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Happiness: Before and After the Kids

Mikko Myrskylä and Rachel Margolis

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Happiness: Before and After the Kids[1]

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Forthcoming in *Demography*

Abstract

Understanding how having children influences the parents' subjective well-being ("happiness") has great potential to explain fertility behavior. We study parental happiness trajectories before and after the birth of a child using large British and German longitudinal data sets. We account for unobserved parental characteristics using fixed-effects models and study how sociodemographic factors modify the parental happiness trajectories. Consistent with existing work, we find that happiness increases in the years around the birth of the first child, then decreases to before-child levels. Moreover, happiness increases before birth, suggesting that the trajectories may capture not only the effect of the birth but also the broader process of childbearing which may include partnership formation and quality. Sociodemographic factors strongly modify this pattern. Those who have children at older ages or have more education have a particularly positive happiness response to a first birth, and although the first two children increase happiness, the third does not. The results are similar in Britain and Germany and suggest that up to two, children increase happiness, and mostly among those who postpone childbearing. This pattern is consistent with the fertility behavior emerging during the second demographic transition and provides new insights into low and late fertility.

Keywords: Fertility, Well-being, Life course, Parenthood

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INTRODUCTION

In the early 1990s, period fertility levels reached a new low in much of the developed world, triggering an intense policy debate about what to do about low fertility and the myriad problems it causes, such as population aging. Much of low period fertility has been due to the postponement of births (Sobotka 2004; Myrskylä, Goldstein and Cheng 2013), but another important part is a decrease in quantum driven by stopping at one or two children. Consequently, policy discussion has focused on the reasons behind postponement and why many stop at one child when most say they want two (Adema and Whiteford 2007; European Commission 2006).[2]

Research aiming to explain fertility postponement and fertility decline – either period or cohort – focuses on the rise of individualistic values and the incompatibility of family and career desires, particularly for women (Adsera 2004; Feyrer et al. 2008; Gauthier 2007; McDonald 2000; van de Kaa et al. 2003). For example, recent research documenting that women's job satisfaction decreases after a first birth provides some indirect support for the hypothesis that work-family stress contributes to low fertility (Georgellis, Lange and Tabvuma 2012). The subjective well-being of parents has received considerably less attention than these traditional explanations even though it may be an important driver of fertility behavior (Hobcraft 2006). Fertility is a choice for most people in the developed world. Once having a first child, the experience of the transition to parenthood will inform new parents' decisions about whether to have another child. This accords with psychological learning theories that predict that people avoid activities which they anticipate to negatively affect their well-being (Newman 2008; Rotter 1954). Earlier demographic research, much of it qualitative, also touched upon the potential effect of subjective parenting experiences on further parity progression (Callan 1985; Cartwright 1976; Newman 2008). For example, Presser (2001) predicted that educated working women who become mothers will be surprised by the demands of childbearing and these feelings may discourage additional births.

[2] Part of the gap between desired and actual fertility is explained by measurement, as desired fertility is a cohort concept but fertility behavior is often measured on a period basis. However, even accounting for this, a gap of .34 children remains in the European Union (Sobotka and Lutz 2011).

Beyond the individual, social learning about the parental well-being trajectories of others may influence the quantum and tempo of fertility. Social learning theory posits that observing the timing and parity of others will inform decisions about one's own fertility (Montgomery and Casterline 1996). We extend this theory by outlining how parental well-being trajectories can influence the fertility behavior of others. First, if we observe that young parents have negative well-being trajectories, but that older parents with more resources have easier transitions to parenthood, this may influence postponement of a first birth through social learning. Second, if we observe the transition to parenthood being accompanied by negative rather than positive changes in well-being, this can lead to lower fertility intentions, lower realized fertility, and also postponement if one surmises that one needs less time to have a smaller optimal number of children. Thus, one's own experiences may influence further parity progression after a first birth, and social learning from other people's subjective experiences may influence decisions to postpone childbearing until one has accumulated more resources (education, income, status) or to adjust fertility intentions downward.

In this paper we analyze how the process of childbearing is associated with parental subjective well-being using two large longitudinal data sets from Britain and Germany. We use fixed effects regression techniques which allow controlling for unobserved heterogeneity and selection into parenthood. We follow the parents up to 18 years after birth, which is markedly longer than what previous studies have done and important because the joys and challenges of parenthood depend on the age of the child. Consistent with prior literature that uses longitudinal designs (e.g., Clark et al. 2008), our results first document a temporary and transitory gain in happiness around the time of birth. Importantly, we observe that happiness increases before birth, suggesting that the happiness gain around the time of birth may capture not only the effect of the birth but also the complex childbearing process that may involve partnership formation, partnership quality, and increased sexual activity. We then analyze the patterns for different socioeconomic groups and parities and show that the changes in subjective well-being over the transition to parenthood are highly consistent with the low and late fertility behavior that has emerged during the second

demographic transition: older parents and those with more socioeconomic resources have the strongest happiness gains around the time of birth, and the temporary happiness gain around the time of birth declines with the number of children one already has. These results were similar in Britain and Germany. The fact that among the older and better educated parents, well-being increases with childbearing, but young and less educated parents have flat or even downward happiness trajectories may explain why postponing fertility has become so common. Similarly, the documented differences by parity may help explain the low quantum of fertility as we find no positive gain in subjective well-being for third births. These results provide a new way of understanding the theories of fertility decline by showing that the fertility behavior that emerged during the second demographic transition would have been to large extent predicted by the subjective well-being response of parents to childbearing.

Trajectories of Parental Well-being by Subgroups

Cross-sectional research finds mixed evidence of the association of having children with happiness (Kohler et al. 2005; McLanahan and Adams 1987; Nomaguchi and Brown 2011; Nelson et al. 2013; Aassve et al. 2009; Billari 2009) giving rise to the question why have children in the 21st century (Morgan and King 2001). One key to this paradox is the importance of life stage: young parents show higher levels of distress than non-parents (Cleary and Mechanic 1983; Lovell-Troy 1983; McLanahan and Adams 1987), but among older parents and non-parents there is no difference in well-being (Koropeckyj-Cox et al. 2007; Rempel 1985; Ross and Huber 1985), or parents have even higher levels of well-being than the childless (Margolis and Myrskyla 2011). However, when the question is how children influence parental well-being, it is important to analyze individual changes over time, instead of just comparing the parents to the childless. Otherwise the analyses may be biased by genetic factors, personality, or other unobserved or difficult-to-measure fixed characteristics such as orientation towards career versus family which may be associated with both fertility behavior and subjective well-being (Alvergne et al. 2010; de Neve 2011; Rogers et al. 2001).

Several recent studies on childbearing and happiness have used longitudinal data to analyze an individual's well-being over time, overcoming much of the selection problems that are present in cross-sectional work, for example, potential selection to parenthood by previous level of subjective well-being (Angeles 2010; Baranowska and Matysiak 2011; Clark et al. 2008; Clark and Georgellis 2013; Frijters et al. 2011). Clark and colleagues (2008) analyzed the pattern in happiness before and after major life events, one of which was the birth of a child using the German Socioeconomic Panel and find that within a ten-year window with the birth of a child in the middle, the happiness of both men and women tends to increase before and up to a birth, and then decreases to the pre-birth levels. Frijters et al. (2011) analyzed Australian data and also found that although happiness increases around birth, it returns to the baseline level in a few years. Clark and Georgellis (2013) and Angeles (2010) used the British Household Panel Survey to analyze whether the happiness of new parents adapts to their new circumstances. Each of these studies focuses on short-term adaptation, and does not consider long-run trajectories or differences by birth order or SES. We build on these existing studies by examining how the happiness trajectory of parents varies by age at parenthood, socioeconomic status measured by education, gender, parity, marital status and context.

Age at first birth and education. Our hypotheses about age are based on quantitative and qualitative studies which suggest that women with more socioeconomic resources have less steep post-birth dips in life satisfaction than those with fewer resources. For example, parents with less education and income have higher rates of post-birth depression (Avison and Davies 2005; O'Hara 2009). Increasing educational and job opportunities for women have in part led to the postponement of childbirth. Research on older mothers suggests that women who postpone childbearing are more "ready" and less stressed by having children (Gregory 2007), possibly because older mothers have more social capital and higher status at work allowing greater financial flexibility and options for childcare, all easing the transition to parenthood. Because it is not clear whether being "ready" is captured by chronological age or socioeconomic resources (education), we analyze both.

However, not all evidence points to higher socioeconomic resources (SES) being associated with more positive well-being trajectories for parents. The stress about "perfect" mothering may have negative effects on high SES mothers' well-being (MacDonald 2011). Moreover, those with low SES may have different expectations for how childbearing affects the lives of parents (Edin and Kefalas 2005; Nomaguchi and Brown 2011) or may have larger kin networks, though they do not necessarily turn into more instrumental support (Harknett and Knab 2007). Higher pre-birth education and income may also imply higher opportunity costs to childbearing.

Gender. Some evidence suggests that post-birth dips in life satisfaction will be stronger for women than men (Clark et al. 2008). This accords with much research in sociology, which documents that women are more socially isolated after childbirth as they more often take leave from the labor force and act as the primary caregiver, particularly when the child is young (Della Giusta et al. 2011; Simon 1992). Part of the stronger dip may also be due to a larger anticipation effect.

Parity. Much prior research averages the happiness response of parents to the birth of a child over all parities, or alternatively focuses only on first births (Clark et al. 2008; Clark and Georgellis 2013; Frijters et al. 2011). Kohler et al. (2005) is an exception and they find that first births have a positive effect on parental happiness, but higher order births do not. Although parity may be an important determinant of the effect of a birth on happiness, it is ambiguous how it changes with parity. If a birth is a positive life event, the happiness response to having a child may be strongest when the event is first experienced. Moreover, higher parity births might increase happiness less than the first birth because of resource dilution. However, parents who already have children may be more confident in their skills and are better able to cope with children, which would predict that parents' happiness response is more positive for higher order births.

Marital Status and Context. Parenthood may be more stressful for unmarried than married persons since they may not have anyone sharing childcare duties (Davies et al. 1997). These differences may be moderated by the welfare state. To analyze how parental well-being depends on the level of support for single parents, we compare Britain and Germany, countries which both have

a high mean age at birth, 30 years in 2008 (OECD 2011) and which both offer support for single parents, but which exhibit differences in the overall context of childbearing. Britain is characterized by higher rates of non-marital childbearing, a more dynamic labor market, limited support for parents with children, a predominantly private childcare system, and higher rates of working mothers.[3] Although direct public support for parents was relatively low in Germany until 2007, total public spending has been higher and the tax code more favorable for parents in Germany than in Britain (Thevenon 2011). The differences in out-of-wedlock childbearing and public support to parents may result in greater differences in parental well-being by marital status in Britain than in Germany.

Mediators of Parental Happiness. When people have children, many aspects of their lives are changing. Before children, people are finding a partner, making commitments and plans, and anticipating a future together. After children, couples are excited by the joys of the baby, but also experience changes in labor force participation, income, health, leisure time, and marital quality. These are all linked to parental well-being. Cross-sectional research cannot capture the effects of these mediating factors of fertility on happiness. Longitudinal research has not considered these factors, or has presented only results based on models which control for these factors (Clark et al. 2008), making it impossible to analyze their mediating role. We use longitudinal data to analyze to what extent such mediators explain the impact of childbearing on parental happiness.

DATA

We use the German Socio-Economic Panel (SOEP) and the British Household Panel Survey (BHPS). The SOEP is a representative longitudinal study of households including Germans living in the Old (West) and New (East) German states, foreigners, and recent immigrants to Germany (Wagner et al. 2007). The SOEP started in 1984, with the New German states added in 1991. The BHPS is an annual survey consisting of a nationally representative sample of households that started in 1991. These data sets have three key advantages for this research. First, the SOEP and the BHPS are the

[3] Perelli-Harris et al. (2009) report that 18% of first births in the UK in 1995-2005 were to single women; in West Germany and among women born in 1971-1973, who were in their prime childbearing years at ages 22-34 in 1995-2005, 11% of first births were to single women. In 2008, 32% of German mothers with children under 3 years were working, whereas in the UK the corresponding proportion was 52% (OECD 2012)

world's longest panel data sets which allow examining life satisfaction before and after births. Second, the samples are large, allowing for stratified analyses. Third, the data include information on potentially important mediators such as health, marital status, income, and labor force participation.

We focus on those who became parents during the observation window (SOEP: 1984-2009, BHPS: 1991-2008), excluding those who had children before entering the surveys and those who were childless at the end of our follow-up. The resulting sample sizes are 4,903 (SOEP) and 3,225 (BHPS). After exclusions due to missing data, our German sample consists of 4,513 people who had in total 7,602 births over an average follow-up of 12.2 years. The British sample consists of 2,689 people who experienced 4,520 births over an average follow-up of 10.2 years.

Key Measures

Our key outcome is the subjective well-being of parents. In the German sample, respondents were asked annually, "How satisfied are you with your life, all things considered?" Responses range from zero (completely dissatisfied) to ten (completely satisfied). In the British sample, parental well-being is measured with two questions. The first measures general happiness with the question "Have you recently been feeling reasonably happy, all things considered?", response range from one (much less happy than usual) to four (more happy than usual). The other question is "How dissatisfied or satisfied are you with your life overall," with answers ranging from one (not satisfied at all) to seven (completely satisfied). The latter life satisfaction question is closer to the one used in SOEP, but is asked only in waves 1996-2000 and 2002-2008. The general happiness question is included in all the BHPS waves. We experimented with both measures and like Clark and Georgellis (2013), found that our results were very similar independent of the measure, the key difference being the loss in statistical power for the sporadically measured life satisfaction. Therefore we use the general happiness measure in BHPS.[4] We rescale this variable to range from zero to ten, the same range as in the SOEP well-being measure, to allow comparison of the magnitude across the two data sets.[5]

[4] The differences in the questions provide external validity. Research on happiness has been criticized for being sensitive to measurement, but we find our results to be robust to the way the life satisfaction question is framed.
[5] After this transformation the distributional characteristics are similar. The median, mean, and standard deviation of well-being in the SOEP (BHPS) are 7.0 (6.7), 7.1 (6.8) and 1.7 (1.9).

Other Variables

We coded variables in the same manner to facilitate parallel analysis for both data sets. In both surveys age (years) is recorded at each wave. In SOEP, information on births comes from the birth biography data which records the sum, birth year and sex of the biological children of the respondents. From the changes in the number of children we infer whether the child was born before or after a given interview. Step-children or adopted children are not observed. In BHPS, we obtain the corresponding information on biological children from questions recording the births of biological children. Marital status is time-varying and categorized to married/living with a spouse, divorced/separated, single, or other. Income is measured at the household level and is pre-tax income in inflation-corrected Euros or Pounds. In the German data, education is measured in years. In the British data, education is measured with six categories: university, some college, other training establishment, polytechnic education, nursing school or similar, or other. Health is measured by self-rated health with five categories. Labor force status is measured with five categories: working, unemployed, maternity leave or similar, in school, or other. Each of these variables is time-varying, with the exception of education which is fixed in the BHPS data.

EMPIRICAL APPROACH

We use longitudinal fixed effects (FE) linear regression models to examine changes in life satisfaction over the transition to parenthood. We assume the cardinality of life satisfaction because treating life satisfaction as ordinal versus cardinal makes little difference (Ferrer-i-Carbonell and Frijters 2004). Our modeling approach, which follows Clark et al. (2008) with some modifications,[6] allows observing anticipation, short-term (1-4 years), and long-term (5-18 years) changes in happiness over the transition to parenthood while controlling for time-invariant unobserved characteristics such as personality or genetic endowments. Life satisfaction is modeled as a function of time to or after a birth with the regression equation

$$H_{it} = \alpha_i + B_{it}^{2-3} + B_{it}^{1} + C_{it} + A_{it}^{1-2} + A_{it}^{3-4} + A_{it}^{5-9} + A_{it}^{10-18} + \boldsymbol{\beta}'\mathbf{age}_{it} + T_t + \boldsymbol{\theta}'\mathbf{x}_{it} + \varepsilon_{it}$$

[6] Clark et al. (2008) estimate two equations, one for the happiness trajectory before the event, another for after the event. A resulting problem is two baselines. We circumvent this problem by combining the equations.

where H_{it} is life satisfaction for individual i at time t, α_i is the individual fixed effect; B^{2-3} and B^1 are indicators capturing the deviation in happiness from the baseline 2-3 and 1 year (*B*) before a child is born; *C* and A^k capture the corresponding deviation in happiness in the interview following the birth of the (*C*) child and k years (*A*) after the birth[7]; age is controlled with single-age dummies[8]; T captures year-specific effects (for example, unification of Germany)[9]; and $\mathbf{x}_{it}$ is a vector for other time-varying covariates (health, education, income, marital status, labor force status, birth of additional children). We include respondents in the regressions 5 years before birth so the baseline to which the coefficients *B, C, A* are compared to is happiness is 4-5 years before the birth of a child.

We apply the above model to full SOEP and BHPS data sets without the time-varying covariates $\mathbf{x}_{it}$ to establish the general pattern of happiness before and after the first child is born and compare the model to an ordinary least squares (OLS) model to analyze the importance of unobserved factors; the OLS specification controls for gender, marital and labor force status, health, age at first birth, income and education at the time of birth (Table 2). We estimate the model for sub-populations stratified by sex (Fig. 1), age at first birth (Fig. 2), marital status (Fig. 3), education (Fig. 4), and parity (Fig. 5). We estimate the model with time-varying controls to shed light on the mediating mechanisms (Fig. 6). We test whether the coefficients differ by sub-groups by estimating full-sample models that include full interactions for the sub-group variables.

An important feature of our analysis is that we focus on the happiness trajectories *among those who experienced a first birth during the observation period.* This approach is limited in that we do not compare happiness of parents to those who never had a child. Such comparisons, which are plentiful in the literature, suffer from the potential bias caused by unobserved confounders.[10]

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[7] In BHPS post-birth follow-up ends in 15 years so in the BHPS analysis we replace A^{10-18} with A^{10-15}.
[8] We also considered linear, quadratic, and cubic age specifications. The results did not change.
[9] We avoid the age-period-cohort identification problem by combining three time periods for which descriptive statistics suggested no differences. Alternative ways to identify the model (e.g., using quadratic age) did not influence the results.
[10] Kohler et al. (2005) analyzed fertility and happiness among twins to get at the causal relationship. This avoids many problems present in standard OLS approaches, though even here unobserved life events may have shaped the twins so that they differ from each other in ways that influence both fertility and subjective well-being; this could bias the results.

RESULTS

Respondents are born between 1934 and 1990 in the German data and 1945 and 1991 in the British data (Table 1). Average age at entry is 25.2 in Germany, and 26.1 in Britain, with average follow-ups 12.2 and 10.2 years, respectively. On average, respondents have 1.7 children during the data collection period. The total number of observed births is 7,602 in Germany, of which 4,513 are first, 2,268 second and 536 third births. In the British data there are 4,520 births; 2,689 first, 1,377 second and 295 third births. In the German sample three quarters of new parents are married/living with a spouse, and in Britain the figure is 90%.[11] Most new fathers are employed in the interview following the first birth (90% in Germany, 88% in Britain), while the majority of mothers are on a maternity or comparable leave (51% in Germany, 55% in Britain). At first interview, parents' levels of life satisfaction are 7.5 in in the German and 7.0 in the British data (scale 0-10). At first birth, life satisfaction is marginally higher, decreasing again by the last interview.

TABLE 1

The Happiness Trajectory of Parents

Overall trajectories. Table 2 shows the results of the FE regression model without time-varying controls except for age and period, and the results from a comparable OLS model that also controls for gender, marital and labor force status, health, age at first birth, income and education observed at the time of birth; modeling these as time-varying would not change the results. We also estimate the FE model for the British data using two happiness measures, general happiness and life satisfaction.

The OLS specification suggests that happiness increases significantly one year before the birth, stays at an elevated level in the year of birth, then quickly returns to pre-birth levels. Happiness stays at this level from when the first child is young through when the child reaches adult ages. The coefficients for the control variables are in the expected direction: good health, working, high income and education are associated with increased happiness. Age at first birth also shows a positive

[11] Excluding cohabiters would decrease the proportion in the British data below that observed in the German data. However, the regression results for partnership status (Figure 4) are not sensitive to whether cohabiters are combined with the married.

gradient with happiness. The FE results are qualitatively consistent with those obtained with the OLS model and similar in Germany and Britain as well as across the two happiness measures available in the BHPS. The main difference between the OLS and the FE models is that the happiness increase in the years preceding birth and in the year of birth is somewhat stronger in the FE specification, and the decrease in post-birth decline is not quite as strong in the FE specification. In the FE model for the German data we also observe an increase in happiness 2-3 years before the birth. Such anticipation effects are not surprising because the process of childbearing from planning to birth may take years. For example, only about 50% of couples who are trying to conceive become pregnant within 3 months, but many wait much longer (Jensen et al. 2005).

Although the overall FE versus OLS differences are not large, they still suggest that the FE model captures unobserved confounders that are not included in the OLS model. Therefore in the following we report only FE results.

TABLE 2 AND FIGURE 1

Sex differences. Figure 1 shows two differences in happiness trajectories for women and men. In both Britain and Germany, women gain more in happiness in expectation (differences statistically significant in both data sets with $p<.10$) and right after the birth of a child ($p<.05$ in both data sets). Women also have steeper drops between the year of the birth and the year afterward, possibly because of a larger initial gain. In the long-run, there are no differences between men and women.

Age at First Birth. Figure 2 shows the happiness trajectories for young (18-22 years), adult (23-34), and mature (35 and older) parents.[12] The youngest category includes those at the cusp of adulthood. The adult category includes ages at which people have often completed their education and are starting careers. The mature parent group includes ages at which people typically have stabilized their socioeconomic position, but also ages at which risks to healthy childbearing start to increase, particularly for women (Heffner 2004).

[12] Parents aged 17 or less are excluded because (i) teenage childbearing is a different process than having children at young adult ages; (ii) our samples include very few people who had children before turning 18; (iii) it is difficult to construct a meaningful pre-birth baseline happiness for teen parents.

Young parents have a predominantly declining pattern of happiness which does not increase above the baseline even during the year of birth. Those who become parents at ages 23-34 have increasing happiness before a first birth and in the year of birth, but 1-2 years afterwards happiness decreases to the baseline or below. Mature parents (ages 35-49) have increasing happiness before and during the birth year, and then after a small drop, happiness remains at or above baseline. A test for whether the coefficients for 3-4, 5-9 and 10-18 years after birth are all zero suggests increased long-run happiness ($p<.05$) in Germany and a borderline significant result ($p<.10$) in Britain.

FIGURES 2 AND 3

Marital Status. Figure 3 charts parental happiness trajectories by marital status at birth. Among both the partnered and un-partnered, happiness increases around the birth, then decreases to pre-birth levels. The differences by partnership status are small in Germany where the only difference is that the partnered are happier than un-partnered in the year before the birth ($p<.01$). In Britain partnered parents have larger increases in happiness in the year the child is born, and have upward happiness trajectories as their children grow up. Un-partnered British experience smaller increases in happiness around the birth and do not experience long-run increases in happiness post-birth. The differences are not significant ($p>.05$) for any single time point, but are significant over the course of parenthood (joint test for the difference in coefficients from 1-2 years to 10-15 years after birth, $p<.05$).

Next, we analyze parental happiness trajectories by education and parity and consider the role of mediating factors. The results are very similar between the German and British data; therefore we present the results only for the larger German data.

Educational Attainment. Figure 4 plots the trajectory by educational attainment, with "high education" measured by 12 or more years of schooling. Men with high education gain more happiness from a first birth than their less educated peers in expectation, after birth, and in the long-run. These education differences are significant ($p<.05$) or marginally significant ($p<.10$) at every measurement point until 9 years after birth. For women there are no differences by education.

FIGURES 4, 5, AND 6 ABOUT HERE

Parity. To this point, we have focused on a first birth. Figure 5 plots the parental well-being trajectories with respect to the first, second, and third births with the German data. The regressions are stratified by parity so parents are in multiple regression equations if they had more than one birth. We control for the influence of previous births; without these the baseline level estimated as 4-5 years before the birth (separately for each parity) would be influenced by the previous births.

For first births, parents' happiness trajectories increase sharply before and around the birth and then settle close to pre-birth levels – this is the same result shown earlier in Table 2. For second births, the overall trajectory is similar, but the increase in happiness before and around the birth is lower than for first births ($p<.05$). For third births, the pattern is qualitatively different as there are no positive effects around the birth and the long-term trajectory is declining, but the differences to second or first births are not significant.

Mediating Factors. Figure 6 plots the happiness trajectories estimated with no time-varying controls other than age and period (Controls I); with time-varying health, income, labor force status, and marital status (Controls II); and with additional controls for the births of 2^{nd} and 3^{rd} births using indicators for the year before and the year of birth (Controls III). For both men and women, the happiness trajectories surrounding a first birth are very similar, and the differences are statistically not significant, across these models. The period when the controls make the most difference is the time just before and after the birth. This may be because the changes in marital status are picking up the happiness of partnering, planning a future together, and anticipation of childbearing. These results suggest that the influence of childbearing on happiness is not strongly mediated by changes in income, health, marital or labor force status.

Sensitivity Analysis

First, we estimated the key results using a conditional fixed effects logit (instead of linear) model with various alternative categorizations to check if our results were influenced by the cardinality assumption of the happiness measures. Second, we stratified the analysis by final parity (1, 2, or 3 or more children) at age 40, excluding those for whom the follow-up ended earlier. Third, we studied

whether the happiness trajectories with respect to the second and third children depend on birth spacing by stratifying by the length of the birth interval. Fourth, we tested whether including those who do not have children during the observation window would influence our results. Fifth, we re-estimated all the German results excluding the former East Germany. Sixth, we tested whether our results for sub-groups would change if time-varying health, income, labor force status, and marital status were controlled for. Finally, we allowed the error term to be autocorrelated (AR(1)), which corrects for biased confidence intervals if there is autocorrelation net of the covariates. The results of each of these sensitivity checks were similar to those presented here.

DISCUSSION

In a context where fertility is a choice for most people, trajectories of subjective well-being around the transition to parenthood may be an important driver of low fertility. In this paper, we replicate the overall happiness trajectory surrounding the birth of a child, which had been highlighted by others (Angeles 2010; Clark and Georgellis 2013; Clark et al. 2008; Frijters et al. 2011) and make several innovations that are important for explaining why subjective well-being is central to understanding low and late fertility. First, we document how the happiness trajectory of parents differs greatly by age at parenthood, socioeconomic status, gender, parity, marital status, and context. Second, we examine long-run changes in happiness following a birth up to 18 years, which is important because the joys and challenges of parenthood depend on the age of the child. Last, we find that the happiness trajectory over the transition to parenthood is not explained by observed factors that are also changing over the period when a first child is born (getting married, leaving the labor force, etc).

The experience of having a first child may affect new parents' decisions about whether or not to have another child. This is basic learning theory in psychology – people will avoid activities which will harm their well-being (Rotter 1954). This theoretical framework is useful for demographers in understanding how the subjective experience of the transition to parenthood can affect parity progression (Callan 1985; Cartwright 1976; Newman 2008; Presser 2001). We find that the happiness gain around the time of childbirth attenuates with parity, being strongest for the first,

lower for the second, and non-positive for the third child. Perhaps the positive response to a birth is strongest when the experience is new, or higher-order births have a weaker impact because they are less likely to be planned (Hayford and Guzzo 2010). Independent of the mechanism, these results accord with qualitative work suggesting that the balance of negative and positive experiences is important when deciding to have an additional child (Newman 2008), and help explain why most people have one or two children, even when the net economic costs to parents are substantial. That parents experience increases in well-being for the first two children but not the third, may explain why so few go on to have a third. Decreasing gains in subjective well-being at higher birth orders may inhibit people moving to parity three.

Not only one's own experience of the transition to parenthood, but also perceiving the well-being of others before and after having children may affect the tempo and quantum of fertility. In addition to the type of social learning about the optimal timing and number of children to have (Montgomery and Casterline 1996), fertility decisions may be affected by observing the subjective experiences of others. We find divergent parental well-being trajectories by age at first birth and socioeconomic status. Those who become parents at young ages have a downward happiness trajectory, while those who become parents at older ages and men with more resources have more positive short- and long-term responses to a birth. Older parents may be more "ready" for parenthood, or may have been anticipating it more intently (Gregory 2007). Socioeconomic resources may be particularly important for men because they take more responsibility of the economic and financial well-being of the household than women. If people see young parents with few resources having a difficult time and others with many resources having an easier time, this may send a message to postpone childbearing. Even if intentions are high, postponement may contribute to lower quantum due to declining fecundity. Thus, perceptions of new parents' experiences can serve to influence others to postpone childbearing until they have accumulated more resources (education, income, status), or to adjust fertility intentions downward.

The divergent trends in the happiness response to a birth by age at first birth and socioeconomic status shed new light on the set point theory of happiness, which posits that after short-term fluctuations due to life events, happiness converges back to the initial level (Brickman and Campbell 1971; Larsen 2000; Lykken and Tellegren 1996). When averaged over the whole population, parental happiness trajectories return to pre-birth levels, consistent with set point theory. However, we find that not all subgroups converge back to their baseline levels. The birth of a child has long-term negative consequences for young parents but positive consequences for older parents. Although set point theory might hold on average, there is important heterogeneity in the long-term happiness response to having a child. The fact that age at first birth has been rising consistently in the latter half of the 20th century may be because high status people serve as a vanguard group. This may point to future postponement among all social groups. However, although postponement may increase the payoff from childbearing, it also increases the risk of involuntary childlessness. The positive well-being trajectory estimated here was *conditional on having a child.* We do not observe the trajectories of those that postponed too long to have a child.

Our results on the association between age at first birth and subjective well-being cover the period 1984-2009 which largely corresponds to the era of fertility postponement. However, our results should not be interpreted as showing that subjective well-being is the driving force of fertility postponement. It is possible that before fertility postponement became common, older-age parenthood was associated with a different happiness response. In addition, we do not argue that subjective well-being was the main driver of fertility decline, because it is likely that subjective experience became an important determinant of fertility during or after the second demographic transition with the rise of individualistic values. Moreover, throughout the period we study (1984-2009 in Germany, 1991-2008 in England) fertility has been relatively low and stable, making it difficult to analyze the contribution of subjective well-being to fertility behavior relative to other factors. Rather, our results provide a new way of understanding theories of fertility decline by

showing that the fertility behavior that emerged during the second demographic transition would have been to large extent predicted by the subjective well-being response of parents to childbearing.

Our results were largely similar in Britain and Germany. The main difference was that German parents had similar happiness trajectories, whether partnered or un-partnered but in Britain, partnered parents experienced larger increases in happiness in response to a birth than the un-partnered. These differences may reflect differences in the social stigma related to out-of-wedlock childbearing and single parenthood. Both carry a stigma in western parts of Germany, but out-of-wedlock childbearing is also relatively rare in these regions. In contrast, out-of-wedlock childbearing is relatively common in eastern parts of Germany, and socially more acceptable (Konietzka and Kreyenfeld 2002). This may diminish the differences in the well-being trajectories in Germany between the partnered and un-partnered, when compared to the difference in Britain. Differences in the tax and family policies available for lone parents may also contribute to the country differences. In Britain there is a clear dichotomy between means-tested out-of-work benefits and in-work support provided through tax credits, while Germany relies more on the traditional means-tested social assistance (Blundell et al. 2009). The resulting differences in poverty are not small as 40-46% of lone mothers in Britain are poor, compared with only 27-30% in Germany (Ruspini 2009). Social norms and social policy may play some role in shaping parental well-being trajectories, but overall the individual sociodemographic characteristics are more important than context.

The happiness trajectories of parents were quite similar in the pooled cross-sectional OLS regressions and the fixed effects regressions. This suggests that in the populations analyzed there is relatively little selection that is not accounted for by our control variables. It is possible that this applies also to other cross-sectional research on subjective well-being and fertility. However, the extent of bias resulting from cross-sectional analysis likely depends on the set of control variables that are available and used, and the context. One cannot infer from our results that the set of control variables used in our regressions would effectively control for selection in some other context.

Our findings open new research questions. First, the mechanisms through which children influence well-being are not well understood and could include both biological and social responses. These might explain why women anticipate a first birth more than men, with stronger happiness increases prior to and around the birth, and a larger drop afterwards. A potentially important physiological factor may be the increased levels of the hormone oxytocin during pregnancy and after birth (Ryan and Deci 2001). Among the possible social mechanisms is the fact that women's typical role as the primary caregiver exposes them to higher risk of sleep-deprivation and social isolation (Della Giusta et al. 2011; Simon 1992). Qualitative information on work-family conflict, planning status of births, and instrumental support would be useful to further our understanding of the social mechanisms. Second, social norms about childbearing have relaxed markedly over the study period and when and how many children to have may be more of a decision than before. Future research could consider whether this has changed the well-being implications of having children. Third, we mapped happiness trajectories for those that become parents; the remaining question is how these trajectories compare to those who are voluntarily or involuntarily childless. Last, how changes in parental well-being affect *children's* well-being is an open question.

Our study has limitations. First, although our fixed effects approach is robust to attrition that varies only across individuals but not within, time-varying attrition risk that is correlated with childbearing could influence our results. We compared the 3-year stay-in-sample probability following a birth (four consecutive waves) to the same probability among those who do not experience a birth within the observation window. The probabilities were not dramatically different from each other (87.8% vs. 90.7%), suggesting that time-varying attrition is not a large source of bias. Other individual-level factors that vary over time and influence both the likelihood of becoming a parent and happiness could also influence our results, for example relationship quality. We controlled for all the relevant time-varying factors for which we had data, for example, for partnership status, which is not relationship quality but includes whether there is any cohabiting or marital relationship. Nevertheless it is possible that unobservables, for example better measures of

partnership quality, could influence both fertility and subjective well-being. Future work, possibly using instrumental variables, could potentially circumvent the problem of such unobservables.[13]

Second, we did not have information on miscarriages or stillbirths. An unknown fraction of the live births we observe are preceded by miscarriages and stillbirths, and this fraction is likely to increase with age. Because miscarriages or stillbirths are also likely to be associated with decreased well-being at baseline, the fact that we do not observe these may explain part of the strong happiness response that we observe for older parents.

Third, we did not have information on adoptions. The process of becoming a parent biologically versus through adoption is very different, and the first years of parenthood may be different for biological and adoptive parents because adopted children often are not babies. Future work could analyze whether this results in different parental well-being trajectories.

In today's developed countries, where having a child is a conscious choice, trajectories of subjective well-being around the transition to parenthood may be an important driver of low and late fertility. The way in which the process of having a child influences parental happiness depends on the individual characteristics of parents and number of previous children. Our results suggest that those who gain from childbearing most are those who have 1-2 children at an older age after acquiring educational and financial resources. This is consistent with the fertility behavior that emerged during the second demographic transition in developed countries. If social learning about the higher well-being trajectories of older and higher status parents affects the timing and quantum behavior, then we can expect that subjective well-being will continue to be a driver of the timing and level of fertility in modern societies.

[13] As recommended by a reviewer, we considered instrumental variables regressions. We first used the birth of twins as an instrument for having two children. Results for twins were not statistically different from zero. The 95% confidence intervals overlapped also with the happiness trajectories observed for the first and second birth. We then used sex distribution of children as an instrument for having additional children. Having a boy versus girl did not predict parity progression, but having the first two children same sex increases the likelihood of a third child. Regressions in which the birth of a third child was instrumented with the sex distribution of the first two children were also statistically indistinguishable from zero and from the non-instrumented happiness trajectory for the third child. In our data, the commonly used instruments of sex distribution and multiple births had too little statistical power to establish any results. Data on miscarriages, another possible instrument, were not available.

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Table 1. Sample characteristics of persons who experienced a first birth during the observation period. SOEP: German Socio-Economic Panel 1984-2009; BHPS: British Household Panel Survey 1991-2008.

	SOEP			**BHPS**		
	Total	Men	Women	Total	Men	Women
Number of respondents (%)	4,513	1,927 (43%)	2,586 (57%)	2,689	1,310 (49%)	1,379 (51%)
Year of birth, Mean (SD)	1969 (7.7)	1967 (8.0)	1970 (7.4)	1971 (7.5)	1969 (7.3)	1972 (7.5)
Range (min, max)	1934, 1990	1934, 1990	1936, 1989	1945, 1991	1945, 1990	1950, 1991
Age at entry, Mean (SD)	25.2 (5.4)	27.0 (5.6)	23.8 (4.9)	26.1 (5.8)	27.5 (5.7)	24.7 (5.5)
Range (min, max)	15, 55	16, 55	15, 47	15, 52	16, 52	15, 41
Age at first birth, %						
<23	14.4	6.4	20.9	14.3	8.7	19.5
23-34	74.3	75.3	73.6	68.1	68.4	67.8
35-49	11.2	18.3	5.5	17.6	22.9	12.7
Years of follow-up						
Mean (SD)	12.2 (6.1)	12.8 (6.1)	11.7 (6.0)	10.2 (5.0)	10.0 (4.9)	10.3(5.0)
Range (min, max)	4, 24	4, 24	4, 24	4, 18	4, 18	4, 18
# children, mean (SD)	1.68 (0.70)	1.69 (0.70)	1.67 (0.70)	1.70 (0.69)	1.68 (0.68)	1.71 (0.69)
Births observed						
Total	7602	3268	4334	4520	2177	2343
1st births	4513	1927	2586	2689	1310	1379
2nd births	2268	991	1277	1377	659	718
3rd births	536	230	306	295	134	161
4th and higher order	285	120	165	159	74	85
Characteristics at the birth of the 1st child						
Married or living with a spouse, %	75.4%	77.9%	73.5%	91.9%	96.5%	87.6%
Health, mean (SD)[a]	2.09 (0.79)	2.11 (0.80)	2.08 (0.78)	2.00 (0.86)	1.93 (0.83)	2.07(0.88)
Income/1000, mean (SD)[b]	38.8 (28.4)	40.6 (26.9)	37.5 (29.4)	30.3 (19.8)	30.3 (19.6)	30.2 (20.0)
Labor Force Status						
Employed	48%	90%	17%	62%	88%	37%
Unemployed	4%	5%	3%	7%	9%	5%
Maternity leave	30%	1%	51%	28%	1%	55%
Other outside labor force	18%	3%	28%	3%	3%	3%
Education, SOEP: years, BHP: Proportion with some college or university	12.1	12.2	12.0	57%	54%	60%
Happiness, mean (SD) [c]						
First interview	7.47 (1.70)	7.44 (1.64)	7.50 (1.75)	6.99 (1.88)	7.08 (1.72)	6.91 (2.02)
At birth of 1st child	7.56 (1.60)	7.47 (1.57)	7.62 (1.63)	7.21 (2.09)	7.19 (1.91)	7.24 (2.26)
Last interview	6.95 (1.70)	6.90 (1.69)	7.00 (1.72)	6.60 (1.91)	6.67 (1.73)	6.54 (2.06)

a. Measured on a scale from 1 (Excellent) to 5 (Poor)
b. SOEP: Income is measured at the household level and refers to pre-tax income in inflation-corrected Euro. BHPS: Income is measured at the household level and refers to pre-tax income in inflation-corrected Pounds.
c. Life satisfaction in SOEP, general happiness in BHPS; scale in both from 0 (Poor) to 10 (Excellent)

Table 2. Happiness trajectory of parents before and after the birth of the first child. Ordinary least squares (OLS) and fixed-effects (FE) regressions. SOEP=German Socioeconomic Panel, N = 4,513 and 54,976 person years; BHPS = British Household Panel Survey, N = 2,689 and 27,307 person years.

	SOEP		**BHPS**		
	OLS	FE	OLS, gen. happiness[a]	FE, gen. happiness[a]	FE, life satisfaction[b]
Time to/after the birth (ref: 4-5 years before)					
2-3 years before	0.07	0.08*	-0.03	0.01	0.05
1 year before	0.26***	0.30***	0.33**	0.40***	0.42***
1st child born	0.27***	0.32***	0.38**	0.47***	0.39***
1-2 years after	0.00	0.05	-0.08	0.01	0.07
3-4 years after	-0.04	0.03	-0.05	0.04	0.06
5-9 years after	-0.05	0.02	-0.03	0.15	0.13
10-15/18 years after[d]	-0.07[t]	0.02	-0.07	0.13	0.21
Female	0.11**		0.03		
Marital status (ref: married)					
Single	-0.06[t]		0.01		
Divorced/Separated	-0.14		0.05		
Other (e.g. widowed, unknown)	-0.42		-0.48*		
Labor force status (ref: working)					
Unemployed	-0.26**		-0.19***		
Maternity leave or similar	-0.18**		-0.09*		
In education	0.00		-0.13*		
Other (e.g. housewife, retired)	-0.15*		0.08		
Health (ref: Very good/Excellent)					
Good	-0.29***		-0.13***		
Satisfactory	-0.82***		-0.36***		
Poor	-1.16***		-0.78***		
Bad	-1.22***		-1.15***		
Log of household income	0.07***		0.02		
Age at first birth (ref: < 20)					
20-24	0.11		0.16*		
25-29	0.19[t]		0.29**		
30-34	0.36*		0.33**		
35-39	0.30[t]		0.34*		
40-44	0.61**		0.44*		
45+	0.67*		0.71*		
Number of Years of Education [c]	0.05***				
Education (ref: some college) [c]					
University			0.17		
Other training establishment			0.07		
Polytechnic			-0.01		
Nursing school or similar			-0.05		
Other			0.05		
Age controls (single year dummies)	YES	YES	YES	YES	YES
Year controls (single year dummies)	YES	YES	YES	YES	YES
Constant	3.58***	6.29***	6.86***	11.02***	8.10***
Observations	54,976	54,976	27,307	27,307	21,395
R-squared	0.070	0.455	0.029	0.261	0.532
Number of persons	4,513	4,513	2,689	2,689	2,672

[t] p<.10, * p<.05, ** p<.01, *** p<.001

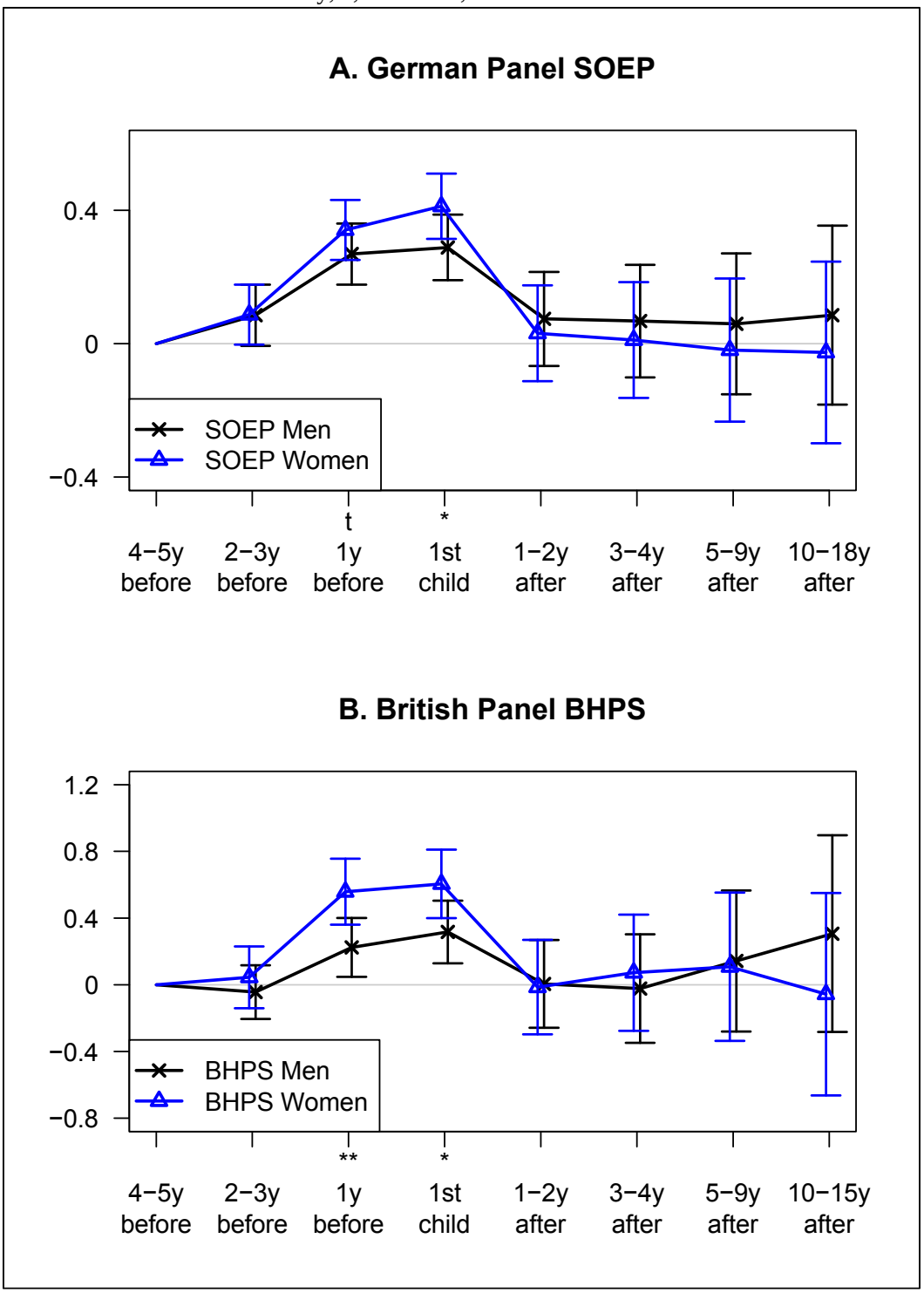
a. General happiness as the dependent variable. See Data section for more details.

b. Life satisfaction as the dependent variable. See Data section for more details

c. Education measured differently in the two data sets, see Data section for more details.

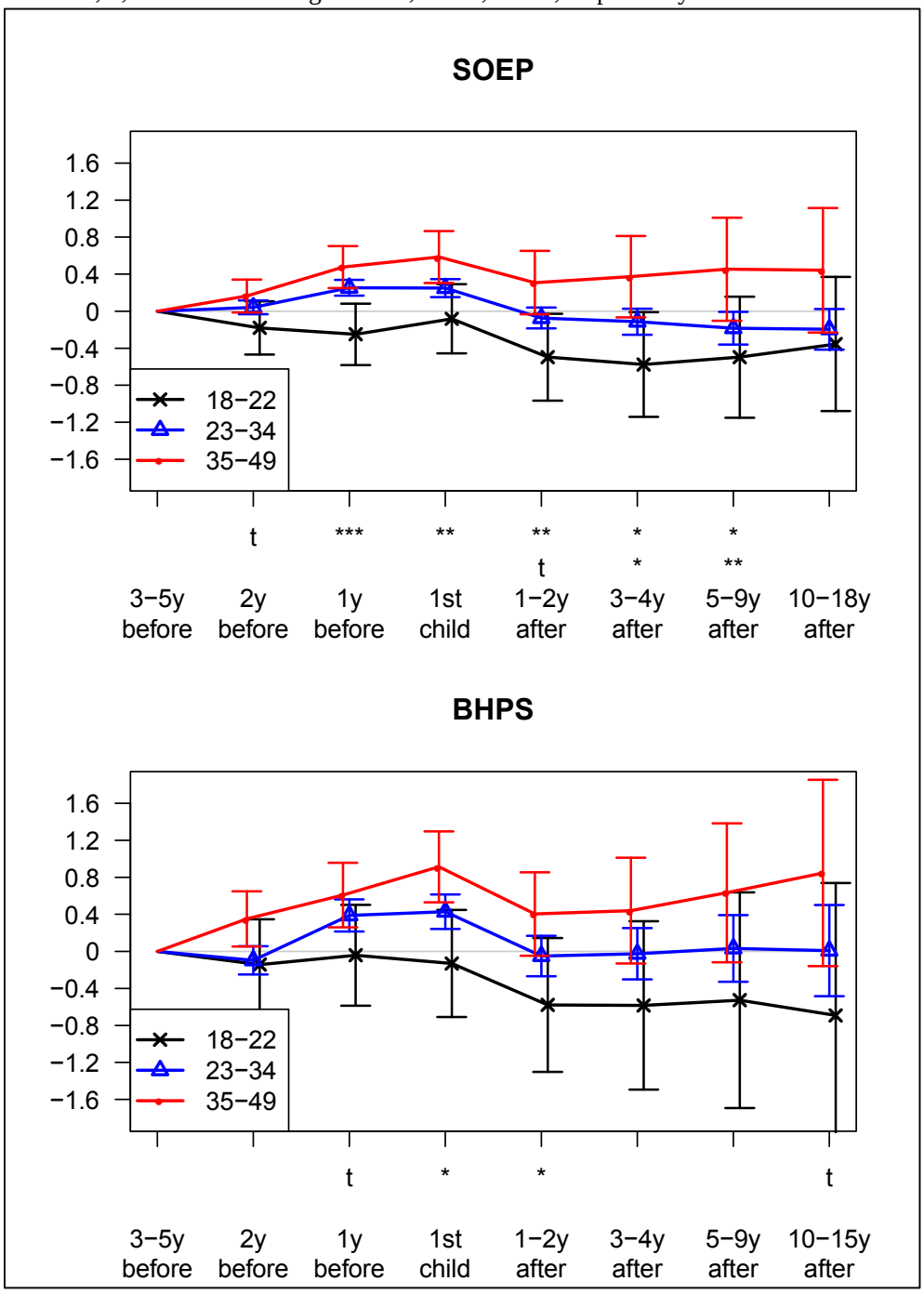
d. 10-18 years in SOEP, 10-15 years in BHPS

Figure 1. Happiness trajectory of parents before and after the birth of the first child, by country and gender. Fixed-effects linear regressions. SOEP = German Socioeconomic Panel, 1,927 men and 2,586 women; BHPS = British Household Panel Survey, 1,310 men 1,379 women.



Notes
1. t (p<.10), * (p<.05), ** (p<.01), *** (p<.001) under the x-axis are for the test between men and women
2. Test for overall male-female difference, p<.05 (SOEP) and p<.01 (BHPS)
3. The model includes as control variables age and period dummies, and fixed-effects for individuals.
4. Standard errors estimated using robust methods which account for the clustering of data within individuals.

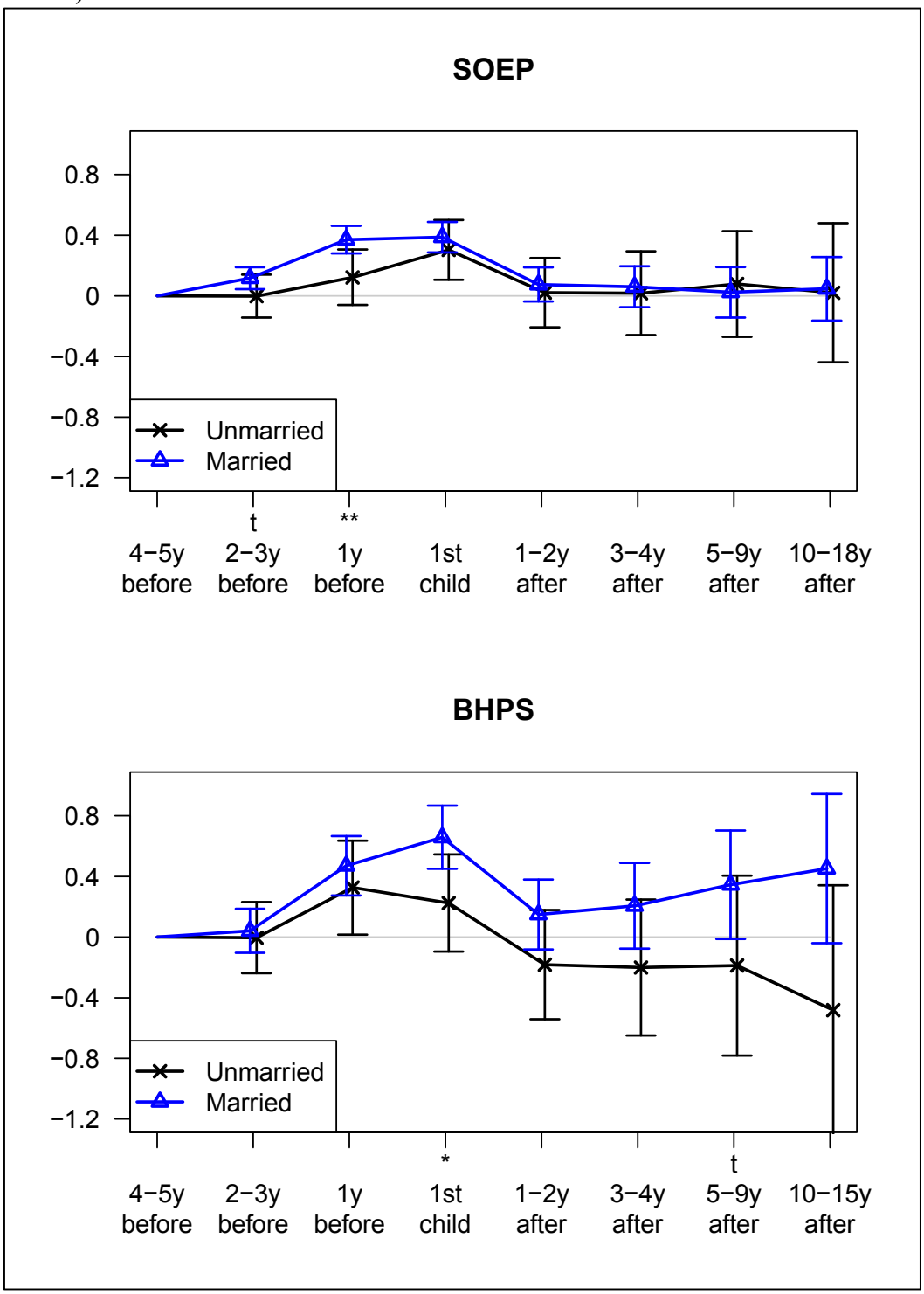
Figure 2 Happiness trajectory before and after the birth of the first child by age of becoming a parent (ages 15-22, 23-34, 35-49). Fixed-effects linear regressions. SOEP = German Socioeconomic Panel, sample sizes 691, 3,258 and 564 for ages 15-22, 23-34, 35-49, respectively; BHPS = British Household Panel Survey, sample sizes 455, 1,768 and 466 for ages 15-22, 23-34, 35-49, respectively



Notes

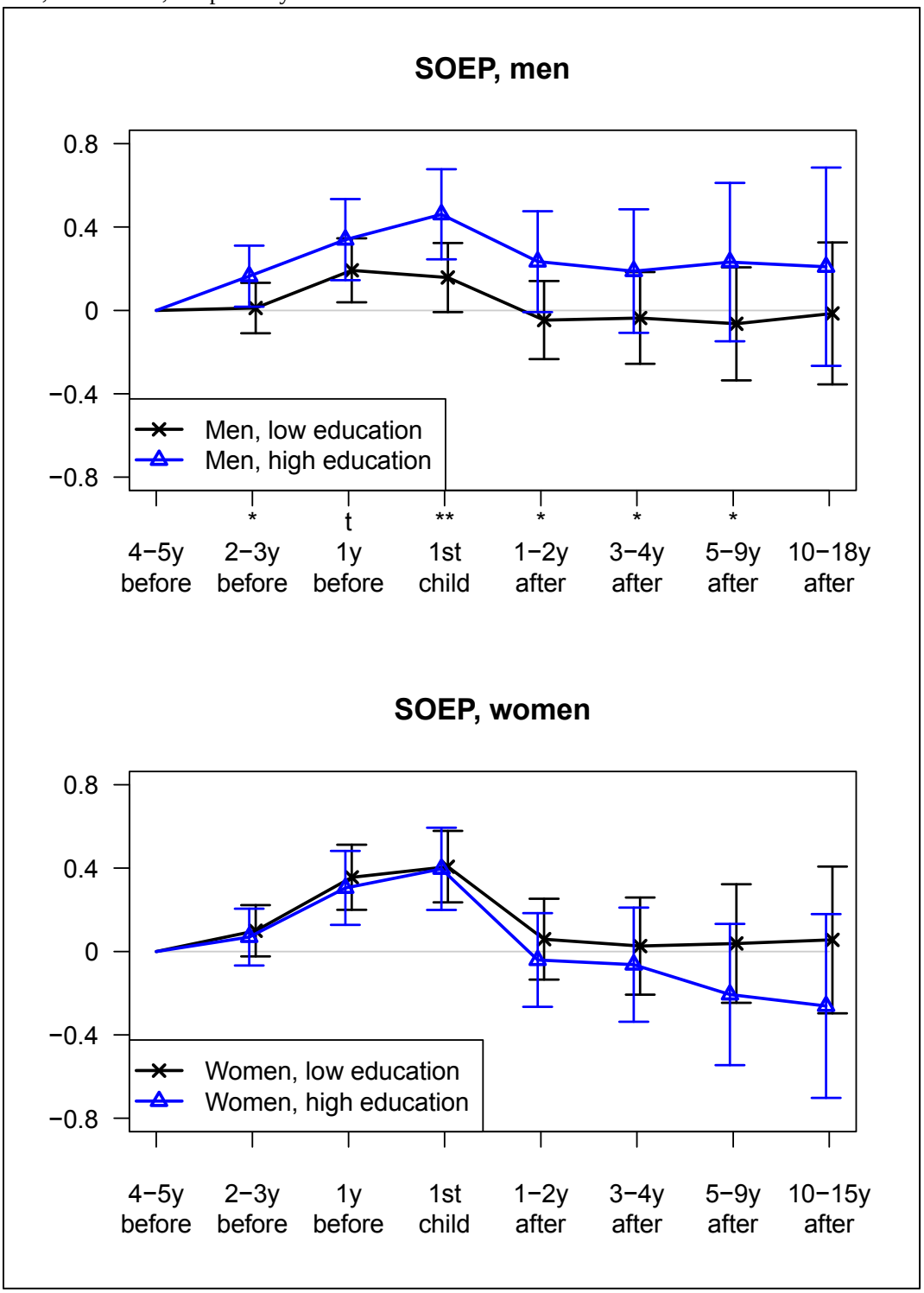
1. The first row of symbols t (p<.10), * (p<.05), ** (p<.01), *** (p<.001) under the x-axis are for the test between ages 18-22 and 23-34; the second row for the tests between ages 23-34 and 35-49.
2. Test for the overall difference between ages 18-22 and 23-34, p<.001 (SOEP) and p<.10 (BHPS); test for the difference between ages 23-34 and 35-49, p<.001 (SOEP) and p>.10 (BHPS)
3. The model includes as control variables age and period dummies, and fixed-effects for individuals.
4. Standard errors estimated using robust methods which account for the clustering of data within individuals.
5. To get stable estimates for the young parents, these age-stratified analysis use 3-5 years before birth as the baseline.

Figure 3. Happiness trajectory before and after the birth of the first child by marital status.
Fixed-effects linear regressions. SOEP = German Socioeconomic Panel, sample sizes 3,402 (married) and 1,111 (not married); BHPS = British Household Panel Survey, sample sizes 1,623 (married) and 1,066 (not married)



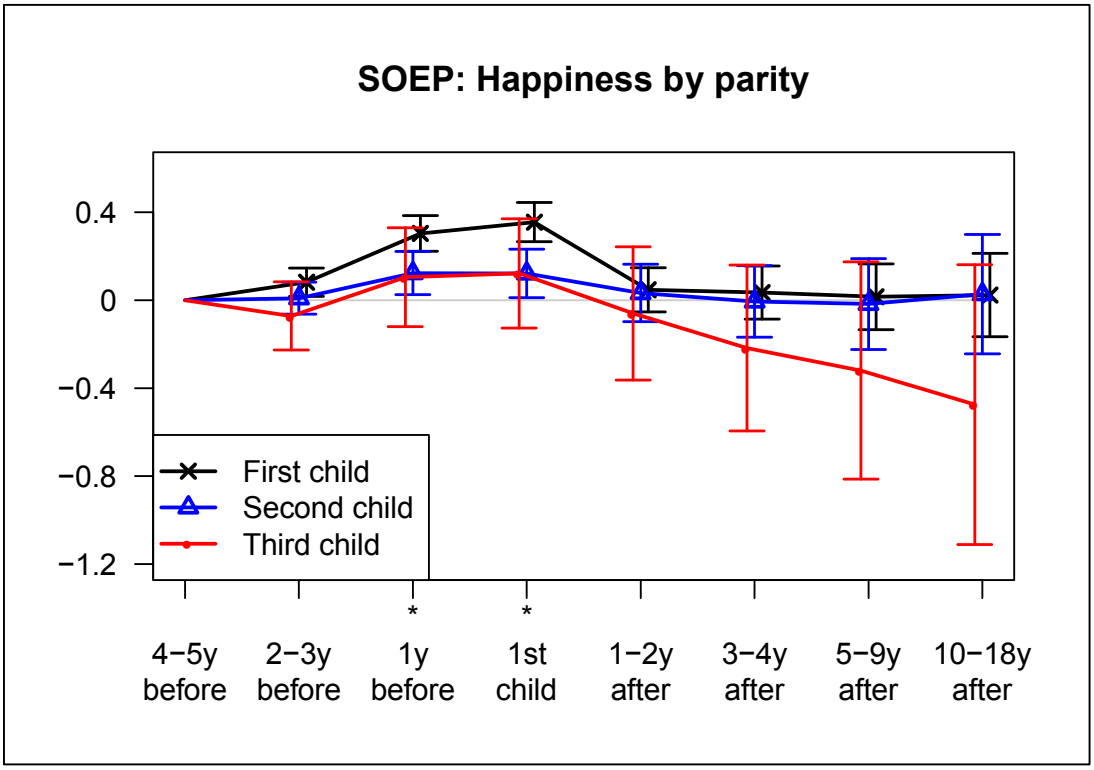
Notes
1. t (p<.10), * (p<.05), ** (p<.01), *** (p<.001) under the x-axis are for the test between married and not married
2. Test for the difference between partnered and non-partnered, p<.001 (SOEP) and p<.05 (BHPS)
3. The model includes as control variables age and period dummies, and fixed-effects for individuals.
4. Standard errors estimated using robust methods which account for the clustering of data within individuals.

Figure 4. Happiness trajectory before and after the birth of the first child by educational attainment (high = at least 12 years; low = less than 12 years). Fixed-effects linear regressions. Data: German Socioeconomic Panel, N=4,513 with 54,976 person years.



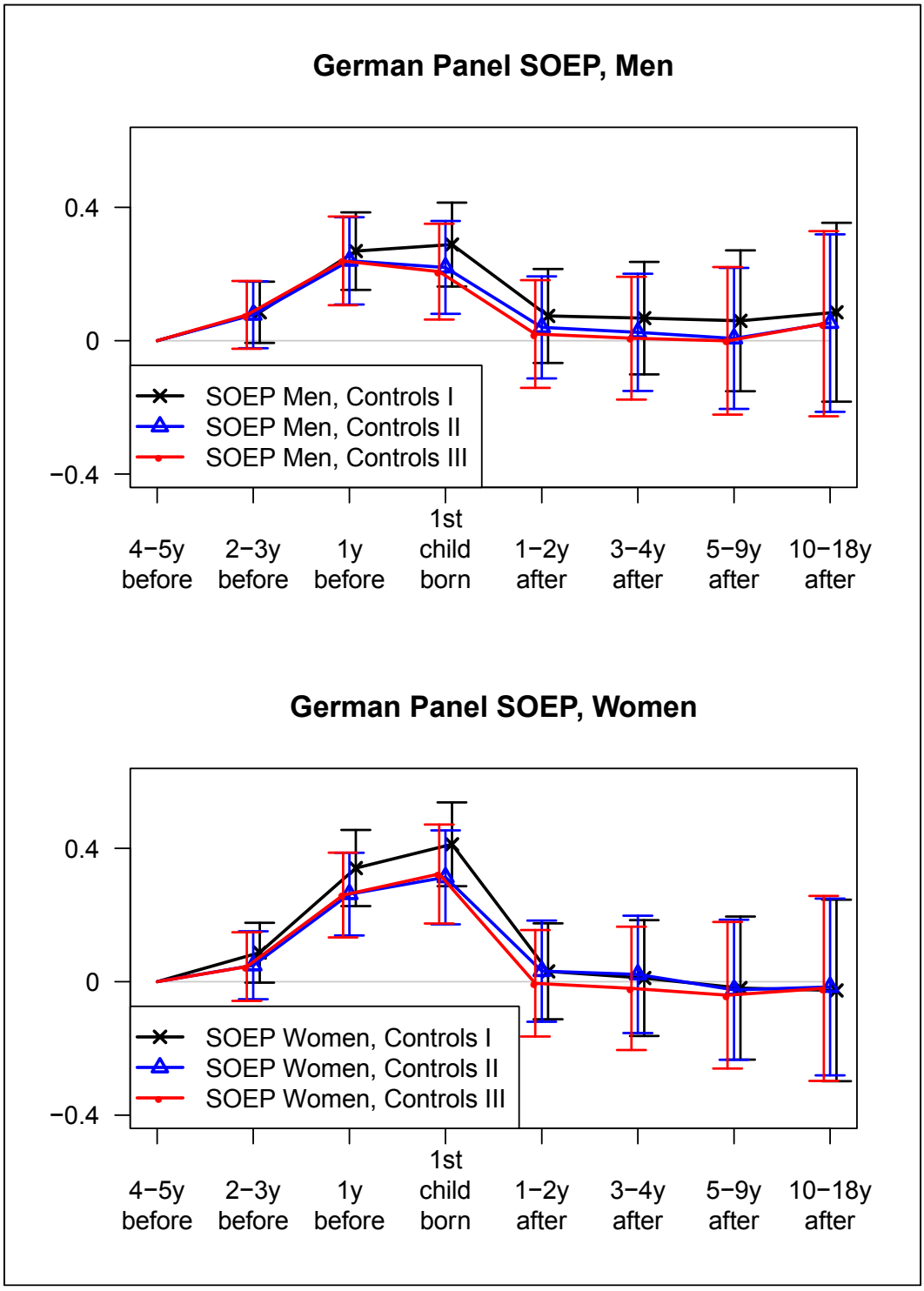
Notes
1. t (p<.10), * (p<.05), ** (p<.01), *** (p<.001) under the x-axis are for the test between high- and low-educated
2. Test for the difference between high and low educated, p<.05 (men) and p>.10 (women)
3. The model includes as control variables age and period dummies, and fixed-effects for individuals.
4. Standard errors estimated using robust methods which account for the clustering of data within individuals.
5. The results are similar for the British BHPS

Figure 5. Happiness trajectory before and after the birth of a child by birth order. Fixed-effects linear regressions. SOEP = German Socioeconomic Panel, sample size fir first births 4,443, for second births 2,268 and for third births 536.



Notes
1. The row of symbols t (p<.10), * (p<.05), ** (p<.01), *** (p<.001) under the x-axis are for the test between first and second child. The differences to the third child were all statistically not significant.
2. Controls for the previous children's birth and its anticipation, age and period dummies, and fixed-effects.
3. Standard errors estimated using robust methods which account for the clustering of data within individuals.
4. The results are similar for the British BHPS.

Figure 6. Happiness trajectory before and after the birth of the first child without time-varying controls (Controls I), with controls for time-varying health, income, marital and labor for status (Controls II), and with Controls II plus controls for the subsequent births (Controls III). Fixed-effects regressions. SOEP = German Socioeconomic Panel, 1,927 men and 2,586 women.



Notes:
1. The shown coefficients for models with controls II and III are not statistically significantly different from the main model with controls I in any of the models or for men or women.
2. The model includes as control variables age and period dummies, and fixed-effects for individuals.
3. Standard errors estimated using robust methods which account for the clustering of data within individuals.
4. The results are similar for BHPS.