child	Not subject to reform N = 159	Subject to reform N = 197

Own illustration.

The regression model equation can be written as follows:

$$y_{ij} = \lambda\left(Mother_{Onlychild}\right)_{ij} \times (Postreform)_{ij} + \beta_1\left(Mother_{Onlychild}\right)_{ij} + \beta_2(Postreform)_{ij} + \pi_j + \mu X_i + c + \epsilon_{ij} \, .$$

The term y_{ij} indicates estimated health and subjective well-being outcomes of mother i who gave birth to her first/only or second child in year j. The dummy variable $\left(Mother_{Onlychild}\right)_{ij}$ indicates if the respective mother i gave birth to her first/only (the dummy is 1) or second child (the dummy is 0) in year j of the study period. The coefficient β_1 captures general differences between mothers with an only child or more children. The dummy variable $(Postreform)_{ij}$ indicates if a mother gave birth to a child in the reform year of 1986 or later (the dummy is 1) or before 1986 (the dummy is 0). β_2 captures general differences between mothers giving birth before or after the reform. The interaction term of the dummy variables $\left(Mother_{Onlychild}\right)_{ij} \times (Postreform)_{ij}$ indicates eligibility (if the interaction term is 1). λ measures the reform effect on health and subjective well-being outcomes. π_j contains cohort fixed effects, X_i covers control variables, c is the constant, and ϵ_{ij} is the heteroskedasticity-robust error term.

I use alternative eligibility criteria and more control variables to test the robustness of estimates from this equation. This paper studies a range of outcomes (see chapter 5). Therefore, I verify whether regression estimates hold after adjusting p-values for multiple hypothesis testing by calculating Westfall-Young stepdown adjusted p-values by using the Stata-command wyoung.[15]

5 Data

This study uses data from the German Socio-Economic Panel (SOEP), which is a representative sample of the population in Germany. From 1990 on, it also covers individuals in East Germany (Goebel et al. 2019). Only women who gave birth in former East Germany are subject to this study, so women in West Germany and women with missing information about their location in 1989 are excluded. I use as many SOEP waves as possible to calculate the outcome variable average to circumvent bias in the data due to short-term changes in observed well-being and health variables. Short-term decreases or increases in the observed variables might be due to the death of a relative, friend, or child, a phase of severe illness, or other challenging life phases (e.g., a divorce).

Treatment variable The treatment variable (intention-to-treat) is unity for mothers who gave birth to their first child in January 1986 or later. It takes the value zero for all other groups of mothers. Cut-off dates are January 1st, 1982, and December 31st, 1989, to exclude directly

[15] For more information on this method, see McKenzie (2021).

affected individuals by the reform of 1976 and mothers with children born after the German unification, as parental leave schemes changed afterward.

Health outcomes The SOEP contains self-reported items on an individual's physical and mental health. This study includes five measures for overall health and two for mental health. I use a measure for *self-assessed health*, where respondents rate their overall health. It ranges from one (best) to five (worst). Included in the analysis is a recoded version of this variable, so the highest possible value, five, is associated with the best possible outcome. It comprises data from 27 waves, covering 1992 to 2019 (earlier data is unavailable). The *BMI* index is calculated using data from 2002 to 2019 on the weight and height of a person, covering nine waves, as the SOEP queries this variable biannually.[16] A measure for the number of *outpatient visits* (in the previous year) is calculated using the average of 28 waves, covering 1991 to 2019. The number of *absent days from work due to illness* is calculated as an average from 17 waves, covering 2002 to 2019.

This study uses two variables to represent mental health. First, the variable *rarely depressed* measures how often the mother felt depressed within the last four weeks, which is queried biannually. Here, one is the worst ("all the time"), and five is the best ("never") value. I calculate the average mental health state using values of eleven waves, covering 1998 to 2019. Second, I use a dummy variable for *clinical depression*, where one indicates a clinical case of depression or other mental illness and zero if otherwise. Data is available for six waves; this variable has been included since 2008 and is covered biannually.

Subjective well-being outcomes The SOEP covers various dimensions of satisfaction with different life spheres. This study includes dimensions that might be affected by parental leave: overall *life satisfaction*, *work satisfaction*, *income satisfaction* (personal income, not household), and *satisfaction with household activity*. All variables are measured on a scale of zero (lowest) to ten (highest). Life and work satisfaction are covered from 1990 to 2019 and queried in 29 waves. The SOEP queries satisfaction with personal income since 2003. Thus, the average of this variable is calculated using 16 waves. Satisfaction with household activity is covered from 2006 onwards, covering 14 waves.

Control variables Control variables are *year of birth*, *age at birth*, *German nationality*, and a dummy for the *current region of living* (whether the respondent contemporarily lives in East or West Germany). I also include an *education* dummy defined as having a high school diploma ("Abitur" or vocational baccalaureate diploma) and a dummy indicating whether the

[16] A value between 18.5 and 24.9 represents a healthy weight. However, values considered healthy are increasing with age.

mother of the respondent has some university education or a university degree (*academic mother*). A dummy for the *region of growing up* (urban or rural) indicates whether the respondent grew up in a small, medium, or big city or a rural area.[17] In robustness checks, I further include dummies for the *child's gender* and *birth month* and the *relationship status* of the respondent (married, partnership, single) in the year before the birth of the respective child. Relationship status is only available for a subsample of observations. I focus on control variables most likely unaffected by the reform itself.

6 Descriptive statistics

Treated individuals are 197 of the 1,213 mothers in the sample (see also Figure 1). Table 1 displays summary statistics for outcome and control variables. For some variables, the sample size is smaller than 1,213 observations. The remaining variables are not adjusted to the variables with the smallest sub-sample size to not reduce the number of observations of the whole sample further. On average, mothers' self-assessed health is relatively high, with a mean of 3.4. The mean BMI is 26.5, indicating an average healthy weight for the age group observed (years of birth between 1942 and 1971). The mean number of outpatient and hospital visits is low (2.4 in the last three months and 0.16 per year). However, there are severe outliers with up to 34 outpatient visits, stemming from women with more severe health issues. The number of absent days from work due to illness is, on average, 15.7, including women with long-term illness with up to 365 days of absenteeism. Regarding mental health, feelings of depression are rare (mean of 3.4), and most mothers have no diagnosed depressive or other mental illness in any of the waves (mean of 0.17).

Subjective well-being measures show that in terms of life, work, and household activity satisfaction, the mean values are between 6.7 and 6.8, indicating medium to high satisfaction. However, income satisfaction is much lower, with a mean of 5.5. Also, the standard deviation shows a larger deviation from the mean than life or work satisfaction. This difference might stem from income differentials between mothers.

Observed mothers were born between 1942 and 1971. They were between 17 and 43 years when they gave birth to the child of interest for this study. The vast majority are of German nationality, live in the Eastern part of Germany, have no high school diploma, and have a mother without a university education. Although most mothers grew up in urban areas (mean of 0.6), another large share grew up in rural areas. Also, most were married before giving birth to the

[17] I code missing data for the variables *academic mother*, *region of growing up*, and the *child's birth month* as zero and include dummies that indicate missing information. Table 1 excludes missing dummies.

child of interest. Remarkably, a large share of mothers was not living with their husbands or partners in the year before the birth. This circumstance might be due to a severe apartment shortage in the former GDR. Many (also married) couples still lived at their parent's place before the government allocated them an apartment.

Table 1:
Descriptive statistics for outcome and control variables

	N	Mean	Std. Dev.	Min	Max
Overall/physical health					
Self-assessed health	1,211	3.425	0.707	1	5
BMI	941	26.481	5.144	16.766	61.028
Outpatient visits in last 3 months	1,213	2.360	2.383	0	34
Absent days from work due to illness	921	15.730	33.100	0	365
Mental health					
Rarely depressed	947	3.400	0.788	1	5
Clinical depression	834	0.173	0.379	0	1
Subjective well-being					
Life satisfaction	1,203	6.693	1.470	0.909	10
Work satisfaction	1,100	6.750	1.689	0	10
Income satisfaction	986	5.505	2.339	0	10
Satisfaction with household activity	900	6.769	1.502	0	10
Control variables					
Year of birth	1,213	1960.162	4.377	1942	1971
Age at birth	1,213	25.447	3.807	17	43
German nationality	1,213	0.943	0.232	0	1
Current region (1: West Germany)	1,213	0.186	0.390	0	1
Education (1: high school)	1,213	0.155	0.362	0	1
Region of growing up (1: urban)	1,213	0.635	0.482	0	1
Academic mother	1,213	0.066	0.248	0	1
Child gender (1: male)	1,213	0.499	0.500	0	1
Birth month of child	1,213	5.364	3.913	0	12
Relationship status (pre-birth)	375	1.547	0.680	0	2
Partner lives in household (pre-birth)	374	0.773	0.420	0	1

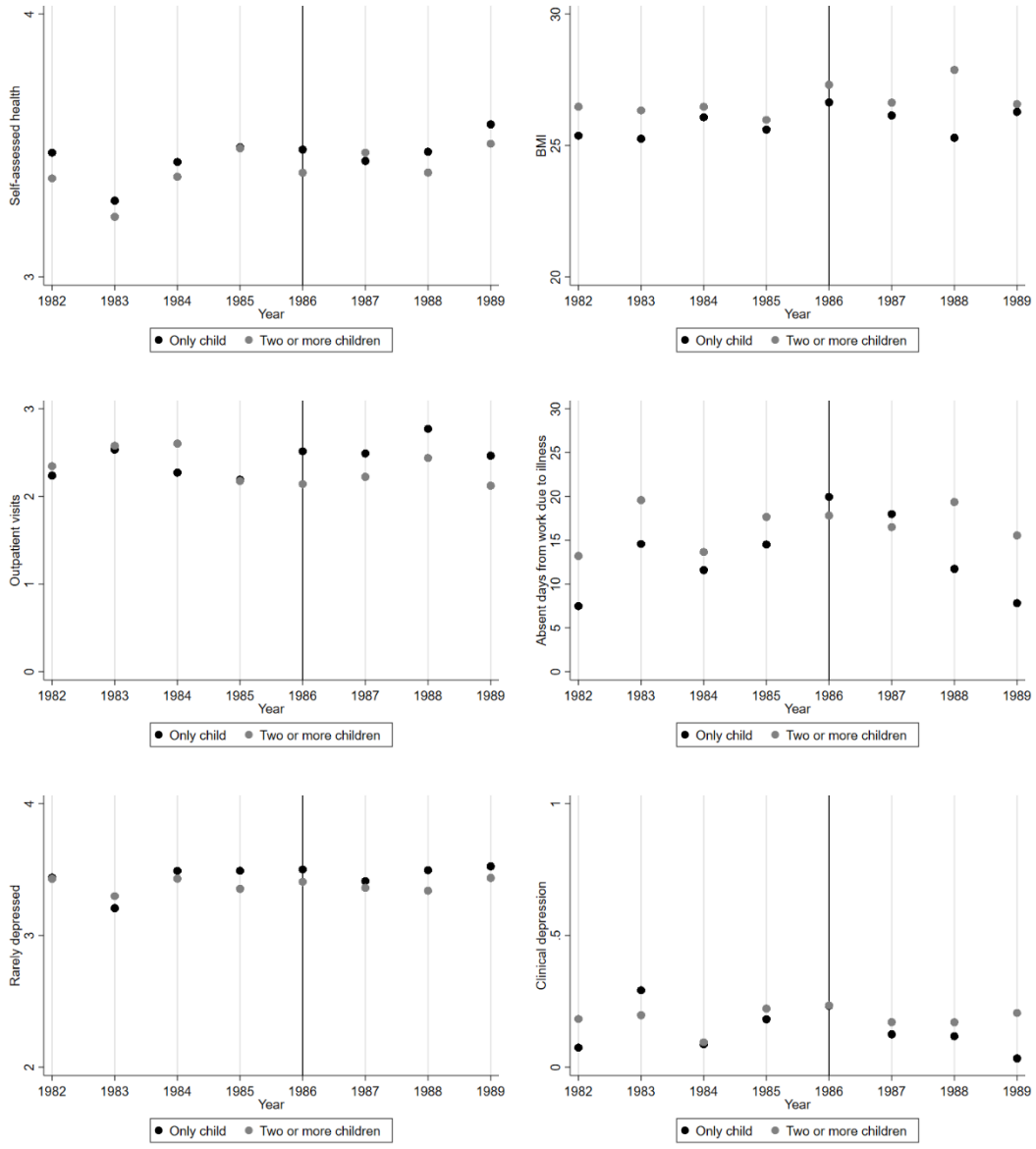
Source: Socio-Economic Panel (SOEP), version 36, SOEP, 2020, 10.5684/soep.core.v36eu. Own calculations.

Figure 2 displays the mean health outcomes of mothers of an only child and mothers with at least two children by the child's birth year. The upper left panel shows that the self-assessed health of mothers with an only child is higher than that of mothers with two or more children in most cases. There is no visible long-term effect of the reform. The BMI of the first group is more favorable than that of the second group, as depicted in the upper right panel. We also see no discontinuity for this variable in the year of the reform or after that. Shown in the centered left panel, mothers with two or more children had more outpatient visits before the reform than mothers with an only child. After the reform, the pattern reverses, although there is no distinct jump in outpatient visits for mothers with an only child. For the absent days from work, depicted in the right panel of the center, the variable for a subjective feeling of depression (lower left panel) and clinical depression (lower right panel) show no differences in the means

before and after the reform. Overall, Figure 2 suggests no paid parental leave reform effects of the reform in 1986 on the long-term health outcomes of mothers.

Figure 2:

Mean health outcomes of mothers of an only child and at least two children by child birth year



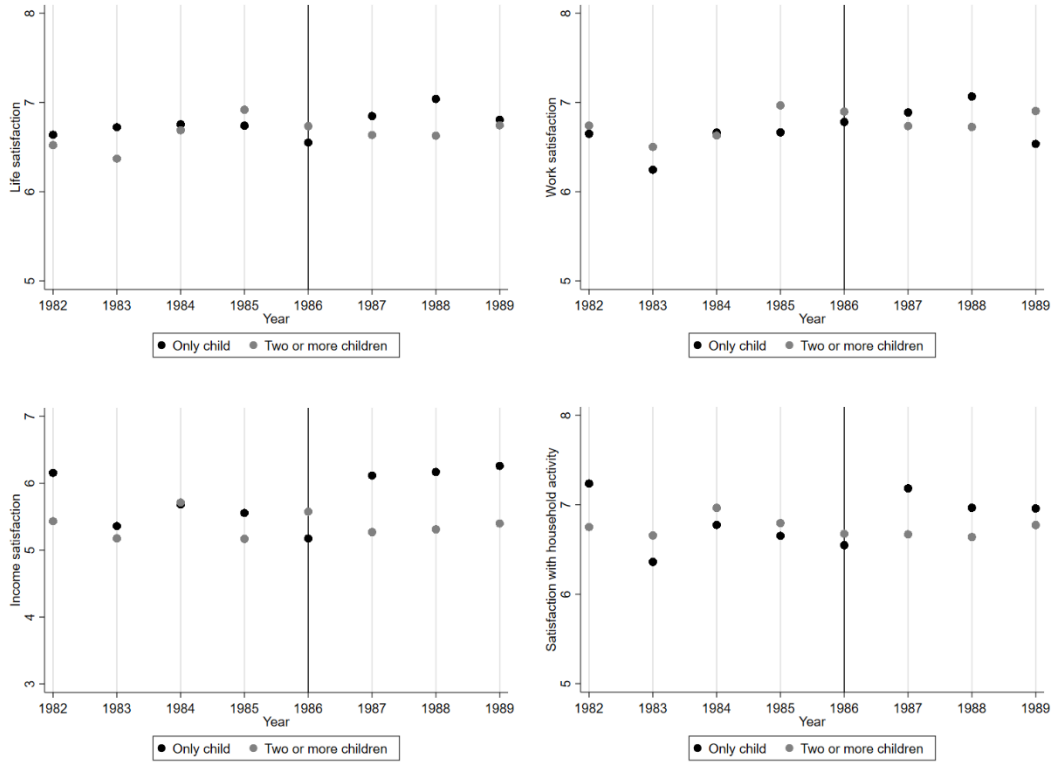
Source: Socio-Economic Panel (SOEP), version 36, SOEP, 2020, 10.5684/soep.core.v36eu. Own calculations.

Figure 3 displays maternal subjective well-being averages by the number of children and the child's birth year. For life satisfaction in the upper left and work satisfaction in the upper right, the means over both groups and time do not vary vastly. Thus, the reform does not make a difference. In the lower-left panel, there are pattern changes in income satisfaction of mothers with an only child after the reform, starting with 1987. From then on, the income satisfaction of mothers with an only child is higher than that of mothers with two or more children. Before the reform, there were no distinct differences (except for 1982). A similar

conclusion can be drawn from the lower right panel, which depicts household activity satisfaction averages. From 1987 on, means of mothers with an only child increased. There is no such pattern for mothers with two or more children.

Figure 3:

Mean subjective well-being outcomes of mothers of an only child and at least two children by child birth year



Source: Socio-Economic Panel (SOEP), version 36, SOEP, 2020, 10.5684/soep.core.v36eu. Own calculations.

7 Results

Tables 2 and 3 show estimation results for long-term maternal health and subjective well-being outcomes. Panel (A) shows estimation results without control variables. Panel (B) is the main specification. It contains most control variables (birth year, age at birth, German nationality, education, whether she lives in West Germany, whether she grew up in an urban area, and whether her mother has tertiary education). Panel (C) (child gender) and (D) (the child's birth month) both include a single new control variable. In Panel (E), I use a shorter time frame around the reform. 1983 and 1988 are cut-off years[18] with a specification similar to Panel (B). I redefine treated mothers in Panels (F) and (G). In Panel (F), mothers with children born in May 1986 and later are 'treated'. This robustness test is conducted because mothers with children born in early 1986 might already have had a space in childcare after their maternal

[18] A shorter time frame is problematic due to a more significant decrease in sample size.

leave and decided not to use paid leave or withdraw from the space in childcare. Also, they might have already announced at work that they return on a specific date. In Panel (G), mothers with children born in November 1985 or later are defined as 'treated', as they were most likely still on maternal leave when the reform was announced.[19] Furthermore, I exclude single mothers in Panel (H), considering that single mothers – who did not find a place in childcare for their child – have been eligible for one year of paid parental leave since 1972. Since the SOEP does not contain information on whether she had a space in childcare for her child, this subgroup is not considered. In Panel (I), I include relationship status variables. Sample size decreases extensively, making sample comparability difficult and estimation results less reliable.

Maternal health

Table 2 shows the estimation results of DiD regressions for maternal long-term health outcomes. Columns (1) to (4) display overall/physical health estimates. The estimates are, as expected from Figure 2, not statistically significant. For self-assessed health, estimated coefficients are very close to zero, so the coefficient changes its sign in some robustness tests. There is no clear correlation between more extended parental leave and overall/physical health outcomes in this setting. Column (2) shows a tendency for a decreased BMI in affected mothers. Results in column (3) suggest an increase in outpatient visits and estimates in column (4) an increase in absent days from work. Columns (5) and (6) show mental health results and suggest fewer depressive symptoms of affected mothers after the reform and in contrast to not affected mothers. Cases of clinical depression also decrease. However, both estimates are not statistically significant.

Thus, results are mixed, as most estimates on overall/physical health suggest a somewhat negative impact of the reform but a more positive effect on mental health. However, the results are not statistically significant and, as Figure 2 suggested, barely visible. By calculating Westfall-Young stepdown adjusted p-values, the p-values increase more strongly.

To conclude this section, regression results on long-term maternal health suggest that prolonged paid leave from six to twelve months had negligible effects. These results align with previous research analyzing leave extensions from already generous pre-reform leave lengths (Baker and Milligan 2008a; Beuchert et al. 2016).

[19] Not shown is a robustness test classifying mothers with children born in June 1985 or later as treated. However, those mothers were partially eligible for extended paid leave. Furthermore, mothers are unlikely to drop out of the labor market again since maternal leave was already over when policymakers announced the reform. Results do not change significantly, apart from a change in the algebraic sign of life satisfaction.

Table 2:
DiD estimation results for health outcomes

	Overall/physical health				*Mental health*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Self-assessed health	BMI	Outpatient visits	Absent days from work	Rarely depressed	Clinical depression
(A) No controls	-0.002	-0.278	0.439	1.324	0.063	-0.050
	(0.086)	(0.685)	(0.292)	(4.279)	(0.113)	(0.057)
N	1,211	941	1,213	921	947	834
R^2	0.004	0.011	0.002	0.003	0.002	0.004
(B, main)	-0.003	-0.258	0.383	0.557	0.039	-0.019
With controls	(0.092)	(0.760)	(0.322)	(4.571)	(0.119)	(0.063)
N	1,211	941	1,213	921	947	834
R^2	0.052	0.071	0.066	0.047	0.062	0.079
(C) With child	-0.003	-0.250	0.384	0.651	0.038	-0.019
gender	(0.092)	(0.759)	(0.323)	(4.577)	(0.119)	(0.063)
N	1,211	941	1,213	921	947	834
R^2	0.052	0.072	0.066	0.051	0.063	0.080
(D) With	0.005	-0.272	0.397	0.606	0.035	-0.016
child birth month	(0.091)	(0.764)	(0.321)	(4.594)	(0.119)	(0.063)
N	1,211	941	1,213	921	947	834
R^2	0.079	0.072	0.070	0.049	0.063	0.081
(E) Short time	0.053	-0.586	0.359	0.689	0.158	-0.030
frame	(0.109)	(0.964)	(0.393)	(5.822)	(0.145)	(0.080)
N	914	708	914	689	711	627
R^2	0.057	0.077	0.074	0.048	0.078	0.085
(F) Treated: May	-0.009	-0.283	0.312	0.287	-0.050	-0.005
1986	(0.092)	(0.759)	(0.321)	(4.543)	(0.118)	(0.062)
N	1,211	941	1,213	921	947	834
R^2	0.052	0.071	0.066	0.051	0.062	0.078
(G) Treated:	0.005	-0.225	0.238	-0.086	0.030	-0.036
Nov. 1985	(0.094)	(0.759)	(0.335)	(4.635)	(0.120)	(0.063)
N	1,177	939	1,179	917	945	832
R^2	0.053	0.073	0.066	0.051	0.062	0.082
(H) W/o single	-0.026	-0.395	0.284	0.605	-0.019	0.018
moms	(0.093)	(0.775)	(0.280)	(4.735)	(0.120)	(0.062)
N	1,171	912	1,173	889	918	801
R^2	0.050	0.073	0.040	0.047	0.067	0.095
(I) With relat.	-0.043	-0.744	0.407	-2.718	0.024	0.020
status	(0.202)	(1.914)	(0.802)	(11.39)	(0.291)	(0.103)
N	374	282	374	315	285	346
R^2	0.212	0.164	0.206	0.088	0.174	0.125

Notes: This table displays DiD estimates resulting from OLS regressions with averages of maternal long-term health variables after birth. Controls include, if not stated otherwise: year of birth, age at birth, German nationality, education before giving birth, whether she lives in West Germany, whether she grew up in an urban area and whether her own mother is an academic. The sample consists of mothers giving birth between 1982 to 1989, if not stated otherwise. Panel (C) to (I) contain all control variables of Panel (B). Robust standard errors are reported in parentheses. Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.
Source: Socio-Economic Panel (SOEP), version 36, SOEP, 2020, 10.5684/soep.core.v36eu. Own calculations.

Maternal subjective well-being

Table 3 displays DiD regression results for measures of maternal subjective well-being. Panels from (A) to (I) are the same as in Table 2. For all subjective well-being measures, there

is an overall positive effect of the reform; however, the coefficients are not statistically significant in rarely any case. For work satisfaction in column (2), the estimate for the specification with a shorter time frame around the reform is statistically significant on a 10%-level.

Table 3:
DiD estimation results for subjective well-being outcomes

	(1)	(2)	(3)	(4)
	Life satisfaction	Work satisfaction	Income satisfaction	Satisfaction with household activity
(A) No controls	0.063	0.169	0.201	0.245
	(0.185)	(0.225)	(0.323)	(0.223)
N	1,203	1,100	986	900
R^2	0.002	0.002	0.008	0.003
(B, main) With controls	0.158	0.247	0.288	0.243
	(0.193)	(0.239)	(0.334)	(0.233)
N	1,203	1,100	986	900
R^2	0.090	0.042	0.125	0.081
(C) With child gender	0.157	0.247	0.290	0.245
	(0.193)	(0.239)	(0.334)	(0.233)
N	1,203	1,100	986	900
R^2	0.091	0.042	0.126	0.081
(D) With child birth month	0.152	0.240	0.285	0.237
	(0.192)	(0.239)	(0.335)	(0.232)
N	1,203	1,100	986	900
R^2	0.099	0.044	0.125	0.082
(E) Short time frame	0.313	0.489*	0.219	0.423
	(0.226)	(0.290)	(0.403)	(0.277)
N	907	829	738	670
R^2	0.094	0.059	0.125	0.087
(F) Treated: May 1986	0.199	0.382	0.559*	0.434*
	(0.195)	(0.237)	(0.332)	(0.231)
N	1,203	1,200	986	900
R^2	0.092	0.045	0.127	0.084
(G) Treated: Nov. 1985	0.061	0.203	0.280	0.274
	(0.193)	(0.245)	(0.335)	(0.235)
N	1,169	1,071	983	898
R^2	0.094	0.042	0.127	0.081
(H) Without single moms	0.145	0.207	0.241	0.209
	(0.194)	(0.245)	(0.344)	(0.237)
N	1,164	1,070	947	861
R^2	0.083	0.045	0.119	0.072
(I) With relatationship status	0.158	0.575	0.184	0.083
	(0.351)	(0.473)	(0.512)	(0.452)
N	364	296	362	343
R^2	0.244	0.191	0.344	0.203

Notes: This table displays DiD estimates resulting from OLS regressions with averages of maternal long-term subjective well-being after birth. Controls include, if not stated otherwise: year of birth, age at birth, German nationality, education before giving birth, whether she lives in West Germany, whether she grew up in an urban area and whether her own mother is an academic. The sample consists of mothers giving birth between 1982 to 1989, if not stated otherwise. Panel (C) to (I) contain all control variables of Panel (B). Robust standard errors are reported in parentheses. Levels of significance: *** p<0.01, ** p<0.05, * p<0.1.
Source: Socio-Economic Panel (SOEP), version 36, SOEP, 2020, 10.5684/soep.core.v36eu. Own calculations.

When comparing this result to Figure 3, the effect is barely visible and not robust. For income satisfaction in column (3) and satisfaction with household activities in column (4), the positive reform effect when classifying mothers with children born in May 1986 or later is statistically significant on the 10%-level.[20]

To conclude this section, estimation results suggest that prolonged paid leave from six to twelve months in former East Germany had negligible effects on long-term maternal subjective well-being. However, there is a tendency for somewhat positive effects, especially in terms of satisfaction with household activity, income satisfaction, and, to a minor degree, work satisfaction. Effects are statistically significant only in exceptional cases and not robust.

One reason for the predominantly insignificant results might be the small sample size. Here, outliers might drive results to an increased extent compared to a larger sample size. As this study investigates the effects of a parental leave reform in the historic setting of the former GDR, there is no other data available for a possible increase in sample size.

8 Discussion and conclusion

This study focused on the long-term maternal health and subjective well-being effects of a paid parental leave reform in former East Germany. The reform was implemented in 1986 in the GDR and made first-time mothers eligible for a maximum of one year of paid parental leave with a 70 to 90%-wage replacement rate. The pre-reform scenario of this group of mothers was a maximum of six months of paid maternity leave (100% wage replacement). I compare first-time mothers (with an only child) to mothers of two or more children, where the latter group was eligible for one year of paid parental leave since 1976. This study exploits all available waves of the SOEP panel survey to calculate various physical and mental health variables and subjective well-being indicators. When combining available information and calculating averages, I can estimate the impact of parental leave from two years post-birth up to 37 years post-birth.

Empirical results suggest negligible long-term effects of the reform for considered health and subjective well-being variables. Finding no overall/physical or mental health effects aligns with other studies analyzing paid parental leave extensions from already generous pre-reform leave lengths (Baker and Milligan 2008a; Beuchert et al. 2016). On average, six months

[20] If I use this classification for all other variables and repeat robustness tests from Panel (C) to (I) – without Panel (F) and (G) –, results do not change for all other considered variables. Only for satisfaction with household activities, the coefficient becomes statistically significant on a 5%-level for a shorter time frame around the reform. Figure 3 shows this increase in effect significance.

of maternity leave and twelve months of parental leave yield similar results for mothers in the former GDR regarding health.

For observed subjective well-being variables, there are some hints of positive effects in terms of satisfaction with household activity, income satisfaction, and work satisfaction. However, estimates are statistically significant only in exceptional cases. This result might be because mothers in the former GDR were firmly attached to the labor market and their pre-birth jobs, so they did not benefit from a more extended leave period in terms of well-being. Maeder (2014) might confirm the results of this study. She analyzes the effects of a German reform giving higher financial incentives to stay home longer after giving birth. On the one hand, she finds an increase in short-term school/job and family satisfaction of West German mothers for German reform. On the other hand, satisfaction with the social network decreased for East German mothers.

This paper adds to the literature by showing that prolonging parental leave from already generous leave lengths yields no additional benefit for long-term maternal health and subjective well-being – at least for the average mother. Finding no average benefit might stem from the former GDR's specific situation - a high labor market attachment of women - or the study's small sample size. Furthermore, parental leave was extended from an already generous length to an even longer leave length. However, Buetikofer et al. (2021) and Chuard (2023) conclude that low-resource mothers and mothers of girls or unhealthy babies might benefit from a more extended leave period regarding their health. Thus, specific subgroups of mothers might indeed benefit from very generous parental leave schemes.

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Appendix

Table A.1:
Overview of studies on the effect of parental leave reforms on maternal health

Study	Country/year	Reform changes	Outcomes	Results
Physical and mental health				
Short term effects				
Albagli & Rau (2019)	Chile, 2011	Extension of paid parental leave (PL) from 12 to 24 weeks.	Stress, probability of being employed, wages 7 months to up to 6 years after birth.	On average, mothers extended leave by 4 weeks. Decrease in stress, increase in the probability of being employed; no effect on wages.
Baker & Milligan (2008a)	Canada, 2000	Extension of paid maternity leave (ML) from 25 to 50 weeks. Extension of job-protected PL from 18-70 to 52 weeks.	Self-reported health, depression index, post-partum depression, other post-partum problems up to 2 years after giving birth.	No statistically significant effects.
Beuchert et al. (2016)	Denmark, 2002	Prior to the reform, 24 weeks of leave with a 100% compensation rate and 52 weeks with 60% wage replacement rate for mothers. After, 46 weeks with 100% wage replacement rate.	Hospital admissions, non-birth related hospital admissions, being hospitalized with depression, receiving antidepressants 1-5 years after delivery.	On average, mothers extended leave by 32 days. Weak evidence for fewer hospital admissions in the very short run. Larger effects for low-resource mothers.
Chatterji & Markowitz (2005)	U.S., 1993	Introduction of 12 weeks of unpaid ML.	CES-D depression scale 6-24 months after childbirth, number of outpatient visits in first 6 months after childbirth.	Decrease in the frequency of depressive symptoms, no increase in cases of clinical depression. Little evidence for effects on outpatient visits.
Chatterji & Markowitz (2012)	U.S., 1993	See Chatterji & Markowitz (2005).	CES-D depression symptoms, dummy for severe depression 6-24 months after childbirth, self-reported health, drinking and smoking behavior.	Decrease in depression symptoms and severe depression. Increase in self-reported health. Increase in depression symptoms if spouse did not take leave. Mixed results on drinking and smoking.
Hewitt et al. (2017)	Australia, 2011	Prior to the reform, 12 months of unpaid PL. After, 18 weeks of paid PL with wage replacement rate at minimum wage rate.	Physical and mental health 12 months after delivery.	Small positive effects on mental and physical health.
Lee et al. (2020)	California, 2004	Prior to the reform, 12 weeks of unpaid PL. After, up to 6 weeks of paid PL (55% of weekly earnings, no job protection).	Self-reported health, mental health, overweight, obesity, alcohol consumption.	Increase in self-rated health. Decrease in psychological distress, overweight and alcohol consumption.
(Short and) long term effects				
Avendano et al. (2015)	8 EU countries, 1960-94	Many different reforms were observed.	Depression symptoms (12-item version of the Euro-D scale) in 50-year-old (or older) mothers.	Decrease in depression symptoms.

Buetikofer et al. (2021)	Norway, 1977, 6 other reforms 1987-92	Before the reform, 12 weeks of unpaid ML. After the reform, 4 months of paid PL and 12 months of unpaid PL.	Various mental and physical health dimensions of around 40-year-old mothers.	Increase in various dimensions of metabolic health, pain, self-reported mental and overall health, increase in exercise and decrease in smoking. Larger effects for first-time and low-resource mothers. Diminishing returns to leave lengths.
Chuard (2023)	Austria, 1990, 1996, 2000	Extension of parental leave from 1 to 2 years (1990), partial decrease by six months to 1.5 years (1996), and an increase to 2.5 years (2000).	Outpatient costs, medication, days of hospitalization, mental disorders, depression, antidepressant, nervous system drugs and analgetics prescriptions, diseases of circulatory system, cardiovascular drugs up to 17 years postpartum.	Hump-shaped relationship between maternal health and parental leave duration: Increase in health for short leave lengths. Decrease in mental health for very long leave lengths. Longer leave spells are more beneficial for low-SES mothers, mothers of girls, and mothers with unhealthy babies.
Guertzgen and Hank (2018)	Germany, 1979	Extension of job protected paid PL from 2 to 6 months.	Return-to-work behavior, sickness absence from work and length of illness (up to 30 years after delivery).	Delay in return-to-work behavior in the first year after delivery. Longer sickness absence from work 3-10 years after delivery.

Sources: Chuard (2023), Buetikofer et al. (2021), Lee et al. (2020), Albagli and Rau (2019), Guertzgen and Hank (2018), Hewitt et al. (2017), Beuchert et al. (2016), Avendano et al. (2015), Baker and Milligan (2008a), Chatterji and Markowitz (2005, 2012).

Table A.2:
Overview of studies on the effect of parental leave reforms on subjective well-being

Subjective well-being				
D'Addio et al. (2014)	Germany (8 reforms 1984-2008) and GB (6 reforms, 1973-2007)	Many different reforms were observed.	Life satisfaction and subjective well-being shortly before and up to 3 years after giving birth.	Increase in life satisfaction up to 6 months after delivery. Decrease in life satisfaction for leave lengths longer than 16 months. Smaller effects for Great Britain.
Maeder (2014)	Germany, 2007	Prior to the reform, 300€ for 24 months or 450€ for 12 months per child. After the reform, paid PL of 12 or 14 months (67% wage replacement rate).	Overall life satisfaction, satisfaction with school, training, job, satisfaction with friends and social network, satisfaction with family.	No overall effects. Increase in life, school/job and family satisfaction if partner's education is medium or high. Increase in school/job and family satisfaction for West German mothers. Decrease in satisfaction with social network for East German mothers.
Pezzini (2005)	12 EU countries, 1975-98	Many different reforms were observed.	Life satisfaction of mothers.	Negligible effects.

Sources: D'Addio et al. (2014), Maeder (2014), Pezzini (2005).