The Economic and Social Review, Vol. 53, No. 2 Summer 2022, pp. 89-136

Family Size and Subjective Well-Being in Europe: Do More Children Make Parents (Un)Happy?

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Abstract: Using the European SILC data we show that having an additional child negatively affects well-being for parents of small children, while parents of teenagers report higher or unchanged levels of well-being when having an additional child. This is mainly driven by satisfaction with time allocation and by the frequency of feeling nervous. Multiple births are used as the source of exogenous variation, the best strategy given the sample size and the context of low fertility countries. We conclude that more help directed towards parents of the youngest children and publicising the positive future effects of having large families could increase fertility.

I INTRODUCTION

Low fertility is one of the challenges of the developed world. Combined with extending life expectancy, low fertility is responsible for population ageing that threatens the stability of tax, public healthcare, and pension systems. Rational

Acknowledgments: This research was supported by the Czech Grant Agency grant no. 17-09119Y and the project no. 260 463 at the Institute of Economic Studies. The authors would like to thank David Card, Andrea Kiss, Shelly Lundberg, Filip Pertold, the participants of seminars at UC Berkeley and UC Santa Barbara, as well as European Society for Population Economics 2018 Conference, European Association of Labour Economists 2019 Conference, the Prague Workshop on Gender and Family in the Labour Market, and Czech Economic Society and Slovak Economic Association Meeting 2019 for their helpful comments and suggestions. The results presented in this paper are based on EU-SILC 2013 microdata. These confidential data were obtained from the Eurostat upon request and approval of a research project. The responsibility for all conclusions drawn from the data lies entirely with the authors. The authors are solely responsible for the content and the views expressed.

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choice models of fertility predict that individuals optimally choose the number of offspring considering the perceived costs and benefits. If rational individuals' objective is to maximise their subjective well-being (Benjamin *et al*., 2012; Fleurbaey and Schwandt, 2015), we should observe that arrival of each planned child is associated with increased levels of well-being, however an increase in family size beyond what was planned is associated with lower levels of well-being. We probe this latter presumption by comparing the subjective well-being of parents with and without an exogenous increase in family size caused by multiple births. To test for potential heterogeneity in the relationship between family size and well-being, we focus on parents with children in different age groups.

The existing literature analysing the relationship between fertility and individual subjective well-being focuses mainly on the effect of being a parent (cross-sectional correlation; see, for example, Deaton and Stone, 2014; Pollmann-Schult, 2018; Blanchflower and Clark, 2021) or becoming a parent (within-parent analysis; for example, Baetschmann *et al*., 2016; Clark *et al*., 2008; Clark and Georgellis, 2013; Frijters *et al*., 2011). The relationship between the number of children and parental subjective well-being is less studied. Some authors present cross-sectional correlations between the number of children and parental well-being (Aassve *et al*., 2015; Margolis and Myrskylä, 2011; Stanca, 2012), while the recent studies by Conzo *et al*. (2017), Mu and Xie (2016), and Priebe (2020) estimate the effect of the number of children on parental well-being in several developing countries with the help of instrumental variables. Our study adds to the existing literature in several ways.[1] To the best of our knowledge it is the first paper estimating the causal relationship between the number of children and parental subjective well-being within developed countries.

We focus on parents with children in different age windows to identify potential heterogeneous effects, while other authors analysing the relationship between the number of children and parental well-being pool parents with younger and older children together (Conzo *et al*., 2017; Mu and Xie, 2016; Priebe, 2020). Slicing the sample by children's age is motivated by the literature documenting the dynamic reaction to the event of childbirth (Baetschmann *et al*., 2016; Clark *et al*., 2008; Clark and Georgellis, 2013; Frijters *et al*., 2011; Myrskylä and Margolis, 2014). The typical result is that birth of a child is associated with a drop in parental well-being, which returns to the pre-childbirth level after a few years, though Baetschmann *et al*. (2016) and Myrskylä and Margolis (2014) show that the first birth is associated with an increase in subjective well-being for a few years. Limited by the cross-sectional nature of the dataset utilised, we are not able to model the within-parent dynamics; however, we divide the sample along children's age. We show that having an additional child is associated with lower levels of

[1] See Pertold-Gebicka (2022) for a most up-to-date review of the literature on the relationship between fertility and well-being.

subjective well-being for parents with small children, but this relationship is positive or indistinguishable from zero for parents with teenage children.

Moreover, we identify heterogeneous effects between parents and show that mothers' and fathers' well-being respond differently to changes in family size. The majority of papers in the literature concentrate on the effect of children on maternal outcomes. Aassve *et al*. (2015), Blanchflower and Clark (2021), Buddelmeyer *et al*. (2018), and Stanca (2012) are among the few studies that analyse mothers and fathers separately. These studies agree that the arrival of the first child affects mothers more strongly than fathers. Recently, Conzo *et al*. (2017) and Mu and Xie (2016) estimated the relationship between the number of children and parental well-being separately for mothers and fathers in rural Ethiopia and in China, pointing towards significant differences between parents. We explore these differences in the context of Europe. We also investigate different aspects of well-being and show that (dis)satisfaction with time allocation and increased frequency of feeling nervous drives the negative relationship between the number of children and parental well-being at young child ages. The positive effect at higher child ages is driven by satisfaction with the financial situation only for fathers; while for mothers it is mainly driven by lower frequency of experiencing negative feelings.

Selection into the number of children is treated by an instrumental variable – occurrence of a twin birth – under the assumption that a twin birth exogenously increases the number of children in a family. We observe parents who have decided for a specific number of children, but some of them experienced multiple pregnancy and were thus assigned to a higher than planned family size. This setup allows estimation of the local average treatment effect (LATE)[2] for parents whose fertility is affected by twinning. To identify LATE we need that the instrumental variable is exogenous, relevant, and monotonic. While the third condition is trivial in the context of twin births, there are some concerns about this instrument's relevance and exogeneity (Bhalotra and Clarke, 2019; Rosenzweig and Wolpin, 2000; Rosenzweig and Zhang, 2009). This is why we present several tests supporting our instrument's exogeneity, control for a set of potentially confounding variables, and present a series of robustness checks.

Our preferred estimates are based on the sample of families experiencing at least two births, where occurrence of twin birth at second parity is used as the instrument for the number of children. This approach estimates a highly policy relevant effect of having the third child. Additionally, it has some methodological advantages. Working with twin births at second parity greatly reduces the unwanted effect of infertility treatments on our estimates and the risk that occurrence of twins is compensated by resigning from future fertility is much lower at second parity than at first parity.

[2] See Imbens and Angrist (1994) for detailed description of LATE estimation.

To sum up, we estimate the causal relationship between family size and parental subjective well-being across European countries. Estimating this relationship for subgroups of mothers and fathers whose children fall into different age categories, we point towards heterogeneity of this relationship with respect to children's age. After controlling for self-selection, we show that parents of larger families with teenage children experience the same or higher levels of well-being than parents of smaller families.

II DATA AND STYLISED FACTS

We use the 2013 wave of the European Union Statistics on Income and Living Conditions (EU-SILC), which includes an ad-hoc well-being module. Apart from the variables capturing individual subjective well-being, the dataset also contains information on individuals' health status, demographics, socioeconomic status, and labour market statistics including wages.

Children can be matched with their parents as long as they live in the same household. Within each household we observe personal relations: who of the observed household's members is the given person's mother, father, or partner. This allows us retrieve information about all children living in the same household as their parent. However, we do not know if there are any other children potentially living in separate households. Because of this, the number of children an adult has might be underestimated, especially for older parents, when relying on SILC data. To limit this imprecision, we restrict the analysed sample to adult individuals included in the well-being module who have at least one dependent child not exceeding 15 years of age *and no older children* living in the same household. Consequently, our estimation sample consists of families whose eldest observed child does not exceed 15 years of age. We believe that limiting the eldest observed child's age to 15 significantly reduces the probability that adults included in the estimation sample have another, older child that is not observed in the data. It is relatively uncommon that parents whose eldest observed child is 15 years old or younger have another child that has already moved out. This is supported by the observation that the majority of siblings are spaced 2-4 years from each other and the majority of children in Europe officially share a household with parents until their early 20s (see the Appendix Figure A.5 and Table A.14 for supportive statistics). Nevertheless, it may still happen that some of the parents included in the estimation sample have more children than we observe. This, most probably tiny, group should not significantly affect our results.

We compare the well-being of parents with different number of children. To abstract from selection into the number of children, we rely on differences in family sizes caused by twin births, similar to Rosenzweig and Wolpin (1980), Cáceres-

Delpianoa and Simonsen (2012), or Aaronson *et al*. (2021). In the SILC sample about 4 per cent of parents with at least two children have twins and most of the twins are born during the first (68 per cent) or second (26 per cent) child-bearing. While we observe about 14,000 fathers and 18,000 mothers who experienced at least two childbirths, there are only about 3,000 fathers and 4,000 mothers with three or more childbirths in our sample. This is one of the reasons why the baseline analysis is focused on the effect of the third and not the fourth child.

The data analysed in this paper were collected in 32 European countries, with the number of parents observed per country ranging from 1,285 to 11,557 (4,018 is the median). As small sample sizes do not allow us to stratify the sample by countries, we divide Europe into six regions: Northern Europe, Central Europe, Southern Europe, Eastern Europe, Balkan countries, and Anglo-Saxon countries. See the Appendix for details concerning assignment of countries into regions.

2.1 Subjective Well-Being Measures

We employ two measures of individual subjective well-being. First, we analyse self-reported life satisfaction. In the SILC dataset life satisfaction is captured by the question: 'Overall, how satisfied are you with your life nowadays?' As a response, individuals have to choose a number from an integer 0 – 10 scale, where 0 means 'Not at all satisfied,' and 10 means 'Completely satisfied.[3] Self-reported life satisfaction might reflect not only subjective well-being but also an evaluative comparison of current life situation with one's aspirations and with others (Emmons and Diener, 1985). To inspect the relationship between the number of children and a measure of subjective well-being that is less influenced by comparison (Diener et al., 1991), we additionally employ a happiness index. We construct this measure of experienced well-being by summing up the self-reported frequency of experiencing positive (calm and peaceful, happy) and the self-reported frequency of experiencing negative (very nervous, down in the dumps, downhearted or depressed) feelings and emotions over the last four weeks. These are measured on the following scale: 1 – 'None of the time,' 2 – 'A little of the time,' 3 – 'Some of the time,' 4 – 'Most of the time,' 5 – 'All of the time', which has been inverted by us in case of negative feelings, so that the most positive person records a '5' in all five components of the happiness index. Consequently, the index can take on values from 5 to 25. For comparability with life satisfaction, we normalise the happiness index and fit it to the 0 to 10 scale. The actual full range of values is used, which implies that the happiness index takes on 21 distinct values from 0 to 10 with 0.5 increments.

Different constructions of each of the subjective well-being measures translates to some differences in their interpretation. Life satisfaction is meant to capture the whole of life to date, while the happiness index refers to emotions experienced over

[3] The few 'I don't know' responses to this and other questions are excluded from the sample.

the past four weeks. Therefore, the happiness index might be influenced by extreme events that happened to the respondent in the past four weeks to a larger extent than life satisfaction. On the other hand, the frequency of experiencing specific feelings included in the happiness index is better quantifiable and more objective than expressing life satisfaction on an abstract scale. Consequently, the happiness index is less affected by comparison to others (Diener *et al*., 1991) or by own aspirations (Emmons and Diener, 1985), and may put less weight on the aspects of well-being connected to one's (un)fulfilled desires than life satisfaction.

Table 1 presents the summary statistics of both well-being measures, while histograms can be found in the Appendix. In our sample, parents report higher levels of life satisfaction and have higher values of the happiness index than childless adults. Among parents, we observe that the highest levels of both well-being measures are observed for parents of two children. It is worth noting that life satisfaction and happiness index are significantly positively correlated (raw correlation coefficient 0.53), but happiness index is slightly more stable with lower overall variation and smaller differences by the number of children, but larger differences by gender. Moreover, the distribution of the happiness index is closer to normal.

Table 1: Summary of Subjective Well-Being Measures

	Number of Observations		*Life Satisfaction*		*Happiness Index*	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*
All adults	165,678	203,516	7.047	7.009	7.005	6.603
			(2.039)	(2.076)	(1.881)	(1.965)
Of which, parents	24,959	33,489	7.348	7.337	7.073	6.763
			(1.845)	(1.884)	(1.755)	(1.852)
Parents of one child	10,748	15,126	7.292	7.251	7.054	6.750
			(1.872)	(1.930)	(1.796)	(1.877)
Parents of two children	11,118	14,250	7.419	7.437	7.103	6.793
			(1.784)	(1.804)	(1.710)	(1.814)
Parents of three children	2,520	3,371	7.331	7.393	7.090	6.752
			(1.920)	(1.924)	(1.801)	(1.854)
Parents of four children	477	596	7.215	7.220	6.771	6.551
			(2.083)	(2.010)	(2.057)	(2.012)

Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Table reports number of observations and the mean value and standard deviation (in parentheses) for each of the subjective well-being measures for the sample consisting of all adult individuals included in the well-being module (first row) and subsamples of these individuals who have the specified number of dependent children younger than 16 (and no older child sharing the household).

The raw statistics presented in Table 1 might suggest that the arrival of the first child is associated with a slight increase in subjective well-being, and parents maximise their well-being when having two children. These statistics are, however, corrupted by subjective selection to parenthood and choices regarding the number of children. In the following section, we describe a strategy of identifying the causal relationship between the number of children and parental subjective well-being net of these selection issues.

III EMPIRICAL APPROACH

The goal of the empirical analysis is to estimate the causal relationship between the number of children and parental subjective well-being. This task is, however, complicated by selection issues.

First, individuals expecting to derive higher utility from having a large family tend to have more children (Kravdal, 2014), which implies a positive correlation between the additional child's effect and the number of children an individual has. Second, individuals with more positive attitudes towards life might be more likely to set up large families (Cetre *et al*., 2016), which implies a positive correlation between unobserved components of subjective well-being and the number of children an individual has. Both of these result in overestimation of the effect of having an additional child on parental well-being when using OLS.

On the other hand, individuals oriented towards actively enjoying life might choose to have fewer children and at the same time report higher levels of subjective well-being, which implies a negative correlation between unobserved components of subjective well-being and the number of children an individual has. This would make OLS underestimate the effect of having an additional child on parental well-being.

Altogether, we expect that a simple OLS would lead to a biased estimation of the effect of having an additional child on parental well-being, with the direction of the bias depending on which of the above-described selection mechanisms is stronger. The relative strength of these mechanisms might depend on children's age because small children affect different aspects of well-being than teenage children and because parents might adapt to specific joys and challenges of parenthood at a different pace (see Clark and Georgellis, 2013, for a discussion of the adaptation hypothesis). For example, we expect that selection into family size based on expected gains would play the strongest role during the first years of parenthood, because over time parents might adapt to having a large family.

3.1 Identification Strategy

Earlier studies analysing the effect of family size on outcomes such as female labour supply or children's academic performance, dealt with selection bias by exploring

the variation in the number of children caused by twin births or by siblings' sex composition (Aaronson *et al*., 2021; Angrist and Evans, 1998; Angrist *et al*., 2010; Black *et al.,* 2010; 2005; De Haan, 2010). We follow the former approach and instrument the number of children by an indicator of twin births. Using siblings' sex composition as an instrument is not appropriate in our case because this instrument is weak and consequently requires large samples, and because subjective well-being might strongly depend on the gender of the third child.

Twin birth as an exogenous shock to family size was first used in Rosenzweig and Wolpin (1980) and has been widely applied since then with one of the most recent applications presented in Aaronson *et al*. (2021). In the context of parental well-being, twin birth instrument was used by Priebe (2020) as a robustness check when estimating the effect of having a third child on maternal subjective well-being in developing countries and by Cáceres-Delpianoa and Simonsen (2012), who express maternal well-being in terms of marriage stability and health outcomes. Note that all the recent contributions used an indicator of twin birth at *second* parity as an instrument for having more than two children (or having exactly three children) in their only or in their preferred specification. We take inspiration from this approach and in the main analysis estimate the effect of having more than two children on parental subjective well-being.[4]

Our baseline estimation strategy can be summarised by the following two-stage model specified for the sample of parents experiencing at least two childbirths, with the first childbirth being a singleton birth:

$$more\_than\_2\_children_{ic} = X_{ic}\alpha + \pi \cdot MB^2_{ic} + \tau_c + \varepsilon_{ic}. \quad \text{if } no\_births_{ic} \geq 2 \tag{1}$$

$$wellbeing_{ic} = X_{ic}\beta + \gamma \cdot \widehat{more\_than\_2\_children}_{ic} + \delta_c + e_{ic} \quad \text{if } no\_births_{ic} \geq 2 \tag{2}$$

The treatment variable $more\_than\_2\_children_{ic}$ indicates whether an individual i from a European region c has exactly two children (=0) or more (=1). Parameter γ then corresponds to the effect of having more than two children on the well-being of parents experiencing at least two childbirths. X_{ic} consists of individual-level variables potentially affecting the level of subjective well-being, such as health status, education level, age, or income; δ_c represents region fixed effects, and u_{ic} is the unobserved error. $\widehat{More\_than\_2\_children}_{ic}$ in the 2nd stage Equation (2) corresponds to the predicted values from the 1st stage Equation (1). The instrumental variable MB^2_{ic} is equal to 0 if a singleton was born to parent i at 2nd

[4] The effects of having more than one child and of having more than three children are also estimated and reported in the Appendix. These estimates are, however, less reliable due to instrument relevance issues (in case of the effect of having more than one child) and due to very few observations of parents with more than three children (in case of the effect of having more than three children).

parity and is equal to 1 if a twin birth was experienced by parent *i* at 2nd parity.[5] Under this approach γ corresponds to the local average treatment effect (LATE), that is the effect of an additional child on parents whose fertility is exogenously increased by experiencing a twin birth at 2nd parity. Consequently, the obtained estimates can be interpreted as the effect of an increase in family size beyond what was planned.

3.1.1 *Identification of LATE*

The conditions under which the LATE is identified are instrument monotonicity, relevance, and validity (Imbens and Angrist, 1994). Monotonicity requires that the instrument affects selection into the number of children in a monotonic way. Given that parents experiencing twin birth at 2nd parity naturally have more than two children, this condition is satisfied by the twin birth instrument. Relevance means that the probability of being treated is a non-trivial function of the instrument. In practice, relevance requires that experiencing a twin birth at 2nd parity affects the final number of children for a significant number of parents. The validity requires that the instrument is as good as random and that it does not have a direct effect on the outcome variable other than through the treatment status. In our context this means that occurrence of twin birth at 2nd parity is a truly random or, at least, conditionally random event and it does not directly affect parental well-being or future behaviour of parents that might influence their well-being differently than a singleton birth (two singleton births).

Relevance of the twin birth instrument could be threatened if future fertility, and thus the final family size, was affected by the occurrence of a twin birth. Families aiming at two children would not plan additional pregnancy after receiving twins as their first-born, while they would plan additional pregnancy after giving birth to a singleton. In such a case, experiencing a twin birth would not increase family size beyond what was planned by the parents. Given that in Europe most parents' preferred number of children is two (Goldstein *et al*., 2003; Testa, 2012), this argument becomes weaker when twin birth at second parity is used as the instrument. The arrival of twins at second parity would exogenously increase such parents' number of offspring from the planned two to unplanned three. If the share of parents in our estimation sample (i.e. parents experiencing at least two childbirths) who plan on having exactly two children is large enough, then the 2nd parity twin birth instrument is relevant. Instrument relevance is supported by the first-stage results (see Appendix Table A.3), which are very strong for the sample of parents experiencing at least two childbirths, where twin birth at second parity is used as the instrument.

The validity of the twin birth instrument might be questioned due to several reasons. First, twin births are more frequent among mothers receiving infertility

[5] The instrument takes the value of 1 for 2.5 per cent of the estimation sample.

treatment, who most probably have high preferences towards family, than among mothers conceiving naturally. In the related literature (Cáceres-Delpianoa and Simonsen, 2012) the problem caused by high occurrence of twin births among mothers undergoing infertility treatment is handled by restricting the twin-births instrument to only same-sex births. Infertility treatment increases the probability of dizygotic (non-identical) twins' occurrence, but it does not affect the probability of monozygotic (identical) twins' occurrence. As monozygotic twins are always of the same gender, this restriction highly oversamples unexpected twin pregnancies over infertility-treatment-induced twin pregnancies. We use the twin-birth instrument limited to same-sex twins as a robustness check and show that the results do not change after applying this restriction (see Table A.4 in the Appendix). Additionally, infertility treatments are less frequent at second parity than at first parity.

Second, as Bhalotra and Clarke (2019) note, twin births might be associated with maternal pre-birth health-related characteristics. This might bias our estimates if these health-related characteristics affect parental well-being. The dataset we use does not contain any pre-pregnancy information. However, arguing that many pre-existing health issues can be observed also after childbirth, we control for current health status to mitigate the bias caused by the relationship between maternal health and occurrence of multiple birth. Moreover, the relationship between the number of children and fathers' well-being should not be affected by this issue.

Third, parental behaviour might be affected by having twins. Rosenzweig and Wolpin (2000) note that the cost of raising twins might be different than the cost of raising singletons, mainly because of simultaneous expenses, and having twins might affect the marginal utility of leisure. There might also be health consequences of carrying and delivering twins. Finally, as Jena *et al*. (2011) show, parents of twins separate/divorce more often than parents of singletons. All these might have a direct, most probably negative, effect on parents' subjective well-being.

To probe these channels we compare different outcomes between parents having the same number of children after different number of births. This allows us to observe the correlations between twin birth occurrence and parental health, financial situation, labour market activity, and probability of separation/divorce, conditional on the fixed number of children (see Table A.10 in the Appendix). Among parents of two children, those who have twins report lower levels of satisfaction with their financial situation (especially mothers) and are more often single than parents who have two children of different age. The latter finding makes the first parity twin-birth instrument questionable, because birth of twins might lead to non-random disappearance of fathers from the sample. Fortunately, among parents of three children both these correlations disappear, and we only observe higher prevalence of being employed among mothers and fathers of twins. This last observation might be driven by two channels: it is easier to assure childcare for two children of the same age than for two children of different age and/or having two

children after one childbirth withdraws mothers from the labour market for a shorter time than having two children in two subsequent childbirths. In the Appendix Table A.11 we further decompose the correlations between experiencing a twin birth and parental outcomes for parents of three children by children's age. There is some evidence that parents (especially mothers) of twins are more often employed than parents of singleton siblings and that fathers of teenage twins are healthier than fathers of teenagers of different age. This is why we control for health and employment status to achieve conditional exogeneity of the second parity twin-birth instrument. In robustness checks we additionally limit the sample to only employed parents and to parents reporting no serious health issues. Both restrictions lead to results comparable with those presented in the text.

To further probe the validity of our identification strategy, we rely on statistical tests of the instrument validity proposed by Kitagawa (2015) and Mourifié and Wan (2017) applied to the second parity twin-birth instrument. Both tests can be used to test the null hypothesis that instrument validity and monotonicity assumptions are jointly satisfied. With the Kitagawa (2015) test we do not reject the null hypothesis for any combination of parent gender and children's ages. Using the Mourifié and Wan (2017) test we reject the null hypothesis in most subsamples for *unconditional* well-being, but do not reject the null in the full specification with control variables. Results of these tests further support our trust in the use of second parity twin birth as an instrument for the number of children.

Given the careful choice of the instrumental variable and the definition of the estimation sample, we believe that LATE assumptions necessary to produce reliable estimates are *most probably* satisfied when conditioning on observed parental characteristics. Nevertheless, we are aware that no instrument, and the twin birth instrument in particular, is perfect. It might still happen that there is some non-random attrition in the sample of fathers or that controlling for employment status does not remove all the direct effect of having twins on mothers' well-being. These should be, however, minor because of all the measures taken to ensure the instrument validity.

3.1.2 *Child Age Intervals*

The relationship between family size and parental well-being might depend on children's age. The related literature has shown that parents adapt to the birth of the first child after a few years and their well-being returns to the before childbirth levels (Clark *et al*., 2008; Myrskylä and Margolis, 2014). A similar effect might be present in reaction to further family size increases. Moreover, when making fertility decisions parents might overweight the early costs (e.g. sleepless nights) and underweight later benefits (e.g. common activities). Finally, parents of the youngest twins might experience a "shock effect" of having to handle two newborns instead of one, which could result in a direct relationship between twin birth and well-being, but this "shock effect" is likely to disappear when children get older.

To account for these heterogeneities, we divide the sample into subgroups of parents according to their children's age. Six-year age intervals are considered as a compromise between sample size and sample homogeneity. All children must fall into the given age interval for their parent to be included in the respective group. This is to assure comparability between the analysed parents – mainly to make sure that the estimated effects are not driven by significant differences in the age structure of children. When stratifying the sample by children's age intervals we lose about 25 per cent of observations that mainly come from parents with three or more births, and from parents with two births spaced far away from one another. Consequently, the estimates based on child age subsamples correspond to much more homogeneous groups of parents.

3.2 Estimation Method

All results presented in this paper come from linear regression models – OLS and 2SLS – even though the dependent variables used in the analysis are of the ordered nature. We apply these simple techniques for their transparency and straightforward application of 2SLS when dealing with endogeneity, which is common in the literature. Specifically, the papers most related to ours, Baetschmann *et al*. (2016), Blanchflower and Clark (2021), Buddelmeyer *et al*. (2018), Clark and Georgellis (2013), and Priebe (2020), base their conclusions on linear model estimates.

Bond and Lang (2019) criticise the use of linear models when working with dependent variables measured on ordered scales. They argue that for reliable comparison of average well-being values between two groups of people we need that the distribution of the latent variable behind the reported well-being values of one group stochastically dominates that of the other group. They show that in most cases analysed in the literature this assumption is not likely to hold. We nonetheless rely on linear models. First, because the dependent variables analysed in this paper use rich scales (11 points in case of life satisfaction and 21 points in case of the happiness index), which brings them closer to the underlying linear latent variables. Second, because a sensitivity analysis using the least absolute deviation estimation produces qualitatively similar results.[6]

IV RESULTS

In this section we report estimates of the effect of having more than two children on parental subjective well-being.[7] Table 2 presents the second-stage estimates of

[6] Results available from the authors on request. In a related study using the same data we explicitly show that OLS and LAD regressions produce comparable results (Spolcova and Pertold-Gebicka, 2019).

[7] For completeness, Table A.1 in the Appendix presents estimates of the effect of having more than one child and of having more than three children on parental subjective well-being. Experiencing twin birth at first or third parity, respectively, are used as the instruments in 2SLS specifications. As explained in Footnote 4, these estimates are less reliable than estimates based on twin birth at second parity.

the γ coefficient from Equation (2), where the variable capturing family size, $more\_than\_2\_children_{ic}$, is instrumented by the indicator of twin birth at 2nd parity. These can be interpreted as the LATE of having more than two children on parental subjective well-being. For completeness we also report OLS estimates, that is estimates of γ from Equation (2) when $more\_than\_2\_children_{ic}$ is not instrumented. Table A.3 in the Appendix presents first-stage estimates, i.e. estimates of π from Equation (1). Note that twin birth at second parity is a very strong predictor of family size, as families which experience twin birth at second parity have on average 0.8 children more than families where a single child arrived at second parity. This finding is in line with the observation that most parents' desired number of children is two (Goldstein *et al*., 2003; Testa, 2012).

The first two columns of Table 2 pool together all parents living with their dependent children aged 15 or less. We do not observe any significant effect of the third child on parents' life satisfaction (Panel A) or parents' happiness index (Panel B) within this sample.[8] However, pooling together families with children of different ages might hide potential heterogeneous effects of family size on parental well-being. First, small children might affect different aspects of well-being than teenage children, and consequently the family size effect on the overall parental well-being might change with children's age. Second, according to the adaptation hypothesis (Clark and Georgellis, 2013), the effect of an additional child might get attenuated over time. Even if strong for the first years after birth, it might be estimated as insignificant when families with young and older children are pooled together. Third, using the twin birth instrument adds a negative "shock effect" which might be observed for the first few months after the arrival of twins and bias the results downwards. Finally, we know nothing about the final number of children the analysed parents have. While for parents of teenage children we can expect that their fertility is completed, parents of young children might plan on having a larger family than what is observed. To account for these heterogeneities, we analyse subsamples of parents according to their children's age.

Columns (3) – (8) of Table 2 report estimates for three different subsamples: parents of children aged 0-5, parents of children aged 5-10, and parents of children aged 10-15.[9] Recall that all own children living in the household must fall into the respective age interval for a parent to be included in the relevant sample, which makes the restricted samples of parents quite homogeneous. The LATE estimates

[8] As a robustness check we repeat the estimations reported in columns (1) – (2) of Table 2 using the occurrence of twins of the same gender as the instrument. This should limit the role of fertility treatments in inducing twin pregnancies. As visible in Table A.4 in the Appendix, this approach gives qualitatively and quantitatively very similar results.

[9] These three subsamples were chosen for the purpose of illustration, as they roughly represent parents of the youngest children, parents of early school children, and parents of teenagers. They are not mutually exclusive. For example, parents of 5-year-olds are included in both the 0-5 and 5-10 groups. Estimation results for all possible 6-year age intervals are reported in Figures 1 and 2.

Table 2: The Estimated Relationship Between the Number of Children and Subjective Well-Being Among Parents of Children Aged 0-15, 0-5, 5-10, and 10-15 who Experienced at Least Two Childbirths

	(1) OLS 0-15	*(2) 2SLS 0-15*	*(3) OLS 0-5*	*(4) 2SLS 0-5*	*(5) OLS 5-10*	*(6) 2SLS 5-10*	*(7) OLS 10-15*	*(8) 2SLS 10-15*
Panel A: Life satisfaction (LS)								
All parents	–0.054	0.124	0.043	–0.671	0.041	0.015	0.106	0.520
	(0.045)	(0.262)	(0.244)	(0.436)	(0.095)	(0.255)	(0.085)	(0.429)
N	31,177	31,177	4,843	4,843	5,011	5,011	4,617	4,617
Mean LS	7.118		7.096		7.066		7.058	
SD	2.020		2.037		2.049		2.053	
Fathers	**–0.135*****	0.076	–0.154	**–0.938****	0.117	0.204	0.008	**0.478****
	(0.044)	(0.301)	(0.314)	(0.473)	(0.129)	(0.321)	(0.158)	(0.211)
N	13,612	13,612	2,149	2,149	2,255	2,255	2,012	2,012
Mean LS	7.103		7.079		7.057		7.051	
SD	2.017		2.036		2.044		2.046	
Mothers	–0.002	0.158	0.212	–0.397	–0.019	–0.162	0.212	0.552
	(0.055)	(0.293)	(0.222)	(0.508)	(0.090)	(0.245)	(0.147)	(0.704)
N	17,565	17,565	2,694	2,694	2,756	2,756	2,605	2,605
Mean LS	7.131		7.111		7.075		7.064	
SD	2.022		2.037		2.053		2.058	
Panel B: Happiness index (HI)								
All parents	**–0.076***	–0.030	–0.066	**–0.724*****	–0.192	–0.337	0.093	**0.448****
	(0.038)	(0.151)	(0.186)	(0.269)	(0.149)	(0.289)	(0.074)	(0.202)
N	30,574	30,574	4,780	4,780	4,919	4,919	4,512	4,512
Mean HI	6.861		6.870		6.849		6.844	
SD	1.910		1.919		1.929		1.932	

Table 2: The Estimated Relationship Between the Number of Children and Subjective Well-Being Among Parents of Children Aged 0-15, 0-5, 5-10, and 10-15 who Experienced at Least Two Childbirths (Contd.)

	(1) OLS 0-15	*(2) 2SLS 0-15*	*(3) OLS 0-5*	*(4) 2SLS 0-5*	*(5) OLS 5-10*	*(6) 2SLS 5-10*	*(7) OLS 10-15*	*(8) 2SLS 10-15*
Panel B: Happiness index (HI)								
Fathers	**–0.106***	0.057	–0.272	**–0.809****	–0.010	0.342	0.074	0.237
	(0.062)	(0.137)	(0.280)	(0.343)	(0.173)	(0.376)	(0.100)	(0.179)
N	13,324	13,324	2,123	2,123	2,206	2,206	1,960	1,960
Mean HI	7.055		7.060		7.049		7.048	
SD	1.863		1.873		1.883		1.881	
Mothers	–0.063	–0.108	0.115	**–0.647****	**–0.329***	**–0.946***	0.119	0.618
	(0.053)	(0.268)	(0.168)	(0.317)	(0.190)	(0.509)	(0.145)	(0.377)
N	17,250	17,250	2,657	2,657	2,713	2,713	2,552	2,552
Mean HI	6.684		6.689		6.659		6.650	
SD	1.934		1.919		1.954		1.959	

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least two childbirths that have only singleton at first parity, at most twins at second parity, and children younger than 16; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Instrumented variable: dummy equal to 1 if having more than two children, 0 otherwise; Instrument: indicator of twin birth at second parity; Other control variables: household income, employment dummy age, partnership status dummy, health limitation dummy, education, region fixed effects. Columns (1) and (2) include parents with children younger than 16 (including large age differences between children) while columns (3) – (8) cover only parents with all children born in the specified six-year span. Each cell reports an estimate of the coefficient corresponding to the marginal effect of an additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

reported in columns (4), (6), and (8) of Table 2 reveal a clear pattern: parental well-being is negatively hit by an unexpected increase in family size caused by twin birth at second parity but having three rather than two children between age 10 and 15 is linked to higher levels of subjective well-being.[10] Even though most of the point estimates are relatively large, many are statistically insignificant because of the limited number of twins observed in the data.

Table 2 only reports three sample age intervals. The complete picture of the third child's effect on parental well-being at different children's age is shown in Figure 1 (life satisfaction) and Figure 2 (happiness index). These figures plot the estimated LATEs of the third child against children's age intervals – eleven coefficients for eleven 6-year-wide age intervals. For fathers, we observe a clearly increasing relationship that flattens at low positive values since the early school ages of their children for both well-being measures. The effect of a third child on mothers' life satisfaction also seems to be positively correlated with children's age with a flattening-out tendency, but the estimated coefficients are statistically indistinguishable from zero at all ages. Mothers' happiness index is negatively affected by a third child for most of the analysed children's age intervals. The estimated coefficients are positive (but not statistically significant) only for the three oldest age intervals.

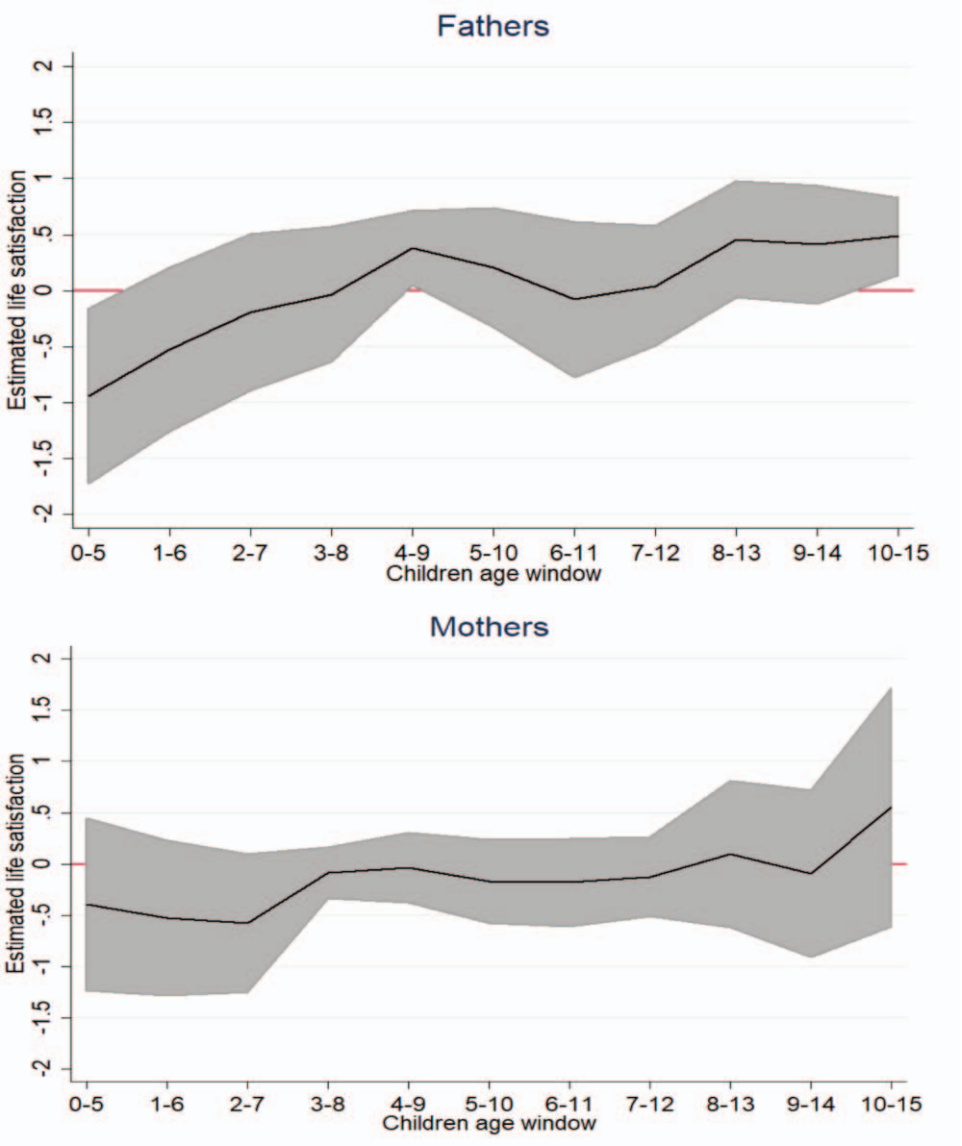
4.1 Family Size and Different Aspects of Subjective Well-Being

The analysis presented in the previous section reveals that parental well-being is negatively related to the number of children among parents of toddlers, but unrelated or positively related to the number of children among parents of teenagers. In this section we ask which channels might be responsible for these effects.

The related literature has discussed several potential explanations for why parents experience a negative shock to their subjective well-being after birth of a child. Two of them are mentioned the most often: the financial channel and time constraint channel. Stanca (2012) shows that the negative association between fertility and subjective well-being can be explained by the negative correlation between fertility and financial satisfaction. Buddelmeyer *et al*. (2018) demonstrate that satisfaction with financial situation drops after the birth of a child. Finally, Blanchflower and Clark (2021) show that financial stress explains the negative relationship between fertility and subjective well-being. The time constraint channel is also frequently studied. For example, Buddelmeyer *et al*. (2018) show that

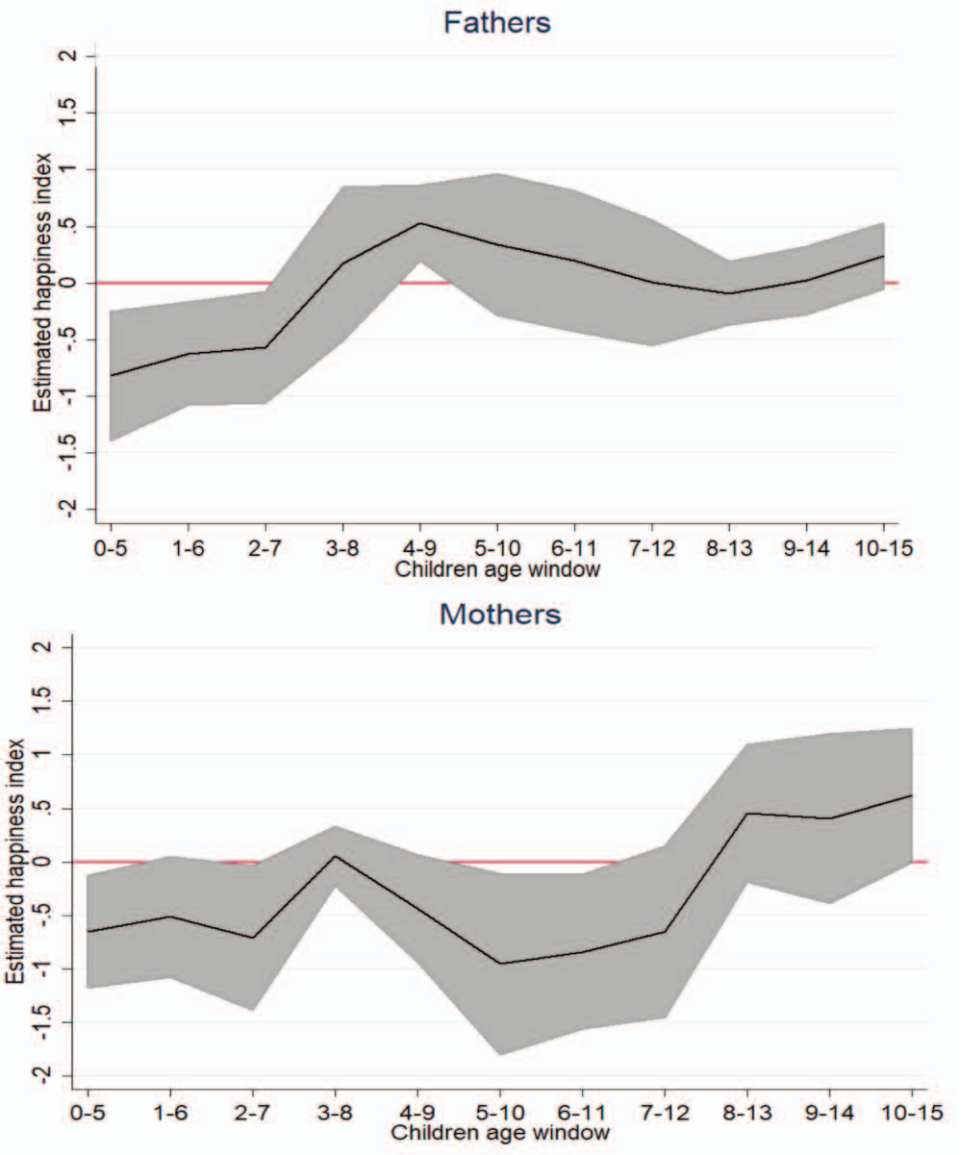
[10] As a robustness check, we repeat the analysis by children age subsamples when these subsamples are defined according to the youngest child age, allowing for older children to be of any age up to 15. The estimated patterns are similar as those reported in Table 2 for fathers' subjective well-being, however with much lower "shock effect" (Table A.8 in the Appendix), especially when life satisfaction is used as the subjective well-being measure. For mothers' life satisfaction we estimate zero effects of having the third child in the 0-5 and 5-10 age categories, while the results for the happiness index are in line with those presented in Table 2.

Figure 1: The Estimated Marginal Effect of the Third Child on Parental Life Satisfaction for Fathers (Panel A) and Mothers (Panel B), Moving Window of Children's Age



Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Sample of fathers (Panel A) and mothers (Panel B) with at least two childbirths who have a singleton at first parity. The line connects point estimates of the LATE of an additional child on parental life satisfaction estimated on the sample of parents all of whose dependent children are within the specific age bracket. The grey area represents the 95 per cent confidence interval.

Figure 2: The Estimated Marginal Effect of the Third Child on Parental Happiness Index for Fathers (Panel A) and Mothers (Panel B), Moving Window of Children's Age



Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Sample of fathers (Panel A) and mothers (Panel B) with at least two childbirths who have only singleton at first parity. The line connects point estimates of the LATE of an additional child on parental happiness index estimated on the sample of parents all of whose dependent children are within the specific age bracket. The grey area represents the 95 per cent confidence interval.

parenthood involves high time stress, while Matysiak *et al*. (2016) show that the relationship between fertility and well-being is to a large extent mediated by experience of work-family conflict.

Following this literature, we investigate how specific aspects of life satisfaction, namely satisfaction with financial situation and satisfaction with time allocation, react to the number of children one has. We also decompose the Happiness Index into its primary components, namely the frequency of feeling calm and peaceful, feeling happy, feeling very nervous, feeling down in the dumps, and feeling downhearted or depressed. Inspired by the earlier literature that mainly relates child-rearing with stress, we expect that the frequency of experiencing negative feelings is more responsive to family size than the frequency of experiencing positive feelings. The results of this exercise are reported in Table 3. For the sake of conciseness, we report only two components of the Happiness Index here (the frequency of feeling happy and the frequency of being nervous), while the remaining three are listed in the Appendix Table A.9.

Table 3 reveals that both parents are hit negatively with an unexpected increase in family size in terms of lower satisfaction with time allocation and experiencing higher frequency of feeling nervous. Among mothers we also estimate a negative effect on the frequency of feeling happy when children are young. Interestingly, the effect of an unexpected third child on satisfaction with financial situation is not statistically different from zero, even though it is negative. Similarly as in the case of overall well-being, the negative effects on specific well-being aspects disappear or turn positive as children become older.

A complete picture is again presented in figures plotting the estimated LATEs of the third child on specific well-being aspects against children's age intervals (see Figures A.3 and A.4 in the Appendix). It seems that the pattern of the additional child's effect observed for fathers' life satisfaction follows the relationship for satisfaction with time allocation, while for mothers it follows instead the relationship for satisfaction with financial situation.

These results suggest that having three rather than two young children strongly increases time pressure and nervousness of parents. This finding is in line with Buddelmeyer *et al*. (2018) estimates of the effect of *arrival* of a child on parental time stress and satisfaction with financial situation. On the other hand, we observe that fathers of three teenage kids are better satisfied with their financial situation and report lower frequency of feeling nervous than fathers of two teenagers. This is consistent with the results for the overall well-being presented earlier and is a strong indicator that fathers of larger families are more satisfied with their lives than fathers of smaller families. Among mothers of teenagers, we observe positive, but insignificant effects of a third child on all the analysed aspects of subjective well-being. Among the strongest is the effect on satisfaction with time allocation.

Table 3: The Estimated Relationship Between the Number of Children and Different Aspects of Subjective Well-Being Among Parents of Children Aged 0-5, 5-10, and 10-15 who Experienced at Least Two Childbirths

	Satisfaction with Financial Situation				*Satisfaction with Time Allocation*				*Frequency of Feeling Nervous*				*Frequency of Feeling Happy*			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*	*(14)*	*(15)*	*(16)*
	IV 0-15	*IV 0-5*	*IV 5-10*	*IV 10-15*	*IV 0-15*	*IV 0-5*	*IV 5-10*	*IV 10-15*	*IV 0-15*	*IV 0-5*	*IV 5-10*	*IV 10-15*	*IV 0-15*	*IV 0-5*	*IV 5-10*	*IV 10-15*
All	0.197	–0.262	–0.095	0.307	**–0.342***	**–1.587*****	–0.559	**0.427***	0.147	**0.463*****	**0.295****	–0.156	–0.015	**–0.227****	–0.038	–0.003
parents	(0.181)	(0.369)	(0.380)	(0.319)	(0.182)	(0.405)	(0.369)	(0.260)	(0.096)	(0.156)	(0.122)	(0.158)	(0.054)	(0.097)	(0.122)	(0.156)
N	31,127	4,865	5,036	4,645	31,024	4,844	5,018	4,626	30,918	4,839	5,000	4,609	30,861	4,840	4,987	4,595
Fathers	0.232	–0.382	0.047	**0.391***	**–0.508****	**–1.962*****	–0.377	0.177	0.005	**0.577*****	–0.031	**–0.223****	0.048	–0.181	0.127	0.009
	0.232	(0.326)	(0.441)	(0.205)	(0.238)	(0.503)	(0.396)	(0.167)	(0.069)	(0.195)	(0.244)	(0.102)	(0.073)	(0.128)	(0.110)	(0.169)
N	13,587	2,161	2,264	2,025	13,547	2,158	2,257	2,018	13,480	2,149	2,248	2,006	13,446	2,153	2,238	1,996
Mothers	0.161	–0.147	–0.219	0.262	–0.221	**–1.234****	**–0.745***	0.661	**0.262***	**0.355****	**0.613*****	–0.123	–0.067	**–0.283*****	–0.188	0.008
	(0.190)	(0.550)	(0.365)	(0.544)	(0.176)	(0.545)	(0.440)	(0.431)	(0.159)	(0.175)	(0.219)	(0.267)	(0.092)	(0.108)	(0.219)	(0.180)
N	17,540	2,704	2,772	2,620	17,477	2,686	2,761	2,608	17,438	2,690	2,752	2,603	17,415	2,687	2,749	2,599

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least two childbirths who have a singleton at first parity; Dependent variables: Satisfaction with financial situation (columns (1)-(3)), Satisfaction with time allocation (columns (4)-(6)), Frequency of feeling nervous (columns (7)-(9)), Frequency of feeling happy (columns (10)-(12); Instrumented variable: dummy variable for having more than two children; Instrument: indicator of twin birth at second parity; Other control variables: household income, employment dummy, age, partnership status dummy, health limitation dummy, education, region fixed effects. Each cell reports an estimate of the coefficient corresponding to the marginal effect of an additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

The estimates reported in Table 3 highlight that the frequency of feeling nervous is much more affected by family size than the frequency of feeling happy. This is consistent with other studies analysing positive and negative affect which show that the frequency of experiencing negative rather than positive feelings is more affected by life events and circumstances (e.g. Jebb *et al.,* 2018; Kahneman and Deaton 2010). Note that the pattern estimated for the frequency of feeling nervous closely follows the pattern estimated for the happiness index. Mothers of larger families feel nervous more often than mothers of smaller families roughly for the first ten years after the arrival of the third child; and only when children are in their teen years, we observe comparable frequency of feeling nervous among mothers of three and mothers of two. For fathers we observe a quicker recovery. Results for the remaining three happiness index components reported in Table A.9 in the Appendix show similar patterns.

V DISCUSSION

The results presented in the body of this paper are estimated on the sample of families experiencing at least two births, where occurrence of twin birth at second parity is used as the instrument for the number of children. This setup allows estimation of the local average treatment effect (LATE) which can be interpreted as the effect of an *unplanned* third child on parental well-being for the compiler population.

We show a positive effect of an additional child on parental subjective well-being in families of teenagers. Parents of an unplanned third child experience the same or even higher levels of well-being than parents of two teenagers. On the contrary, among parents of pre-school children we mainly observe a negative effect of an additional child. Is this because of adaptation? According to the adaptation hypothesis, the well-being impact of entering a particular state is attenuated over time. Among others, Myrskylä and Magnolis (2014) show that parents in Britain and Germany adapt to the birth of a child after a few years and their well-being returns to the before childbirth levels. Our results suggest that the initially negative effect of an additional child might actually turn into a positive effect several years after childbirth,[11] which cannot be explained by pure adaptation. The negative estimates for parents of young children might be to some extent driven by the "shock effect" – difficulty to deal with two babies/toddlers at the same time. They might capture the effect of an *arrival* of twins (what is similar to the effect measured by longitudinal analyses in the spirit of Myrskylä and Magnolis, 2014) rather than the effect of *having* three as compared to two children. In other words, 2SLS

[11] 2SLS results suggest that the effect of an additional child is negative during the first years after childbirth and turns into a zero or a positive effect once children are teenagers. OLS results exhibit a similar, but flatter pattern.

estimates might be somehow downward biased at young child ages. However, when children are older, raising twins becomes comparable to raising closely spaced siblings, which is confirmed by comparing several outcomes between parents of three singletons and parents of a singleton plus twins (Tables A.10 and A.11 in the Appendix). The results presented in this study thus suggest that after a few years parents adapt to having a larger than planned family. On top of that, however, it appears that fathers of teenagers appreciate having more children. Whether this is driven by additional utility derived from the third child or whether this is driven by parents of two who in later years regret not having decided for more children, remains to be investigated.[12]

Inspecting different aspects of subjective well-being we find that financial situation is not the main driver of the observed effect of children. The negative relationship between the number of children and parental well-being at young child ages is mainly driven by time pressure and by increased frequency of feeling nervous. Similarly, Buddelmeyer *et al*. (2018) identify increased time stress experienced by parents after childbirth. The positive effect of the number of children on fathers' well-being when children are in their teens seems to be driven by increased satisfaction with financial situation and lower frequency of feeling nervous. This result is consistent with earlier findings by Lundberg and Rose (2002) concerning fathers' wage response to each additional child. Among mothers of (unplanned) three teenagers we observe significantly lower frequency of feeling down in the dumps than among mothers of two teenagers.

Two measures of well-being are analysed in this paper: life satisfaction and a happiness index. We show that having a large family affects both, although among mothers the third child's effect on life satisfaction is weaker (and in most cases statistically insignificant) than the effect on the happiness index. This is most probably driven by the differences between the two well-being measures. As suggested by Emmons and Diener (1985), life satisfaction captures not only pure well-being but also to some extent comparison with others and with own expectations. Its level, as reported by individual respondents, is strongly evaluative and might be influenced by social norms. The happiness index is based on questions reporting the frequency of experiencing specific emotions and feelings. As such it is less prone to arbitrariness because it is easier to report frequency than intensity and is less affected by expectations and comparison to others because emotions are less controllable than life evaluation. On the other hand, the happiness index pools together people experiencing frequently both positive and negative feelings with

[12] Some hint may be derived from the observation that 2SLS estimates exceed OLS estimates among parents of teenagers. Parents of teenagers who have chosen to have two children report similar levels of well-being as parents of teenagers who have chosen to have three children. However, among parents who have chosen to have two children, those who gave birth to twins and thus have three children in the end report higher levels of well-being. This suggests that the unplanned third child has improved parents' well-being. Maybe the affected parents have changed their priorities, which in turn affected their baseline well-being levels?

people experiencing all types of feelings with medium frequency. We argue that the third child's effect on life satisfaction captures parental evaluation of their life situation and observing a positive effect here suggests that parents positively assess the fact that they have three rather than two (as originally planned) children. The third child's effect on the happiness index measures the emotional load of dealing with more children than originally planned. Our results suggest that at young child ages this emotional load is high, however when children grow older, parents of three experience lower emotional load than parents of two.

The differences between life satisfaction and the happiness index are even more pronounced when comparing mothers and fathers in specific children's age intervals. While the reaction of mothers' and fathers' life satisfaction to the unexpected third child follow a similar pattern across child ages, the happiness index of mothers remains negative for longer (until higher child ages) than the happiness index of fathers. In other words, the emotional adaptation to the third child takes longer time for mothers than for fathers. This might be because life satisfaction is affected both by feelings and emotions and by expectation (societal and own) that a mother should be satisfied when having a large family, while the happiness index is much less affected by such expectations. The cross-sectional nature of the SILC data does not allow us to conduct a within-parent analysis that would reveal evolution of both well-being measures over time. Nevertheless, our results suggest that for mothers it takes longer to adapt to the new, unplanned situation of having a large family than for fathers. This may be caused by higher childcaring cost for mothers than for fathers and might be to a large extent influenced by country-specific family policies. Previous research suggests existence of a positive link between generous family policies and the strength of the first child's positive effect on parental happiness (Aassve, 2015; Glass *et al*., 2016), as well as a positive link between generous family policies and fertility (Harknett *et al*., 2014). This motivates our next project, which pools together the 2013 and 2018 SILC well-being modules to increase the number of observations per country, and formally checks whether the third child's effect either on life satisfaction or on the happiness index correlates with fertility, family policies, and social norms.

Identification of the additional child effect heavily relies on relevance and validity of the instrument used to predict the number of children parents have. We carefully consider conditions under which these assumptions might fail and present a series of tests and arguments suggesting that most probably the applied instrumental variable strategy is valid. It might still happen, though, that the two-stage least squares estimates presented in this paper are slightly biased. This could be driven by non-random attrition in the sample of fathers or by increased employment among mothers of twins. We believe, however, that the bias carried by the two-stage least squares estimates is lower than the bias in OLS estimates. For example, note that being employed improves female life satisfaction by about 0.3 (mothers of children aged 5-10). Mothers of twins are about 0.18 more likely

to be employed than mothers of singletons (see Appendix Table A.11). This implies a direct effect from having twins on mothers' life satisfaction of about 0.05 and could potentially lead to a bias in 2SLS estimate of γ of the order of 0.06, if employment status is not controlled for (because of the 0.8 correlation between having twins and family size).

What might be more worrying is the external validity of our estimates, as we extend the conclusions based on parents with twins to the full population of parents. We would like to say that our findings imply that parents of three teenage singletons would report higher levels of subjective well-being than parents of two teenage singletons. This could be implied, but with caution. Specifically, this implication is solid when parents of closely spaced siblings are considered because raising twins is comparable to raising closely spaced siblings. However, it is risky to say that our results imply that deciding for a third child *at any point in time* would increase parent's subjective well-being once the third child reaches adolescence.

VI CONCLUSION

In this paper we investigate whether parents can reach higher levels of subjective well-being when having a larger than planned family by exploiting exogenous increases in the number of children caused by twin births. Our results extend the so far narrow literature estimating causal effects of an additional child on parental well-being. The recent studies by Conzo *et al*. (2017), Mu and Xie (2016), and Priebe (2020) concentrate on developing countries and pool together parents of children in all age categories. We add to this stream of literature by providing evidence on the causal relationship between the number of children and parental well-being in European countries and by zooming in on children in different age categories.

We show that parents derive different levels of well-being from having a large family at different stages of their children's lives. Having an additional child is associated with lower levels of subjective well-being for parents with small children, but this relationship is neutral or positive for parents with teenage children. On that account we suggest that higher fertility levels might be reached by two policy approaches. First, if parents receive more help during the early years of their children. As Bucher-Koenen *et al*. (2020) point out, more help during the early years of child-rearing could also mitigate potential future negative effects of children that are caused by prolonged exposition to stress. Second, if the positive (future) effects of having large families are publicised.

In contrast to the previous literature analysing fertility effects on parental well-being, which uses gender of the first child or gender of first two children as an instrument for family size, we rely on a twin birth instrument. Our preferred specification exploits an exogenous increase in the number of children caused by

twinning at second parity. Although the validity of the twin birth instrument has been criticised by some, we provide multiple evidence supporting its ability to identify LATE. Moreover, within our sample twin births are highly relevant when predicting the number of children. All this combined, we believe that in the context of European countries, twin birth at second parity allows identifying the LATE of having more than two children on subjective well-being of parents.

The identified effect is local in the sense that it is only identified by parents of twins. This might generate doubts about the external validity of our findings. However, a complementary analysis shows that parents of three children with twins born at second parity are comparable in all observable characteristics (with exception of maternal employment status, but including subjective well-being) to parents of three children with all singleton births. Hence, we believe that the presented results are also informative of the well-being effects of having a third child born relatively soon after the previous one. Whether these results can be extended further could be probed by repeating the analysis with an alternative instrumental variable, for example, the first two siblings sex composition, but to follow this approach one would need (1) a larger dataset, and (2) to deal with the direct effect of the gender of the third child on parental well-being.

We show that the relationship between the number of children and parental well-being depends on children's age up until children's teens. It would be both interesting and policy relevant to know how this relationship evolves beyond that age, but the dataset used in this study does not allow for such analysis. Some hint in this direction is provided by Oliveira (2016) who shows that Chinese parents are better-off at old age if they gave birth to twins. On the other hand, Kruk and Reinhold (2014) show that higher number of children is linked to increased occurrence of depression at old age among mothers. To build a full picture of the effect of children on parental well-being one should follow the subjective well-being of parents over the whole life course. Unfortunately, we are not aware of a dataset that would allow for such analysis.

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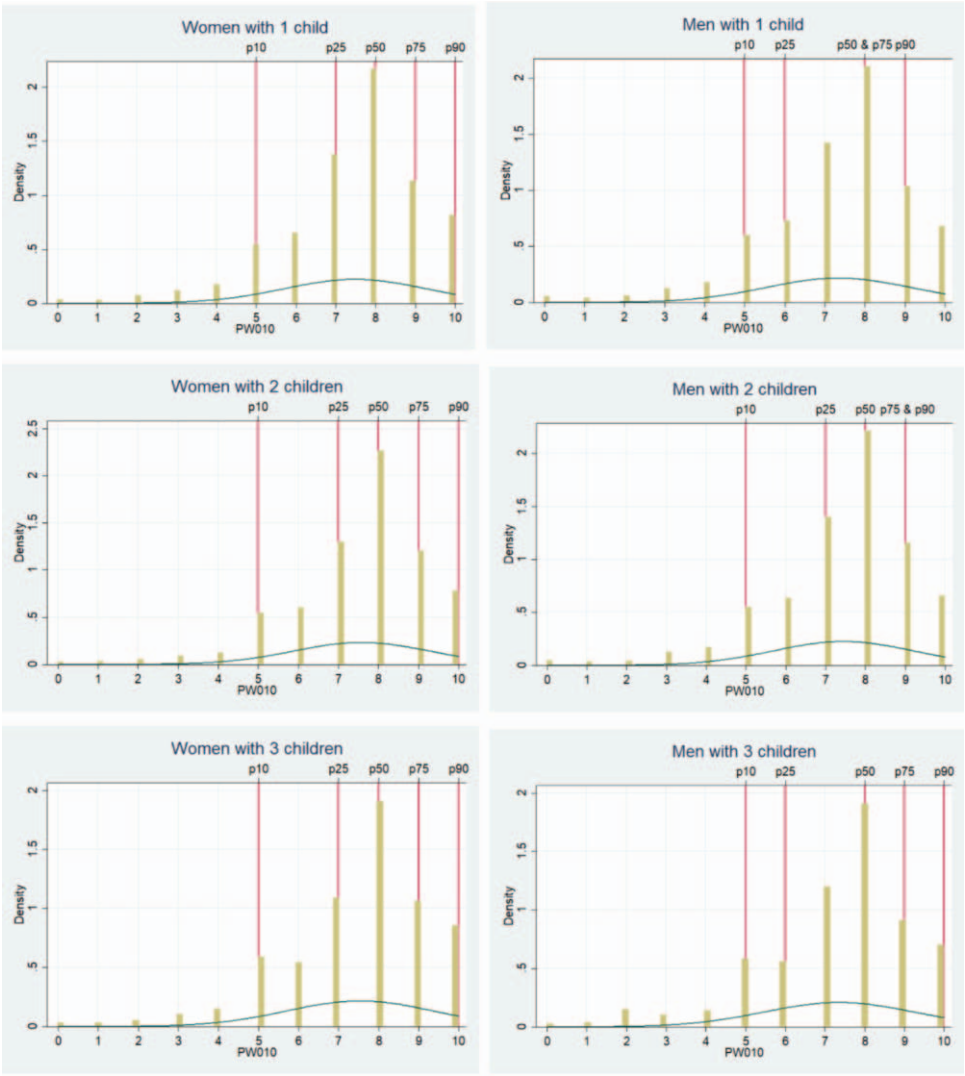
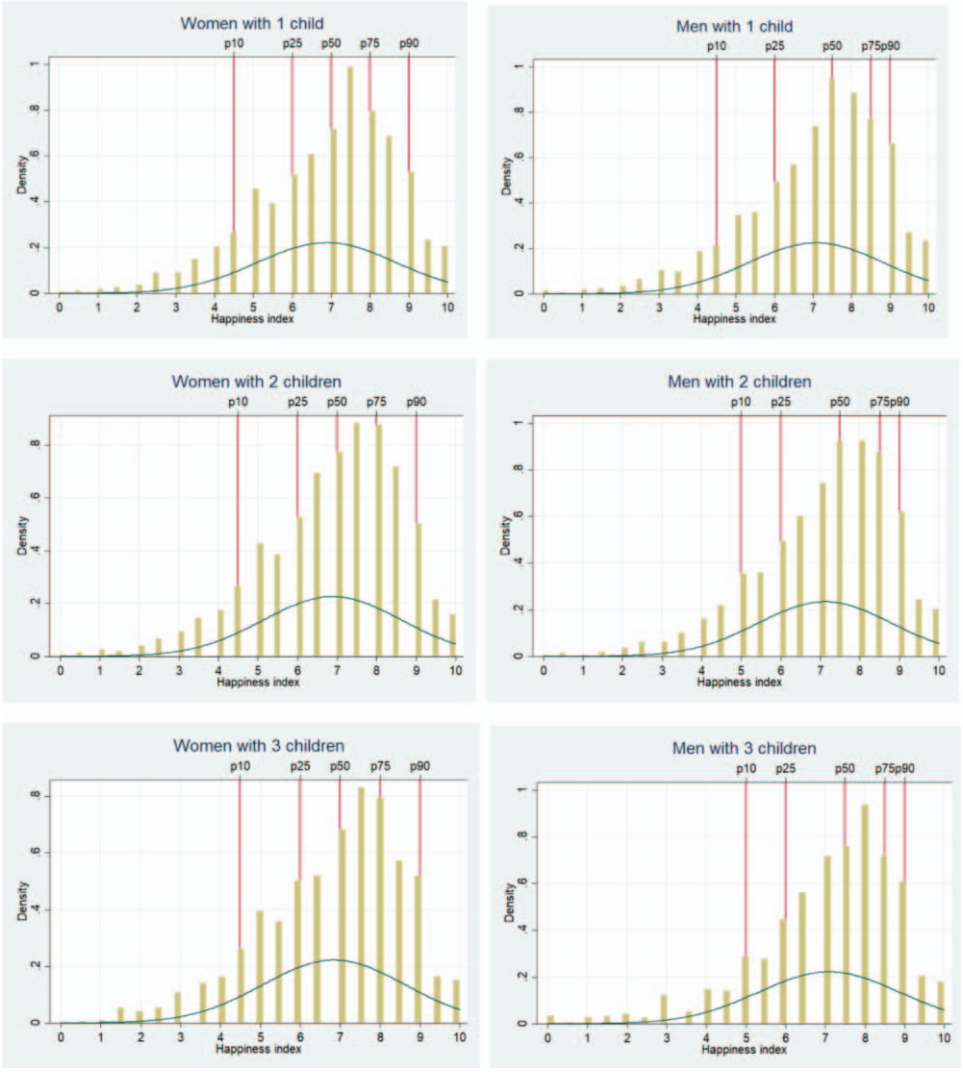
APPENDIX 1

Figure A.1: Histograms of Life Satisfaction for Mothers and Fathers by the Number of Own Children



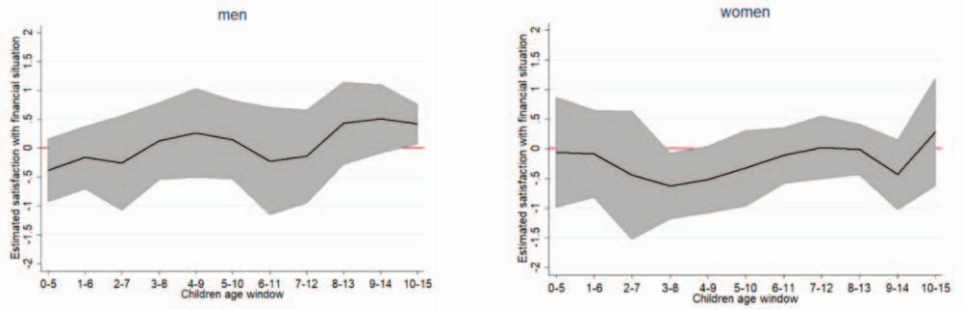
Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Histograms present the distribution of self-reported life satisfaction for the sample of mothers (left column) and fathers (right column) living in a partnership and having the specified number of own children not older than 15 living in the same household.

Figure A.2: Histograms of the Happiness Index for Mothers and Fathers by the Number of Own Children



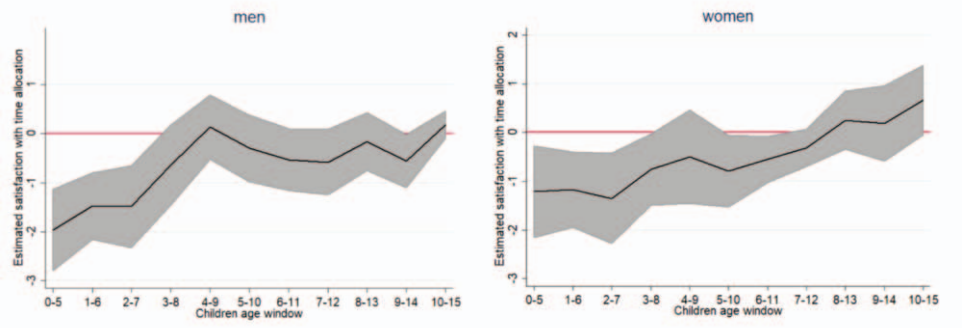
Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Histograms present the distribution of the happiness index for the sample of mothers (left column) and fathers (right column) living in a partnership and having the specified number of own children not older than 15 living in the same household.

Figure A.3: The Estimated Marginal Effect of the Third Child on Parental Satisfaction with Financial Situation for Fathers (Left) and Mothers (Right), Moving Window of Children's Age



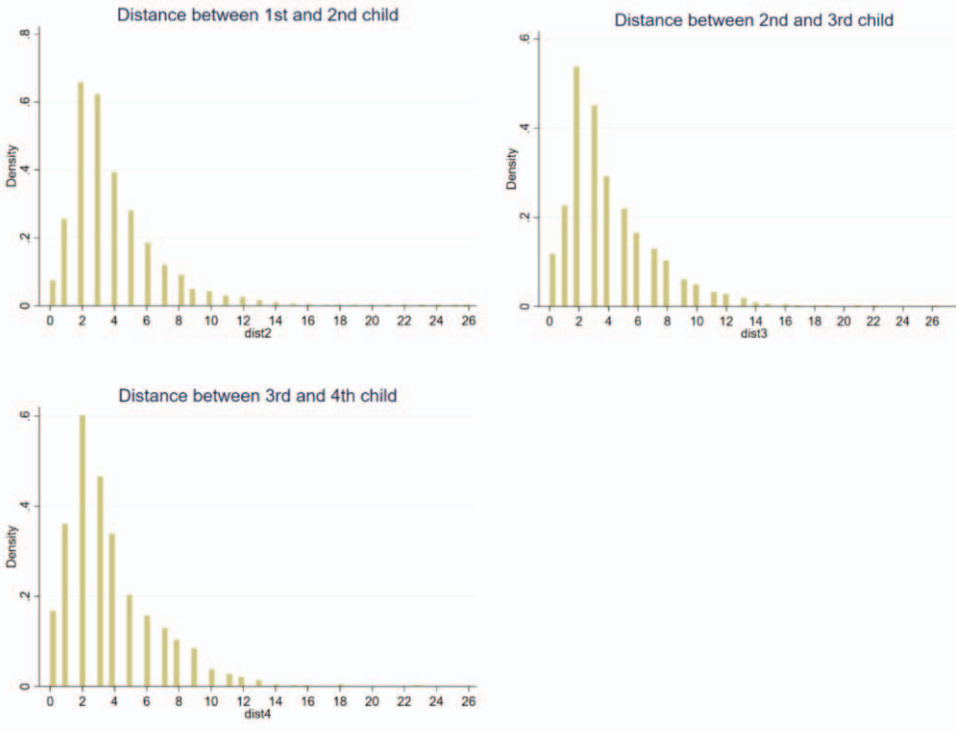
Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Sample of fathers (Panel A) and mothers (Panel B) with at least two childbirths who have only singleton at first parity. The line connects point estimates of the LATE of an additional child on parental satisfaction with financial situation estimated on the sample of parents all of whose dependent children are within the specific age bracket. The grey area represents the 95 per cent confidence interval.

Figure A.4: The Estimated Marginal Effect of the Third Child on Parental Satisfaction with Time Allocation for Fathers (Left) and Mothers (Right), Moving Window of Children's Age



Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Sample of fathers (Panel A) and mothers (Panel B) with at least two childbirths who have only singleton at first parity. The line connects point estimates of the LATE of an additional child on parental satisfaction with time allocation estimated on the sample of parents all of whose dependent children are within the specific age bracket. The grey area represents the 95 per cent confidence interval.

Figure A.5: Histograms of Spacing Between Children



Source: Authors' analysis based on EU-SILC 2013 microdata.

Table A.1: The Estimated Relationship Between the Number of Children and Subjective Well-Being Among Parents of Children Aged 0-15

Model	*(1) OLS*	*(2) 2SLS*	*(3) OLS*	*(4) 2SLS*	*(5) OLS*	*(6) 2SLS*
Sample	*≥1 birth*	*≥1 birth*	*≥2 births*	*≥2 births*	*≥3 births*	*≥3 births*
Panel A: Life satisfaction						
All	**0.051****	0.080	–0.054	0.124	–0.012	0.485
parents	(0.025)	(0.187)	(0.045)	(0.262)	(0.137)	(0.313)
N	57,890	57,890	31,177	31,177	6,478	6,478
Fathers	**0.050***	0.183	**–0.135*****	0.076	–0.001	0.608
	(0.028)	(0.248)	(0.044)	(0.301)	(0.162)	(0.379)
N	24,726	24,726	13,612	13,612	2,779	2,779
Mothers	0.054	–0.010	–0.002	0.158	–0.024	0.404
	(0.032)	(0.162)	(0.055)	(0.293)	(0.146)	(0.379)
N	33,164	33,164	17,565	17,565	3,699	3,699
Panel B: Happiness index						
All parents	**–0.051****	**–0.429****	**–0.076***	–0.030	–0.167	0.370
	(0.023)	(0.171)	(0.038)	(0.151)	(0.129)	(0.364)
N	56,590	56,590	30,574	30,574	6,359	6,359
Fathers	–0.029	–0.204	**–0.106***	0.057	**–0.262***	0.165
	(0.026)	(0.207)	(0.062)	(0.137)	(0.138)	(0.490)
N	24,127	24,127	13,324	13324	2,727	2,727
Mothers	**–0.074****	**–0.591*****	–0.063	–0.108	–0.105	0.523
	(0.028)	(0.189)	(0.053)	(0.268)	(0.181)	(0.396)
N	32,463	32,463	17,250	17,250	3,632	3,632

Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Sample of parents with at least one childbirth (columns 1, 2), at least two childbirths (columns 3, 4), and at least three childbirths (columns 5, 6), with all children younger than 16; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Other control variables: household income, employment dummy, age, partnership status dummy, health limitation dummy, education, region fixed effects; Having more than one, two, or three children, is instrumented by a dummy equal to one if multiple birth occurred at first, second, or third parity, respectively. Each cell reports an estimate of the effect of an additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.2: First Stage Regressions for Appendix Table A.1

Sample	*(1)* *≥1 birth*	*(2)* *≥2 births*	*(3)* *≥3 births*
All parents	**0.482*****	**0.817*****	**0.834*****
	(0.013)	(0.013)	(0.013)
R^2	0.074	0.075	0.091
F-statistic	1,146.845	1,973.696	990.239
Fathers	**0.481*****	**0.822*****	**0.835*****
	(0.014)	(0.012)	(0.013)
R^2	0.071	0.073	0.088
F-statistic	843.390	1,036.766	6,895.758
Mothers	**0.487*****	**0.811*****	**0.831*****
	(0.012)	(0.017)	(0.015)
R^2	0.090	0.083	0.102
F-statistic	1,135.769	2,026.856	743.815

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Table reports point estimates of the relationship between the instrument and the endogenous explanatory variable (having more than n children) coming from the first-stage regressions in 2SLS estimations presented in Table 3. The instruments are: a dummy equal to one if multiple birth occurred at first (column 1), second (column 2), or third parity (column 3), a dummy equal to one if the first two children are of the same gender (column 4). Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.3: First Stage Regressions for Table 2 and Table 3

	(1) *2SLS 0-15*	*(2)* *2SLS 0-5*	*(3)* *2SLS 5-10*	*(4)* *2SLS 10-15*
All parents	**0.817*****	**0.959*****	**0.951*****	**0.937*****
	(0.013)	(0.008)	(0.012)	(0.009)
R^2	0.075	0.187	0.197	0.209
F-statistic	1,973.696	17,869.13	6,432.184	10,043.04
Fathers	**0.822*****	**0.951*****	**0.957*****	**0.938*****
	(0.012)	(0.009)	(0.014)	(0.015)
R^2	0.073	0.229	0.231	0.195
F-statistic	1,036.766	4,642.359	4,206.656	3,680.293
Mothers	**0.811*****	**0.964*****	**0.948*****	**0.939*****
	(0.017)	(0.010)	(0.010)	(0.011)
R^2	0.083	0.160	0.178	0.226
F-statistic	2,026.856	4,069.624	6,487.936	5,138.662

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Table reports point estimates of the relationship between the instrument and the endogenous explanatory variable (having more than n children) coming from the first-stage regressions in 2SLS estimations presented in Table 4 and Table 5. First column reports the full sample estimates and columns 2–4 report estimates on subsamples according to children's age. The instrument is a dummy equal to one if multiple birth occurred at second parity. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.4: The Estimated Relationship Between the Number of Children and Subjective Well-Being, Pooled Sample, Family Size Instrumented by Same-Sex Twin Births

Model	*(1) OLS*	*(2) 2SLS*	*(3) OLS*	*(4) 2SLS*	*(5) OLS*	*(6) 2SLS*
Sample	*≥1 birth*	*≥1 birth*	*≥2 births*	*≥2 births*	*≥3 births*	*≥3 births*
Panel A: Life satisfaction						
All	0.022	0.123	–0.036	0.183	–0.018	0.359
parents	(0.018)	(0.195)	(0.030)	(0.251)	(0.086)	(0.390)
N	57,917	57,917	31,365	31,365	6,552	6,552
Fathers	0.009	0.218	**–0.081****	0.177	0.006	0.071
	(0.021)	(0.299)	(0.034)	(0.235)	(0.101)	(0.714)
N	24,739	24,739	13,692	13,692	2,809	2,809
Mothers	0.033	0.034	–0.007	0.186	–0.039	0.490
	(0.021)	(0.144)	(0.033)	(0.326)	(0.113)	(0.358)
N	33,178	33,178	17,673	17,673	3,743	3,743
Panel B: Happiness index						
All	**–0.044****	**–0.375****	**–0.066****	−0.007	–0.080	0.100
parents	(0.017)	(0.188)	(0.031)	(0.187)	(0.073)	(0.526)
N	56,617	56,617	30,758	30,758	6,433	6,433
Fathers	–0.037	–0.261	**–0.086***	0.183	–0.092	0.037
	(0.026)	(0.256)	(0.050)	(0.166)	(0.060)	(0.927)
N	24,140	24,140	13,403	13,403	2,757	2,757
Mothers	**–0.055*****	**–0.457*****	−0.057	–0.155	–0.073	0.116
	(0.019)	(0.160)	(0.051)	(0.322)	(0.125)	(0.420)
N	32,477	32,477	17,355	17,355	3,676	3,676

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least one child (MB1S), at least two children (MB2S), at least three children (MB3S) younger than 16; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Other control variables: household income, employment dummy, age, partnership status, health limitation dummy, education, region fixed effects; In columns (2), (4), and (6) the number of children is instrumented by a dummy equal to one if same sex multiple births occurred at first, second, or third parity, respectively. Each cell reports an estimate of the coefficient corresponding to the marginal effect of an additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.5: First Stage Regressions for Table A.4

	(1) *2SLS* *≥1 birth*	*(2)* *2SLS* *≥2 births*	*(3)* *2SLS* *≥3 births*
All	**0.547*****	**0.917*****	**0.907*****
parents	(0.037)	(0.046)	(0.052)
R^2	0.062	0.052	0.049
F-statistic	166.216	115.524	202.661
Fathers	**0.556*****	**0.935*****	**0.800*****
	(0.033)	(0.054)	(0.036)
R^2	0.059	0.046	0.037
F-statistic	126.794	83.238	98.165
Mothers	**0.542*****	**0.901*****	**0.978*****
	(0.038)	(0.050)	(0.059)
R^2	0.078	0.063	0.066
F-statistic	190.589	154.151	185.003

Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Table reports point estimates of the relationship between the instrument and the endogenous explanatory variable (having more than n children) coming from the first-stage regressions in 2SLS estimations presented in Table A.8. The instruments are: a dummy equal to one if multiple birth of the same gender children occurred at first (column 1), second (column 2), or third parity (column 3). Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.6: The Estimated Relationship Between the Number of Children and Subjective Well-Being, Sample of Parents with at Least One Childbirth, by Children Age

	(1) OLS 0-5	*(2) 2SLS 0-5*	*(3) OLS 5-10*	*(4) 2SLS 5-10*	*(5) OLS 10-15*	*(6) 2SLS 10-15*
Panel A: Life satisfaction						
All	**0.080****	–0.010	0.069	**0.338***	**0.203*****	–0.139
parents	(0.038)	(0.222)	(0.057)	(0.174)	(0.039)	(0.196)
N	17,911	17,911	13,525	13,525	12,747	12,747
Fathers	0.093	–0.024	**0.096****	0.344	**0.178*****	0.192
	(0.055)	(0.205)	(0.044)	(0.252)	(0.040)	(0.233)
N	7,791	7,791	5,758	5,758	5,231	5,231
Mothers	**0.072***	0.002	0.043	0.330	**0.230*****	**–0.458****
	(0.042)	(0.236)	(0.072)	(0.262)	(0.055)	(0.217)
N	10,120	10,120	7,767	7,767	7,516	7,516
Panel B: Happiness index						
All	–0.033	**–0.398*****	0.047	0.069	0.085	**–0.447***
parents	(0.038)	(0.104)	(0.050)	(0.194)	(0.061)	(0.268)
N	17,556	17,556	13,181	13,181	12,412	12,412
Fathers	0.002	–0.141	0.047	–0.058	**0.111***	–0.200
	(0.046)	(0.135)	(0.060)	(0.168)	(0.062)	(0.312)
N	7,638	7,638	5,596	5,596	5,078	5,078
Mothers	–0.067	**–0.587*****	0.044	0.157	0.064	**–0.677****
	(0.051)	(0.157)	(0.047)	(0.263)	(0.080)	(0.325)
N	9,918	9,918	7,585	7,585	7,334	7,334

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least one childbirth younger than 16 living in the same household; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Instrumented variable: having more than one child; Instrument: indicator of twin birth at first parity; other control variables: household income, employment dummy age, partnership status dummy, health limitation dummy, education, region fixed effects. Each cell reports estimate of the coefficient corresponding to the marginal effect of additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.7: Robustness Check: The Estimated Relationship Between the Number of Children and Subjective Well-Being, the Sample of Parents with at Least Two Childbirths, by Children Age, Multivalued Treatment

	(1) OLS 0-5	*(2) 2SLS 0-5*	*(3) OLS 5-10*	*(4) 2SLS 5-10*	*(5) OLS 10-15*	*(6) 2SLS 10-15*
Panel A: Life satisfaction						
All	0.019	–0.616	0.061	0.056	0.068	0.494
parents	(0.218)	(0.402)	(0.096)	(0.238)	(0.072)	(0.410)
N	4,868	4,868	5,039	5,039	4,650	4,650
Fathers	–0.163	**–0.916****	0.083	0.215	–0.035	**0.434****
	(0.262)	(0.459)	(0.107)	(0.305)	(0.113)	(0.193)
N	2,162	2,162	2,267	2,267	2,027	2,027
Mothers	0.171	–0.337	0.040	–0.098	0.175	0.535
	(0.217)	(0.439)	(0.114)	(0.237)	(0.134)	(0.686)
	2,706	2,706	2,772	2,772	2,623	2,623
Panel B: Happiness index						
All	0.061	**–0.669*****	–0.135	–0.290	–0.044	**0.417****
parents	(0.179)	(0.258)	(0.132)	(0.280)	(0.110)	(0.191)
N	4,805	4,805	4,947	4,947	4,543	4,543
Fathers	–0.110	**–0.799****	0.050	0.372	–0.063	0.196
	(0.242)	(0.347)	(0.148)	(0.351)	(0.119)	(0.164)
N	2,136	2,136	2,218	2,218	1,974	1,974
Mothers	0.211	**–0.558****	–0.266	**–0.891***	–0.021	0.598
	(0.170)	(0.283)	(0.176)	(0.506)	(0.158)	(0.367)
	2,669	2,669	2,729	2,729	2,569	2,569

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least two childbirths and children younger than 16; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Instrumented variable: number of children; Instrument: indicator of twin birth at second parity; other control variables: household income, employment dummy, age, partnership status dummy, health limitation dummy, education, region fixed effects. Each cell reports an estimate of the coefficient corresponding to the marginal effect of an additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.8: Robustness check: The Estimated Relationship Between the Number of Children and Subjective Well-Being, Subsamples Defined by the Age of the Youngest Child

	(1) OLS 0-5	*(2) 2SLS 0-5*	*(3) OLS 5-10*	*(4) 2SLS 5-10*	*(5) OLS 10-15*	*(6) 2SLS 10-15*
Panel A: Life satisfaction						
All	–0.077	–0.025	–0.069	0.197	0.106	0.520
parents	(0.050)	(0.289)	(0.059)	(0.226)	(0.085)	(0.429)
N	17,456	17,456	13,633	13,633	4,617	4,617
Fathers	**–0.133***	–0.114	**–0.172****	0.389	0.008	**0.478****
	(0.068)	(0.369)	(0.080)	(0.323)	(0.158)	(0.211)
N	7,579	7,579	5,999	5,999	2,012	2,012
Mothers	–0.044	0.015	0.004	0.050	0.212	0.552
	(0.049)	(0.272)	(0.087)	(0.184)	(0.147)	(0.704)
N	9,877	9,877	7,634	7,634	2,605	2,605
Panel B: Happiness index						
All	**–0.095****	–0.149	–0.091	–0.015	0.093	**0.448****
parents	(0.046)	(0.233)	(0.076)	(0.212)	(0.074)	(0.202)
N	17,139	17,139	13,358	13,358	4,512	4,512
Fathers	–0.054	–0.108	–0.172	**0.386***	0.074	0.237
	(0.076)	(0.170)	(0.107)	(0.233)	(0.100)	(0.179)
N	7,431	7,431	5,866	5,866	1,960	1,960
Mothers	–0.129	–0.221	–0.034	–0.331	0.119	0.618
	(0.077)	(0.370)	(0.077)	(0.413)	(0.145)	(0.377)
N	9,708	9,708	7,492	7,492	2,552	2,552

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least two childbirths and children younger than 16; Dependent variable: life satisfaction (Panel A) or happiness index (Panel B); Instrumented variable: dummy for having at least two children; Instrument: indicator of twin birth at second parity; Other control variables: household income, employment dummy, age, partnership status dummy, health limitation dummy, education, region fixed effects. Each cell reports estimate of the coefficient corresponding to the marginal effect of additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.9: The Estimated Relationship Between the Number of Children and the Frequency of Experiencing Specific Feelings

	Frequency of Feeling Down in the Dumps			*Frequency of Feeling Calm and Peaceful*			*Frequency of Feeling Depressed*		
	(1) 2SLS 0-5	*(2) 2SLS 5-10*	*(3) 2SLS 10-15*	*(4) 2SLS 0-5*	*(5) 2SLS 5-10*	*(6) 2SLS 10-15*	*(7) 2SLS 0-5*	*(8) 2SLS 5-10*	*(9) 2SLS 10-15*
All parents	0.275	0.035	**–0.347*****	**–0.259***	–0.078	0.203	0.142	0.116	–0.138
	(0.177)	(0.141)	(0.113)	(0.139)	(0.128)	(0.131)	(0.160)	(0.191)	(0.115)
	4,835	5,000	4,596	4,843	5,005	4,610	4,833	5,000	4,588
Fathers	0.364	**–0.340***	0.051	–0.232	0.133	0.122	0.236	–0.127	–0.119
	(0.254)	(0.202)	(0.094)	(0.214)	(0.163)	(0.116)	(0.164)	(0.151)	(0.109)
	2,145	2,246	1,997	2,151	2,251	2,006	2,145	2,246	1,996
Mothers	0.188	0.387	**–0.633*****	**–0.297****	**–0.278****	0.279	0.051	0.346	–0.154
	(0.177)	(0.295)	(0.123)	(0.142)	(0.136)	(0.204)	(0.208)	(0.285)	(0.204)
	2,690	2,754	2,599	2,692	2,754	2,604	2,688	2,754	2,592

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with at least two children and all children younger than 16; Dependent variables: Frequency of feeling down in the dumps (columns (1)-(3)), Frequency of feeling calm and peaceful (columns (4)-(6)), Frequency of feeling depressed (columns (7)-(9)); These variables are measured on a 1 – 5 scale with 0 meaning 'none of the time' and 5 'all of the time'; Instrumented variable: having more than two children; Instrument: indicator of twin birth at second parity; Other control variables: household income, employment dummy age, partnership status dummy, health limitation dummy, education, region fixed effects. Each cell reports estimate of the coefficient corresponding to the marginal effect of additional child from a separate regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.10: Correlation Between Having Twins at the Last Childbirth and Selected Parental Outcomes

Dependent Variable	*(1) Being Single*	*(2) Health Limit*	*(3) Financial Satisfaction*	*(4) Being Employed*
Panel A: Parents of two children				
All	**0.050*****	–0.006	**–0.345***	0.020
parents	(0.010)	(0.015)	(0.191)	(0.017)
N	25,191	25,191	25,154	25,191
Fathers	**0.034****	0.022	–0.084	–0.004
	(0.015)	(0.019)	(0.196)	(0.020)
N	11,049	11,049	11,029	11,049
Mothers	**0.059*****	–0.025	**–0.548*****	0.032
	(0.014)	(0.022)	(0.199)	(0.023)
N	14,142	14,142	14,125	14,142
Panel B: Parents of three children				
All parents	0.036	–0.020	0.056	**0.117*****
	(0.024)	(0.017)	(0.172)	(0.036)
N	5,823	5,823	5,810	5,823
Fathers	0.005	–0.032	–0.034	**0.086*****
	(0.012)	(0.049)	(0.306)	(0.028)
N	2,491	2,491	2,484	2,491
Mothers	0.052	–0.010	0.108	**0.145****
	(0.039)	(0.018)	(0.134)	(0.056)
N	3,332	3,332	3,326	3,332

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with exactly two children (Panel A), and exactly three children (Panel B), with all children younger than 16; Dependent variable (column): dummy for living without partner in the household (1), dummy for having health limitation restricting your life (2), financial satisfaction (3), employment dummy (4); Other control variables: household income, age, education, region fixed effects. Each cell reports an estimate of the coefficient corresponding to the marginal effect of having twins at the last parity from a separate OLS regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.11: Correlation Between Having Twins at the Last Childbirth and Selected Parental Outcomes for Parents of Three Children Within Subsamples Defined by the Age of Children

Dependent Variable	*All Parents*			*Fathers*			*Mothers*		
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
Age group	0-5	5-10	10-15	0-5	5-10	10-15	0-5	5-10	10-15
Living without partner	–0.019	–0.047	0.066	N/A	–0.023	0.017	–0.043	–0.073	0.119
	(0.022)	(0.040)	(0.073)		(0.018)	(0.036)	(0.039)	(0.074)	(0.103)
N	309	416	440		183	204	173	233	236
Health limitation	0.044	–0.063	**–0.070****	0.036	–0.097	**–0.184***	0.031	–0.031	0.007
	(0.059)	(0.052)	(0.034)	(0.109)	(0.071)	(0.101)	(0.076)	(0.038)	(0.081)
N	309	416	440	136	183	204	173	233	236
Financial satisfaction	0.053	–0.862	–0.049	–0.139	–1.369	–0.307	0.284	–0.423	0.062
	(0.540)	(0.538)	(0.366)	(0.640)	(0.819)	(0.464)	(0.411)	(0.342)	(0.450)
N	309	416	439	136	183	204	173	233	235
Being employed	**0.154***	**0.195****	**0.154****	0.029	**0.225*****	0.121	**0.292****	**0.176***	**0.163***
	(0.087)	(0.079)	(0.057)	(0.125)	(0.081)	(0.106)	(0.139)	(0.098)	(0.091)
N	309	416	440	136	183	204	173	233	236

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Sample of parents with exactly three children with all children within the indicated age interval. The results presented in this table compare parents of one singleton plus twins with parents of three singletons who must be closely spaced to fit into the 0-5, 5-10, or 10-15 age intervals. This makes the compared families with and without twins highly similar in terms of their children's needs and abilities. Dependent variable specified in the rows; Other control variables: household income, age, education, region fixed effects. Each cell reports an estimate of the coefficient corresponding to the marginal effect of having twins at the last parity from a separate OLS regression. Standard errors clustered by country in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Coefficients significant at least at 90 per cent level are given in bold.

Table A.12: Summary of the Subjective Well-Being Aspects

	Satisfaction With Financial Situation		*Satisfaction With Time Allocation*		*Satisfaction With Accommodation*	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*
All adults	6.083	5.975	6.762	6.696	7.463	7.501
	(2.418)	(2.463)	(2.333)	(2.381)	(1.988)	(2.061)
Of which, parents	6.004	5.875	5.924	5.909	7.313	7.274
	(2.288)	(2.396)	(2.331)	(2.435)	(1.991)	(2.117)
Parents of one child	5.968	5.780	6.005	6.064	7.287	7.246
	(2.261)	(2.405)	(2.314)	(2.417)	(1.990)	(2.094)
Parents of two children	6.083	6.002	5.911	5.814	7.378	7.370
	(2.272)	(2.357)	(2.314)	(2.429)	(1.943)	(2.081)
Parents of three children	5.903	5.866	5.578	5.623	7.216	7.113
	(2.413)	(2.432)	(2.462)	(2.475)	(2.094)	(2.217)
Parents of four children	5.622	5.595	5.737	5.356	6.960	6.660
	(2.660)	(2.657)	(2.318)	(2.500)	(2.441)	(2.661)

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Table displays the mean value and standard deviation (in parentheses) for each of the three selected subjective well-being aspects for the baseline sample consisting of all adult individuals included in the well-being module (first line) and subsamples of these individuals who live in a partnership (second line) and have the specified number of dependent children younger than 15 and no older child sharing the household. All subjective well-being aspects range from 0 to 10 with 0 meaning 'Not at all satisfied' and 10 'Completely satisfied'.

Table A.13: Summary of the Frequency of Feelings

	Feel Happy		*Feel Nervous*		*Feel Down*		*Feel Calm*		*Feel Depressed*	
	Men	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*	*Men*	*Women*
All adults	3.585	3.516	2.318	2.508	1.868	2.041	3.573	3.413	1.979	2.183
	(0.918)	(0.929)	(1.039)	(1.060)	(0.989)	(1.044)	(0.948)	(0.969)	(0.977)	(1.017)
Of which,	3.703	3.676	2.396	2.535	1.802	1.933	3.518	3.364	1.890	2.052
parents	(0.839)	(0.841)	(1.030)	(1.052)	(0.943)	(0.997)	(0.943)	(0.964)	(0.933)	(0.964)
Parents of	3.700	3.662	2.403	2.524	1.814	1.962	3.519	3.390	1.903	2.079
one child	(0.845)	(0.861)	(1.044)	(1.048)	(0.948)	(1.004)	(0.956)	(0.973)	(0.945)	(0.969)
Parents of	3.714	3.700	2.395	2.548	1.789	1.894	3.526	3.347	1.866	2.018
two children	(0.826)	(0.813)	(1.014)	(1.052)	(0.927)	(0.979)	(0.957)	(0.952)	(0.909)	(0.946)
Parents of	3.689	3.663	2.352	2.523	1.775	1.931	3.491	3.318	1.901	2.035
three children	(0.836)	(0.883)	(1.013)	(1.067)	(0.971)	(1.015)	(0.957)	(0.962)	(0.954)	(0.981)
Parents of	3.587	3.639	2.437	2.611	1.932	2.041	3.399	3.338	2.085	2.191
four children	(0.961)	(0.892)	(1.125)	(1.111)	(1.057)	(1.107)	(1.055)	(0.937)	(1.100)	(1.101)

Source: Authors' analysis based on EU-SILC 2013 microdata.

Note: Table displays the mean value and standard deviation (in parentheses) of the variables reporting the frequency of feeling nervous, the frequency of feeling happy, the frequency of feeling down in the dumps, the frequency of feeling calm and peaceful, and the frequency of feeling depressed over the last four weeks for the baseline sample consisting of all adult individuals included in the well-being module (first line) and subsamples of these individuals who live in a partnership (second line) and have the specified number of dependent children younger than 15 and no older child sharing the household. The reported variables are measured on a 1 – 5 scale with 1 meaning 'none of the time' and 5 'all of the time'.

Table A.14: Summary of the Child Ages Difference

	Distance between 1st and 2nd childbirth		*Distance between 2nd and 3rd childbirth*	
	Median	*Mode*	*Median*	*Mode*
All countries	*3*	*2*	*3*	*2*
Northern Europe	3	2	3	2
Central Europe	3	2	3	2
Southern Europe	4	3	4	2
Eastern Europe	3	2	3	2

Source: Authors' analysis based on EU-SILC 2013 microdata.
Note: Table reports the median and mode difference in age between the first and second as well between the second and third observed children of women included in the 2013 SILC database.

APPENDIX 2
Description of the European Regions

In a similar spirit as Aassve *et al*. (2015) and Cukrowska-Torzewska and Lovasz (2020) we divide Europe into six regions: Northern Europe, Central Europe, Southern Europe, Eastern Europe, Balkan countries, and Anglo-Saxon countries.

Northern Europe includes Denmark, Finland, Norway, Sweden, and Iceland. These countries are known for generous family policies and high participation of women, also mothers of small children, in the labor market, and very egalitarian gender norms. Also involvement of fathers in child-rearing is high in Northern Europe. In 2013 these countries reported the highest fertility rates within Europe as well as the highest average life satisfaction and happiness index.

Central Europe includes Austria, Belgium, France, Germany, Luxembourg, the Netherlands, and Switzerland. These countries, especially Austria and Germany, used to have quite traditional views on family and the primary role of mothers as child-bearers and housekeepers. At the same time these countries report quite high female labour force participation with wide availability of part-time employment, and many of them have recently reformed family policies to promote higher involvement of fathers in child-rearing and to facilitate mothers' return to work after childbirth.

Southern Europe includes Cyprus, Greece, Spain, Italy, Malta, and Portugal. These countries, together with post-communist countries, report the lowest fertility rates in Europe. Countries of Southern Europe report also the lowest female labour force participation and are known for traditional views on the role of women in the society. Fathers in Southern Europe are rarely involved in child-rearing and childcare coverage is low in these countries, which leaves the burden of child-rearing on mothers.

In the group of Eastern Europe, we include Czechia, Estonia, Hungary, Lithuania, Latvia, Poland, Slovenia, and Slovakia. This group of countries used to be in the Soviet bloc before 1989, went through transition in the 1990s and entered the European Union in 2004. These countries experienced a huge drop in fertility during transition and in 2013, together with Southern European countries, reported the lowest fertility rates in Europe. These countries (until 2013 with exception of Poland) apply generous family policies, namely long parental leaves with job protection which are in great majority taken by mothers. At the same time, they stand out because of low provision of childcare for children below age three and very traditional views on the roles of women and men in a family.

Among Balkan countries we include Bulgaria, Croatia, Romania, and Serbia. These countries share some similarities with Southern European countries and some similarities with Eastern European Countries. Fertility rates are quite high in Balkan countries and mothers spend a long time on maternity and parental leaves. Citizens of this region share the most traditional views among all the analysed countries on the role of men and women in a family.

Finally, the Anglo-Saxon countries included in our analysis are the United Kingdom and Ireland. These countries do not offer paid parental leave and mothers usually spend just a few months at home with their newborns. This is, however, compensated by high availability of part-time jobs and quite egalitarian attitudes towards the roles of men and women in family and society.

For more detailed characteristics of these groups of countries see Cukrowska-Torzewska and Lovasz (2020).