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RESEARCH PAPER

Tracking the Effects of Parenthood on Subjective Well-Being: Evidence from Hungary

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Abstract
The low perceived subjective well-being of potential parents has been put forward as an explanation for the low fertility rates in developed countries. Accordingly, research about the effect of parenthood on life satisfaction is increasing, although the related studies are mostly restricted to western countries. The case of Hungary represents a great opportunity to extend the scope of the related research as this country has one of the lowest fertility rates in Europe, along with an exceptionally long and extensively utilised system of parental leave. The issue is examined here with a genetic matching method using longitudinal data from the Turning Points of Life Course survey (Hungarian GGS). Overall, the research described in this paper finds that fertility has a positive effect on subjective well-being in general. Moreover, not only a first child but also a second one increase subjective well-being. However, observation of the moderating effect of gender reveals that women benefit from having children both in the short and long term, whereas men benefit only in the short term. To sum up, this paper finds that pre-existing theory that uses the link between parenthood and subjective well-being to explain fertility trends makes a limited contribution to the discussion about the Hungarian situation.

Keywords Parenthood · Subjective well-being · Matching · Longitudinal data · Fertility

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1 Introduction

Developed countries have for decades been experiencing below replacement level fertility. This situation has caught the attention of scholars and decision makers alike due to its implications for population ageing and associated costs. Researchers have argued that one of the reasons for low fertility is that potential parents do not perceive that having children will sufficiently increase their subjective well-being (Aassve et al. 2016; Billari 2009; Luppi and Mencarini 2018; Margolis and Myrskylä 2015; Parr 2010). Consequently, a growing number of scientific papers have investigated whether having children actually leads to a decrease in subjective well-being. So far, most longitudinal evidence has come from western-European countries and finds that parenthood in general has a positive effect on subjective well-being (Balbo and Arpino 2016; Clark et al. 2008; Frijters et al. 2011; Kohler et al. 2005; Pollmann-Schult 2014). However, inconsistencies remain regarding how the effect of having children changes in specific circumstances; for example, as children grow up, and according to the parity and gender of the parents.

Although the topic has received significant attention in the West, in Central-Eastern Europe (CEE)—the area in which fertility is the "lowest-low" (Kohler et al. 2002)—only limited research has been undertaken (Baranowska and Matysiak 2011; Sironi and Billari 2013). However, in the affected region fertility decisions are embedded in a very different economic, cultural, and social context than in Western countries. Firstly, a lower standard of living in CEE countries may limit individuals' options in their quest for happiness (Szalai 1991). Secondly, the below average fertility rate in the CEE region is mainly attributable to a low level of second births (Miettinen and Szalma 2014; Szalma and Takács 2015) and less to childlessness. Finally, CEE countries typically have long periods of paid parental leave, which go hand-in-hand with the low employment rate of mothers. Within CEE countries this paper focuses on Hungary, which is an especially interesting case since here the persistently low fertility rate is paired with one of the longest and most extensively used periods of parental leave in the region (Spéder and Kapitány 2014).

Policies such as parental leave schemes can be designed in a way that increases the subjective well-being of parents. A question that arises in relation to this objective is whether countries with generous parental leave produce satisfied parents. Hungary provides an interesting setting for testing this issue. If parenthood is not satisfactory in a country with generous parental leave such as Hungary, then shorter terms of parental leave may be considered for increasing fertility rates. Long periods of leave can have short-term positive effects but may also generate long-term externalities. However, if parental satisfaction remains high, even in the long term, then other reasons for the low fertility trend need to be identified.

The hypotheses that will be tested are based on a set of three theories. First, the value of children theory has emphasized the positive impact of having a child (Hoffman and Hoffman 1973; Nauck 2007). Second, demand and reward theory postulates that parenthood is associated with both costs and benefits which simultaneously affect subjective well-being (Hansen 2012; Nomaguchi 2012; Nomaguchi and Milkie 2003; Umberson et al. 2010). Finally, set-point theory argues that the effect of parenthood is only temporary, thus subjective well-being eventually returns to the pre-birth baseline level (Headey and Wearing 1989; Lucas et al. 2004).

The hypotheses are tested by using the state-of-the-art technique of genetic matching on longitudinal data. Applying matching to longitudinal data substantially reduces the likelihood of biased estimations (Ho et al. 2011; King and Zeng 2006; Radó and Boisonneault

2018). Though this method has been used to analyse the effects of parenthood (Baetschmann et al. 2016; Balbo and Arpino 2016; Sironi and Billari 2013) and other life events (Binder and Coad 2016) it has never been applied to examine the effect of parenthood on subjective well-being in Hungary.

2 Background

2.1 General Effects of Parenthood

Parenthood has complex consequences for subjective well-being as this life event is both rewarding and stressful. It is not surprising, therefore, that various—sometimes conflicting—theories have emerged about the topic.

First of all, *value of children theory* postulates that parenthood has a positive effect on subjective well-being. This theory argues that children fulfil different parental needs. Hoffmann and Hoffmann (1973) suggested several ways in which children can modify parental satisfaction, such as by being a source of entertainment, expanding the sense of self, creating a social identity, and generating economic utility. Furthermore, this theory also claims that parenthood has a persistent effect as ageing children fulfil different types of needs throughout their entire lives (Nauck 2007).

Further, *demand and reward theory* argues that both the positive and the negative effects of having children should be taken into account as these effects offset each other (Nomaguchi 2012; Nomaguchi and Milkie 2003; Umberson et al. 2010). On the one hand, parenthood is rewarding and can be grasped, for example, based on relationship satisfaction with a child. On the other hand, parenthood is also associated with enormous costs. Hansen (2012) distinguishes between psychological cost, marital cost, financial cost, and opportunity cost in relation to childbearing. Based on this theory, both childbearing-related costs and benefits tend to decline as children age (Nomaguchi 2009; Nomaguchi and Milkie 2003; Munch et al. 1997).

Finally, *set-point theory* claims that people have a stable baseline level of subjective well-being which is determined by personality traits and other genetic factors (Headey and Wearing 1989). According to this theory, after major life events such as having a child individuals eventually adapt to their new situation and their subjective well-being returns to the initial baseline level (Myers 1999). As a consequence, it is claimed that parenthood also has only a temporary effect on subjective well-being.

Up-to-date empirical evidence about the relationship between parenthood and subjective well-being is mostly restricted to observations from western countries where longitudinal data are available. This body of research has typically found a positive effect of parenthood for the average person (Balbo and Arpino 2016; Frijters et al. 2011; Pollmann-Schult 2014), while only limited research has shown an insignificant effect (Angeles 2010; Keizer et al. 2010). In contrast, cross-sectional studies, that also covered non-western countries, produced mixed evidence, with some finding a negative link between parenthood and subjective well-being (Hansen 2012; McLanahan and Adams 1987; Stanca 2012), and others a positive one (Aassve et al. 2012).

Longitudinal research also permits tracking of how the effect of parenthood on well-being changes over time among individuals. All of the reviewed papers found that subjective well-being declines as children grow up. In some cases, subjective well-being even returns to its pre-birth level, which is consistent with set-point theory (Balbo and Arpino

2016; Clark et al. 2008; Frijters et al. 2011; Myrskylä and Margolis 2014), although other authors have found significantly higher well-being among parents in the long term (Baetschmann et al. 2016; Mikucka 2016; Pollmann-Schult 2014). Moreover, parenthood not only affects subjective well-being after the birth of a child, but even before this, as parents prepare for the new arrival. The literature refers to this phenomenon as the *anticipation effect*, the existence of which is supported by several studies (Baetschmann et al. 2016; Clark et al. 2008; Frijters et al. 2011; Mikucka 2016; Myrskylä and Margolis 2014).

In Hungary, no research has so far estimated the causal relationship between parenthood and subjective well-being using longitudinal data. However, there have been some cross-sectional studies. Molnár and Kapitány (2013) found that individuals who are on parental leave have significantly higher subjective well-being than the rest of the population. Furthermore, Neulinger and Radó (2018) found a significant positive association between well-being and the presence of a young child among parents who are in a relationship, but no significant one between the presence of an older child and subjective well-being, or among single parents. Comparative cross-sectional research has often included Hungary but has arrived at different conclusions (Aassve et al. 2012; Billari 2009; Margolis and Myrskylä 2011; Vanassche et al. 2013).

2.2 Parity-Specific Parenthood Effects

Many theories recognize parity differences in the effect of parenthood on subjective well-being. First, *set-point theory* assumes that people eventually adopt to parenthood. If this adaptation occurs gradually, then the effect of parenthood should peak when the first child is young because the birth of first child is more novel than the birth of subsequent children. Thus, the effect of parenthood is stronger with the first child, while weaker effects are associated with higher order children (Aassve et al. 2012; Lucas et al. 2004; Mikucka 2016).

According to the *demand and reward theory*, the moderating effect of parity is based on a comparison of the marginal utility and marginal cost of having a child. First, empirical results show that the law of diminishing marginal utility also apply to the value of children, thus the reward of having a child decreases with each additional child (Nauck 2007; Nomaguchi 2012). Second, there is inconsistency in the empirical findings about the marginal cost of children (Kageyama and Matsuura 2018; Thévenon 2010; Troske and Voicu 2009). Considering both marginal utility and marginal costs several authors have argued that having additional children is less 'beneficial' and thus elicits a smaller increase in subjective well-being (Aassve et al. 2012; Mikucka 2016).

The vast majority of longitudinal studies have found that first children have a positive effect on subjective well-being (Baetschmann et al. 2016; Balbo and Arpino 2016; Baranowska and Matysiak 2011; Kohler et al. 2005; Matysiak et al. 2016; Mikucka 2016; Mikucka and Rizzi 2019; Myrskylä and Margolis 2014), but a few studies have not supported this finding (Angeles 2010; Pedersen and Schmidt 2014). Further, several empirical studies have provided evidence to support set-point theory and *value of children* theory by finding that the effect of parenthood gradually decreases for higher-order children. These studies have found that second children have a non-significant (Angeles 2010; Baranowska and Matysiak 2011; Kohler, et al. 2005; Pollmann-Schult 2014) or only a temporary effect (Matysiak et al. 2016; Myrskylä and Margolis 2014). However, some studies have found that second children have a positive and lasting effect (Balbo and Arpino 2016) and sometimes even a particularly strong positive effect (Mikucka 2016).

2.3 Gender-Specific Parenthood Effects

The moderating effect of gender is especially important as couples generally make fertility decisions together (Bauer and Kneip 2012). If only one of the genders derives well-being from parenthood, this may create obstacles to parity progression. For example, Aassve et al. (2016) found a multiplicative effect for partners' subjective well-being on parity progression. Further, the authors found that females' subjective well-being matters more in decisions about the first child, whereas males' subjective well-being has more influence in decision-making about higher-order children.

The *value of children theory* argues that, on average, females benefit more from having children than males since women are more likely to claim that children strengthen primary group ties, provide fun, expand the self, and foster social identity. However, the theory also claims that parenthood is rewarding for both genders (Hoffman and Hoffman 1973; Hoffman et al. 1978).

Further, *demand and reward theory* emphasize that parenthood might influence mothers and fathers differently as they face distinct child-related opportunities and restrictions. On the one hand, most studies have found that women's burdens may be heavier during parenthood, suggesting that women's subjective well-being is more negatively affected after the arrival of children. During parenthood, women tend to have higher stress (Nomaguchi and Milkie 2003), greater work-life conflict (Goldsteen and Ross 1989), more household and parenthood duties (Bianchi et al. 2006; Bird 1999; Nomaguchi and Milkie 2003), worse career opportunities (Bianchi 2000), and less leisure time (Craig and Mullan 2013; Mattingly and Bianchi 2003). Furthermore, females typically experience a greater decrease in marital satisfaction and more marital conflicts than males after the birth of a child (Twene and Campbell 2003; Nomaguchi and Milkie 2003). However, in general, finance-related stress is more pronounced for men than it is for women as males experience more pressure to provide for their families (Pollmann-Schult 2014). Also, males more frequently report a higher level of sexual dissatisfaction than women following the transition to parenthood (Twene and Campbell 2003). On the other hand, whether mothers or fathers experience more reward is less certain. Some studies found that that there are no differences between the genders in this regard (Nomaguchi and Milkie 2003). Others have argued that mothers spend more time with their children than fathers, therefore motherhood is more rewarding than fatherhood (Nomaguchi 2012). Other authors have emphasised that fathers, in contrast to mothers, often contribute to childbearing only through playing or other enjoyable activities, thus fatherhood is more rewarding than motherhood (Nelson et al. 2014).

Empirical findings are also inconsistent about the moderating effect of gender. Most studies have found that women have higher subjective well-being after the birth of a child than men (Angeles 2010; Clark et al. 2008; Clark and Georgellis 2013; Myrskylä and Margolis 2014; Sironi and Billari 2013). Furthermore, some of these studies have found that fatherhood has non-significant (Sironi and Billari 2013) or only a temporary effect (Baranowska and Matysiak 2011). However, other research has found that both genders equally benefit from having a child (Pollmann-Schult 2014). Finally, some studies have even supported the idea that men benefit more from having children in terms of subjective well-being (Aassve et al. 2012; Balbo and Arpino 2016; Nelson et al. 2013), while a few studies claim that *only* fathers benefit significantly from parenthood (Nelson et al. 2013).

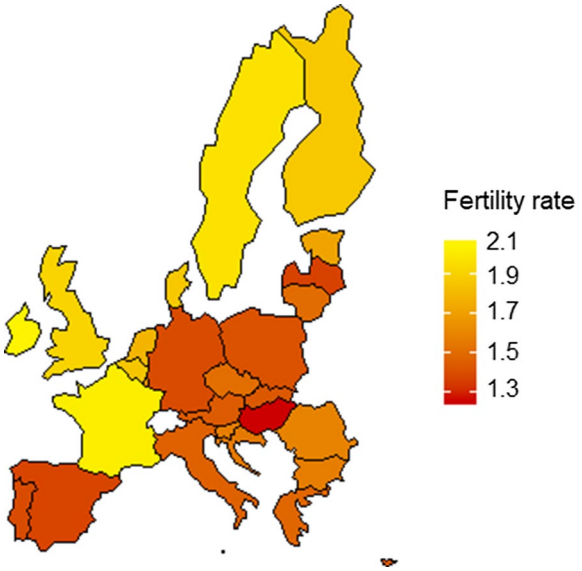

Fig. 1 Total fertility rates in Europe (2010). Author's own work, based on Ewen Gallic's blog.[a] Source: Eurostat. [a]Access: http://www.egallic.fr/en/european-map-using-r/

2.4 The Hungarian Context

The focus of this paper is Hungary, where fertility rates have been decreasing for the last 40 years and the total fertility rate has remained under 1.5 for the last 25 years. Figure 1 illustrates the Hungarian fertility rate in European comparison. There are multiple reasons for the relatively low fertility level in Hungary, including poor economic conditions, the dismantling of institutions, value shifts, and social anomie (Spéder and Kapitány 2014). Empirical studies suggest that the low number of children can mostly be attributed to the fact that second children are not being born, whereas childlessness still plays a relatively minor role (Miettinen and Szalma 2014; Szalma and Takács 2015). Further, Hungarians generally have strong intentions of having children since there is a considerable gap between the ideal and actual number of children (Molnár 2009; Kapitány and Spéder 2015). Thus, the low level of childlessness and high ideal number of children together indicate that in Hungary the *value of children* is still relatively high, despite the low fertility rates.

In terms of the generosity of the family support system, Hungary is an exceptional case. By law, parents are eligible to 24 weeks' leave at 70% of the average salary before birth and to 3 years of flat-rate benefits (Makay et al. 2012). This is one of the longest terms of parental leave in Europe. Moreover, the policy environment not only makes it possible to leave the labor market for this long, but mothers utilize this option to an extremely high degree. Only 10% of mothers with a young child (under 3 years old) were employed in 2005—by far the lowest employment rate among the OECD countries (see Fig. 2). The minimal opportunities for flexible work and poor access to childcare encourage parents to take full advantage of the 3-year period of parental leave (Radó et al. 2016). Further, this long period of parental leave is also strongly supported by public opinion: 94% of Hungarians think that mothers should stay at home until their children are at least 2 years old (Blaskó 2011).

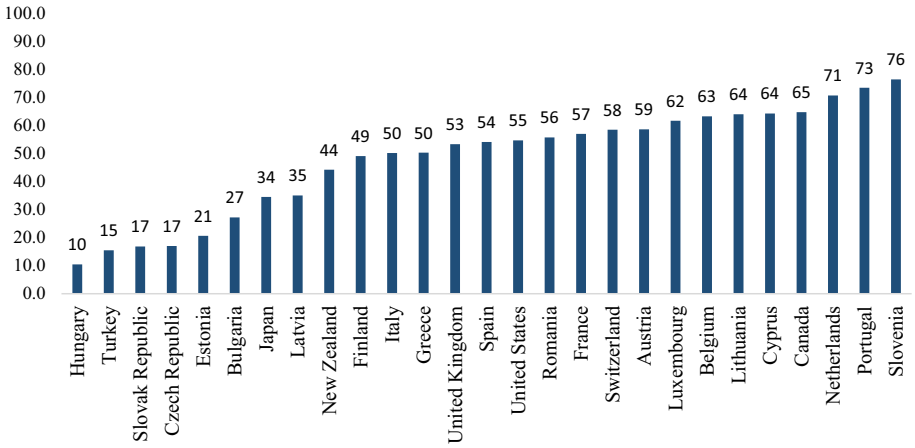

Fig. 2 Employment rates (%) for women (15–64 years old) whose youngest child was under 3 years old in 2005 Source: OECD family database

Such long and widely exploited parental leave creates different costs in the short and long term. On the one hand, one might expect that the short-term cost of children would be relatively low, thus the short-term positive impact on subjective well-being would be relatively strong. On the other hand, long parental leave increases the costs of children in the long term, which could negatively affect the progression of subjective well-being. As it is usually females who take parental leave, they are penalized more (Aassve et al. 2012, Bartus et al. 2013). However, the high opportunity cost for women can also create spillover effects on males' subjective well-being, since in male-breadwinner households it is typically men who experience finance-related stress (Pollmann-Schult 2014).

2.5 Hypothesis

The following, often competing hypotheses are formulated based on the international theoretical background and the Hungarian context.

Hypothesis 1A Parenthood has a long-lasting positive effect on subjective well-being. This expectation is in line with value of children theory.

Hypothesis 1B Parenthood has only a temporary positive effect on subjective well-being or no effect at all. This hypothesis is consistent with set-point theory. Further, it is also consistent with the Hungarian social policy context which supports childbearing in the short term, but creates opportunity costs in the long term.

Hypothesis 2A Both the first and the second children elicit long-lasting positive changes in subjective well-being. This hypothesis is in line with previous studies which found that the value of children is high in Hungary.

Hypothesis 2B Second children either do not have an effect, or have only a temporary effect on subjective well-being. This expectation is consistent with set-point theory because

first children are more novel than second ones, thus adaptation might be more rapid for second children.

Hypothesis 3A Parenthood has a long-lasting positive effect among both mothers and fathers. This expectation is in line with value of children theory, which emphasizes that parenthood can be rewarding for both genders.

Hypothesis 3B Mothers experience only a temporary positive effect or no effect at all. This hypothesis is consistent with the demand and reward theory which states that mothers generally experience high costs (such as sleep deprivation, lower satisfaction with partner, less leisure time, and greater work-life conflicts). Further, Hungarian mothers face particularly high opportunity costs in the long term due to long periods of parental leave.

Hypothesis 3C Fathers experience only a temporary positive effect or no effect at all. This expectation is also in line with the nature of the Hungarian social support system since the long period of parental leave in Hungary creates a higher level of stress for males as their partners remain outside of the labour force, leaving the former as the main breadwinners. Based on demand and reward theory, a lower level of intimacy with a partner and children could also explain this expectation.

3 Data

The empirical basis of the present research is the *Turning Points of Life Course* programme (Hungarian GGS), a longitudinal survey carried out by the Hungarian Central Statistical Office. This survey was carried out in 2001/2002, 2004/2005, 2008/2009 and 2012/2013, and followed an initial 16,663 Hungarian adults born between 1922 and 1983. This paper uses data from those waves in which subjective well-being was measured (the first, second, and fourth waves).

Longitudinal data are never free of sample attrition. In the most recent wave, 8103 people were addressed, whereas twice as many participated in the first wave. The most common reason for dropping out of the study was refusal to participate. Between the first and the second wave 6% of the initial sample refused to answer, whereas this proportion reached 11% in the fourth wave. However, the major advantage of this research was that $<8\%$ of the initial sample dropped out due to their moving to an unknown destination during the course of research. The high drop-out rate, just like the other missing data, might cause biased estimations. This problem was handled with longitudinal weighting [see more about the weighting of the given dataset in Bartus (2015)].

3.1 Treatment Variables

Table 1 summarizes the treatment variables in this study, which are (1) parenthood in general, (2) motherhood, (3) fatherhood, (4) having a first child, and (5) having a second child. This table also details the composition of the treatment and control groups. In all cases,

Table 1 Description of the observed treatments

Observed phenomenon	Treatment group	Control group
General parenthood	Those whose child(ren) was (were) born between 2003 and the second wave (2004/2005), but to whom no children were born between 2001/2002 and 2003	Those to whom no children were born between 2001/2002 and 2004/2005
Motherhood	Women whose child(ren) was (were) born between 2003 and 2004/2005, but to whom no children were born between 2001/2002 and 2003	Women to whom no children were born between 2001/2002 and 2004/2005
Fatherhood	Men whose child(ren) was (were) born between 2003 and 2004/2005, but to whom no children were born between 2001/2002 and 2003	Men to whom no children were born between 2001/2002 and 2004/2005
First child	Those who had a first child between 2003 and 2004/2005	Those who remained childless between 2003 and 2004/2005
Second child	Those who had a second child between 2003 and 2004/2005, but to whom no children were born between 2001/2002 and 2003	Those who had a child before 2001/2002, but to whom no children were born between 2001/2002 and 2003

those whose child(ren) was (were) born between the first wave (2001/2002) and 2003 were omitted from the analysis to eliminate the anticipation effect.[1]

To help estimate the overall effect of parenthood, respondents were asked to list details about all of their children, including year of birth. This question served to measure the treatment variable which took a value of '1' if a respondent's child(ren) was (were) born between 2003 and the second wave (2004/2005) and '0' if no child was born.

The parity effect was distinguished by reducing the initial dataset for (1) those who had had no children before the observation period, and (2) those who had had only one child before the observation period. Firstly, a dataset which contained details about those who were initially childless was used to distinguish the effect of the first child. Secondly, a dataset that included those who initially had one child was used to estimate the effect of the second child. Further, the moderating effect of gender was observed by splitting the initial dataset between (1) women and (2) men. Afterwards, the same treatment variables which had been developed to measure the overall effects of parenthood were applied to these subgroups.

3.2 The Outcome Variables

Subjective well-being was measured in all waves with the following question: "*On an eleven-point scale, how satisfied are you with the trajectory of your life*?" This variable used a value of '0' to mean 'not satisfied at all', and a value of '10' for 'completely satisfied'. The outcome variable was the change in subjective well-being before and after exposure to treatment. More specifically, the change in subjective well-being was calculated in terms of the change in life satisfaction between the first and second waves to measure short-term change, and between the first and fourth waves to estimate long-term change. The short-term effect refers to the effect of having a 0- to 2-year-old child, since in this case the children were born between 2003 and 2004/2005, in regard to which I observed changes in subjective well-being between 2001/2002 and 2004/2005. With children of this age, parents are entitled to parental leave in Hungary. Therefore, the generosity of parental leave directly influences the short-term effect. The long-term effect refers to the effect of having a 7- to 10-year-old child, since such children were born between 2003 and 2004/2005, in regard to which I observed changes in subjective well-being between 2001/2002 and 2012/2013. Subjective well-being was treated as an interval variable as other studies have found that it makes little difference treating it as an ordinal (Ferrer-i-Carbonell and Frijters 2004).

The correlations between subjective well-being and the treatment variables are displayed in Table 2. This analysis reveals that, in general, parenthood—more specifically, fatherhood and having a first child—was associated with a short-term increase in subjective well-being but not with a long-term change. However, motherhood and the arrival of a

[1] The claim to a 1-year anticipation effect is in line with the vast majority of the literature (Balbo and Arpino 2016; Clark et al. 2008; Myrskylä and Margolis 2014; Pollmann-Schult 2014). To my knowledge only two studies have found that this impact appears 2–3 years—(Clark and Georgellis 2013) or 5 years (Baetschmann et al. 2016) before birth for women. Thus, I also tried matching individuals 2 years before childbirth, but this generated similar results to the scenario that I obtained assuming a 1-year anticipation effect (see the results of this matching in Table 5). As a result, I narrowed down the anticipation effect to 1 year, which permitted a higher number of observations than a longer anticipation period would have.

Table 2 Difference in subjective well-being between the treatment and control groups for each observed phenomenon (mean and level of significance)

	Change in subjective well-being in the short term (between 2001/2002 and 2004/2005)			Change in subjective well-being in the long term (between 2001/2002 and 2012/2013)		
	Treatment group	Control group	Sig.	Treatment group	Control group	Sig.
General parenthood	0.37	0.02	0.01	0.43	0.42	0.93
First child	0.48	−0.02	0.02	0.31	0.13	0.63
Second child	0.30	0.14	0.59	0.47	0.43	0.86
Motherhood	0.30	0.03	0.11	0.20	0.34	0.50
Fatherhood	0.40	0.01	0.02	0.49	0.45	0.98

second child were not associated with a significant increase in subjective well-being either in the short or long term.

3.3 The Matching Variables

Statistically speaking, those variables should be involved as covariates that have an effect on the treatment and the outcome, although they should not be affected by the treatment variable. Thus, one should involve only pre-treatment covariates which are less likely to be affected by the treatment (Elwert and Winship 2014; Rosenbaum and Rubin 1984). Therefore, all the matching variables were measured in the first wave at least 1 year before exposure to treatment. Previous research in this topic has identified the confounding variables (e.g. Balbo and Arpino 2016) which were also included in this research.

Matching variables included demographic and socio-economic variables. Education was categorized as primary or less, vocational, general secondary, and tertiary. Four categories of residence were distinguished: villages, smaller cities, bigger cities, and the capital city. Age (in years) and equivalent household income (thousand HUF) were measured as continuous variables. Gender was also controlled for. The first-wave value for subjective well-being was also involved. Subjective health, satisfaction with housing, and perceived well-being were also measured on a ten-point scale.

I also controlled for labour-market-related characteristics. In general, the analysis incorporated data relating to whether the respondent had ever experienced unemployment. An attitude variable was also included to measure whether respondents enjoyed working. Individuals were asked to rate the validity of the statement "*I usually do not enjoy working*" using a four-point scale. Moreover, labour market status was categorized as employed, entrepreneur, unemployed, and other non-working. Furthermore, type of work was also classified as blue-collar and white-collar. Finally, data about whether the respondents' jobs were private or public was collected.

Family-related characteristics were also controlled for. Marital status was recorded as single, married living together, married living apart, divorced, and widow/er. Length of current marriage was measured as the difference between the year of data collection (first wave) and the date of marriage. Satisfaction with partner was categorized as does not have a partner, dissatisfied, neutral, rather satisfied, very satisfied, and no answer. Partner activity status was measured similarly to the respondent's own labour market status. Moreover, the analysis recorded how many children the respondent had.

To estimate the subgroup effect of parenthood, certain matching variables were omitted since they played a role in conceptualizing the treatment variable. Thus, gender was not controlled for when estimating the effect of mother or fatherhood. Similarly, number of children was not used as a matching variable when estimating the effect of the first or second children.

See the distribution of the matching variables in Table 4 for the initial (raw) dataset and for the matched dataset.

4 Analytical Strategy

The present research applied genetic matching method on longitudinal data, which reduces the possibility of biased estimations. First, longitudinal analysis enabled us to control for every time-variant confounder, which reduced selection bias. Second, the advantage of matching over other longitudinal regression methods (e.g. fixed-effect regression) is that it can help avoid interpolation and extrapolation biases. Interpolation bias can arise from using the wrong functional form in a parametric regression model. Extrapolation bias can appear as a result of an improper overlap between the treatment and control groups (here, those to whom a child was born/was not born) (Ho et al. 2011; King and Zeng 2006; Radó and Boisonneault 2018).

For expositional simplicity, in this section the effect of the first child will be demonstrated. Let Y_i denote individual i's subjective well-being, and J denote a binary treatment variable which takes a value of '0' if the individual is childless (control group), and '1' if the individual has a child (treatment group). The method entails matching each treated individual ($j=1$) with one or more non-treated individual(s) ($j=0$) who is/are as similar as possible to the given treated individual in all parameters except for the treatment itself. In other words, matching aims to fit the *unconfoundedness* assumption:

$$Y_{ji} \perp J_i | X_{ji} \tag{1}$$

where X_{ji} denotes the observable properties of individual i from group j.

Matching may be performed using one of several procedures; the present study employed genetic matching. This method generalizes propensity score matching and Mahalanobis distance matching. The former matching applies a one-dimensional distance metric which is the probability p_{ji} of treatment assignment based on the subject's X_{ji} observable properties. The latter matching method measures multivariate distance, which can be defined in the following way:

$$M\left(X_{1i},\ X_{01}\right) = \sqrt{\left(X_{1i} - X_{0i}\right)^T S^{-1} \left(X_{1i} - X_{0i}\right)}, \tag{2}$$

where S is the sample covariance matrix of X, and $X^T$is the transposition of matrix X. Although both propensity score matching and Mahalanobis distance matching are widely used, in certain cases they fail to produce unbiased estimates. Therefore, it is advisable to apply these methods together; for example, in the case of genetic matching (Diamond and Sekhon 2013; King and Nielsen 2019; Rosenbaum and Rubin 1985).

The basic idea behind genetic matching is that one needs to transform the Mahalanobis metric by using Cholesky decomposition[2] and by adding a weight parameter:

$$M(X_{1i},\ X_{0i}) = \sqrt{(X_{1i} - X_{0i})^T \left(S^{-1/2}\right)^T W S^{-1/2} (X_{1i} - X_{0i})}, \tag{3}$$

where W is a positive definite weight matrix which contains a set of weights for each X_i covariate. Besides the covariates, the propensity score is also used in the matching, and thus also influences the distance metrics with a given weight. This matching method uses a genetic search algorithm to find W matrix such that the optimal balance between the treatment and the control group is identified. One advantage of this method is that genetic matching significantly reduces bias compared to pre-existing matching methods (Diamond and Sekhon 2013).

A successful matching procedure demands that a good balance is reached between the treatment and control groups in the sense that the treatment and control groups must randomly differ from each other in all of the covariates (Stuart 2010). In the case of the general effect of parenthood, I assessed whether a good balance was reached by using descriptive statistics (See Table 4) and propensity score distributions (See Fig. 3 in the Appendix) between the treated and control groups before and after matching. Respectively, I examined if the overlap was similar in the case of the other treatment variables.[3] These statistics illustrate that the overlap prior to matching was poor, increasing the risk of biased regression coefficients. Further, they showed how matching was able to increase the overlap between the treatment group and the control group. For this reason, matching was considered a statistically reasonable choice of methodology for this study.

Matching is normally undertaken to balance the observed covariates between the treated and the control group, but one needs to compare the treatment and the control group afterwards to obtain causal estimates. DuGoff et al. (2014) have argued that matching should be followed by multivariate regression analysis that involves the control variables used in matching, which may further improve the balance between the treatment and the control groups.

The matching method can be extended to longitudinal design. Athey and Imbens (2006) and Arpino and Aassve (2013) claim that using longitudinal data provides an opportunity to apply pre-post treatment settings, with two main benefits. First, it is possible to use only those X_{t_1} covariates which are measured before the exposure to treatment; therefore, these covariates are less likely to be affected by the treatment. Second, the lagged value of the outcome variable can also be involved in the matching procedure and controlled for. In other words, the unconfoundedness assumption can be extended to a longitudinal design, as follows:

$$Y_{it_2} \perp J_i | X_{t_1},\ Y_{t_1} \tag{4}$$

where t refers to the time of the observation, thus Y_{t_1} is the outcome variable measured in the first wave of the panel data, and Y_{t_2} is the outcome variable measured in the second wave. The process of matching using the lagged value of the outcome variable is similar to making fixed-effect estimates, and further increases the balance between the treated and the control group by eliminating the time-invariant confounding variables (Allison 1990). For the present study, this means that individuals who had a child between the two waves were matched with individuals who did not have a child in this period, but who had had similar properties in the first wave, including subjective well-being.

[2] That is, $S = S^{-1/2}\left(S^{-1/2}\right)^T$, in which $S^{-1/2}$ is a lower triangular matrix with positive diagonal elements.

[3] Statistics available upon request.

Sample weights play an important role in longitudinal data analysis. DuGoff et al. (2014) suggested that original sampling weights should also be involved in the matching process if one desires to reach conclusions pertaining to the entire population. The authors also advised the creation of a new weight variable for the regression estimation, generated as the product of the sampling weight and the matching weight. Consequently, this analysis applied the calibrated longitudinal weight calculated by the Hungarian Statistical Office (Bartus 2015).

This research employed Rosenbaum (2002) sensitivity analysis to assess to what degree the results were sensitive to unobserved factors. This test observes how sensitive the results are to a quantifiable increase in uncertainty. More specifically, Rosenbaum's test relies on the parameter Γ that assumes a certain degree of departure from the random assignment of the treatment given the controlled covariates.[4] If $\Gamma = 1$, then for every k treated individual and $m(l)$ matched control individuals with the same covariates $X_k = X_{m(l)}$ would have an equal chance of receiving the treatment $P(J = 1)_k = P(J = 1)_{m(l)}$; in other words, the study would be free of bias. If $\Gamma = 2$, then in the case of k treated individual and $m(l)$ matched control individual with the same covariates $X_k = X_{m(l)}$, one could be twice as likely as the other to receive the treatment. If the results remain significant even for a high value of the Γ parameter, this suggests a robust treatment effect, even if some confounders were not controlled for. This paper reports the critical value of the Γ parameter using a 90% confidence level. There is no straightforward and reliable critical Γ value which may be considered statistically valid, but DiPrete and Gangl (2004) suggest that a value of approximately 1.5 or more should be considered as robust in the field of social sciences. Sensitivity analysis was conducted using the rbound package which runs in the R environment (Keele 2010).

5 Results

5.1 General Effects of Parenthood

First, the general effect of parenthood on subjective well-being was analysed. In order to rule out confounding variables, those to whom a child was born in the observation period (i.e. the treatment group) were matched to those to whom no children were born in this period (i.e. the control group) using genetic matching. This process reduced the number in the control group from 5154 to 166 but caused no change in the number in the treated group (233). More about the improvement in balance can be seen in the Appendix in Table 4 and Fig. 3.

In contrast to the simple correlation analysis (see Table 2), the multivariate analysis (see Table 3) reveals that parenthood has a large positive significant effect both in the short and the long term. The estimated treatment effect in this research is 0.61 for the short term and 0.54 for the long term, which is higher than was found, for example, in Great Britain (0.20 in the short term and 0.04 in the long term) when similar methodology was applied (Balbo and Arpino 2016).

The multivariate result is consistent with Hypothesis 1A, which predicted a persistent positive effect on subjective well-being based on value of children theory. However, this

[4] More specifically, the Γ parameter and the reciprocal of the Γ parameter bound the $\frac{P(J=1)_k / P(J=0)_k}{P(J=1)_{m(l)} / P(J=0)_{m(l)}}$ odds ratio for the odds that k treated individual will receive the treatment and the odds that $m(l)$ matched control individuals will receive the treatment for all k and $m(l)$, thus:

$$\frac{1}{\Gamma} \leq \frac{P(J=1)_k / P(J=0)_k}{P(J=1)_{m(l)} / P(J=0)_{m(l)}} \leq \Gamma.$$

finding contests Hypothesis 1B by suggesting that the subjective well-being of parents does not return to the pre-birth baseline level even seven to 10 years after birth. Thus, the empirical evidence presented in this research contradicts set-point theory, similarly to some other international evidence (Baetschmann et al. 2016; Mikucka 2016; Pollmann-Schult 2014).

I used Rosenbaum's (2002) sensitivity analysis to bound the treatment effect estimates. The $\Gamma_{general}$ parameter is 1.51 in terms of the short-term effect, and 1.38 for the long-term. The parameter for the short-term effect is larger than the 1.5 threshold, which suggests the robustness of the estimates and indicates that it is very unlikely that an unobserved difference in covariates would change the interference of the short-term effect. However, the $\Gamma_{general}^{long-term}$ parameter for the long-term effect on parenthood is more significantly below this threshold. Thus, parenthood also has a long-term positive effect, but it is more sensitive to unobserved confounders.

5.2 Parenthood Effect According to Parity

Further, the effect of parenthood on subjective well-being was analysed in terms of parity. Again, matching was undertaken to obtain sufficient balance between the treatment and the control group. In terms of measuring the first child effect, matching reduced the control group from 725 to 87 responses but did not modify the size of the treatment group (134). In the case of the second child, matching reduced the dataset from 1274 control individuals and 82 treated individuals to 75 control and 82 treated.

Matching using longitudinal data (see Table 3) revealed that both the first child and the second child had a positive effect both in the short and long term. This evidence is at odds with Hypothesis 2B and supports Hypothesis 2A, and is in line with those studies which found that the value of children is high in Hungary (Molnár 2009; Kapitány and Spéder 2015). However, the result that even second children have a lasting positive effect on subjective well-being is especially interesting in light of the relatively low number of second children in Hungary.

Again, Rosenbaum's (2002) sensitivity analysis was conducted to measure the robustness of the estimations. The estimations for the first child effect were robust ($\Gamma_{first}^{short-term}$: 1.58; $\Gamma_{first}^{long-term}$: 1.50). The estimation of second children effects was also fairly robust in terms of the measurement of short-term changes ($\Gamma_{\text{sec}\,ond}^{short-term}$: 1.46); however, the estimation of long-term effects of the second child was more sensitive to unobserved confounders ($\Gamma_{\text{sec}\,ond}^{long-term}$: 1.38).

5.3 Parenthood Effects in Terms of Gender

Finally, the effect of parenthood on subjective well-being was analysed in terms of gender (see Table 3). In the case of females, matching reduced the control group from 3105 to 93, and maintained the 131 members of the treatment group. In the case of males, matching decreased the number of members of the control group from 2049 to 77, while the number of individuals in the treated group stayed at 102.

Matching using longitudinal data shows that motherhood has a strong long-lasting positive effect. Moreover, the latter model confirms that fatherhood has a moderate positive effect in the short term, and no significant effect in the long term. This finding is in line with Hypothesis 3C, but contests Hypothesis 3A and 3B. Thus, the results contradict *set-point theory* since mothers' subjective well-being does not return to the baseline level, even in the long term. Further, the *value of children theory* is not confirmed for fathers. However, gender differences

Table 3 Parenthood status in regression models after matching (regression coefficient, level of significance, standard error, and number of units)

	General parenthood	First child	Second child	Motherhood	Fatherhood
N before matching (control/treatment)	5154/233	725/134	1274/82	3105/131	2049/102
N after matching (control/treatment)	166/233	87/134	75/82	93/131	77/102
Short-term change (between 2001/2002 and 2004/2005)	0.61** (0.16)	0.71*** (0.19)	0.49** (0.23)	0.67** (0.23)	0.56** (0.28)
Long-term change (between 2001/2002 and 2012/2013)	0.54** (0.19)	0.52** (0.24)	0.66** (0.29)	0.66** (0.25)	0.41 (0.33)

This table contains only the treatment variable; the entire analysis is available upon request. *P*-values: *** < 0.001, ** < 0.05, * < 0.1

can be explained in terms of costs and benefits. More specifically, the finding shows that for females the benefits of childbearing outweigh the costs, but for males the costs offset benefits in the long term. This finding is in line with the results of some earlier studies conducted in other CEE countries (Baranowska and Matysiak 2011; Sironi and Billari 2013).

Sensitivity analysis on the estimations of motherhood effect reveals that the results are fairly robust (Γ_{female} : 1.62 for short-term effect; 1.61 for long-term effect). However, the short-term effect of fatherhood is less robust ($\Gamma_{male}^{short-term}$: 1.38). Thus, although fatherhood also has a significantly positive short-term effect, this result is more sensitive to unobserved confounders. As a consequence, the gender differences in terms of parenthood effect might be even more pronounced than this analysis has suggested.

6 Discussion

During recent decades the effect of parenthood on subjective well-being has been identified as the missing link in understanding recent fertility trends (Aassve et al. 2016; Billari 2009; Luppi and Mencarini 2018; Margolis and Myrskylä 2015; Parr 2010). Based on these arguments, the fertility rate in contemporary developed countries is low as parenthood is not satisfactory enough. So far, this theory has received only limited support in studies involving western European countries (Balbo and Arpino 2016; Clark et al. 2008; Frijters et al. 2011; Keizer et al. 2010; Kohler et al. 2005; Myrskylä and Margolis 2014; Pollmann-Schult 2014). However, the Hungarian case represents a great opportunity to test this premise due to two special characteristics of the country. First, Hungary had a lower fertility rate than that of the formerly researched countries at the beginning of the twenty-first century. Second, an exceptionally long period of paid parental leave exists that eases the cost of children in the short term but arguably creates opportunity costs in the long term. This paper has examined whether this policy environment promotes satisfactory parenthood, which is a prerequisite for promoting a higher fertility rate.

Overall, the research described herein finds that parenthood has a long-lasting positive effect on subjective well-being in Hungary. This effect is not only positive during parental leave, but long after it. Thus, the evidence contradicts the expectation that long parental leave in Hungary creates externalities that also affect general parental well-being. The persistent positive effect found in Hungary is comparable to that found in countries with a higher fertility rate or shorter parental leave system in some international findings (Baetschmann et al. 2016; Mikucka 2016; Pollmann-Schult 2014).

Further, the present research found that not only the arrival of a first child but also a second one permanently increases subjective well-being. These findings are exceptional in international comparison, since only in Russia has it been found that second children have such a strong long-term effect (Mikucka 2016). The question thus arises why Hungarians do not have more second children if they indeed experience such positive changes upon having a second child, as this study finds. Understanding this paradox is crucial, as the low fertility rate in Hungary is mainly attributable to the low number of second children (Miettinen and Szalma 2014; Szalma and Takács 2015).

The only trend that the research found which could explain the low fertility rate is that fatherhood does not have a significantly positive long-term effect on life satisfaction (fathers experience only a temporary positive effect). The effect of fatherhood is important, as parenthood typically involves a joint decision and both genders should ideally benefit from this life event in order to realize further parity progression (Aassve et al., 2016). The finding of

an insignificant effect of fatherhood is in line with previous research conducted in the CEE countries—specifically, in Poland (Baranowska and Matysiak 2011) and in Bulgaria (Sironi and Billari 2013). As this result typically has been found in CEE countries, it might be characteristic of this region and thus contribute to understanding the low fertility rate of the area.

To sum up, the present research finds that the value of children is still high in Hungary, and that children constitute a source of life satisfaction. Besides fathers, every other subgroup that was examined reported experiencing a persistent positive change in subjective well-being upon the arrival of children. This supports previous findings that one needs to go beyond observing subjective well-being to understand low fertility rates. This is true even in a setting where the fertility rate is the lowest of the low, despite the existence and widespread use of extremely long parental leave. The reasons for low fertility rates in this context are probably the dismantling of institutions, poor economic conditions, value shifts, and social anomie (Spéder and Kapitány 2014), but not that parenthood is unsatisfactory per se.

Finally, these findings are at odds with the influential *set-point theory*. This theory argues that major life events are able to alter subjective well-being only temporarily since individuals adopt to their new situations eventually (Headey and Wearing 1989). This paper extends the evidence that this theory does not stand in every circumstance (Baetschmann et al. 2016; Mikucka 2016; Lucas et al., 2004; Pollmann-Schult 2014). In Hungary, the subjective well-being of parents had not entirely (re)adjusted even seven to 10 years after the birth of a child.

The major limitation of this study is that it might not have been successful in controlling for all possible confounding variables. Although steps were taken to rule out confounding variables by applying a state-of-the-art matching method on longitudinal data which controls for all unobserved time-invariant variables and observable variables, even this approach could not eliminate unobserved time-variant confounding variables. For example, Kravdal (2014) has argued that all earlier estimations about the effect of parenthood were biased since none of them controlled for expectations about the effect of parenthood. This variable may cause selection bias since those who expected to have an enjoyable parenthood are more likely to have had a child than those who were not looking forward to this event. This bias is especially likely to be present in estimations of the effect of second children. The present research has made an attempt to assess the extent of selection bias using sensitivity analysis (Rosenbaum 2002), finding that most of the results are fairly robust. However, future research should further investigate whether the persistent positive effect of second children found in this paper may be attributed to this bias.

Further, only those matching variables were used in the analysis that were measured in the first wave of data collection, before exposure to the treatment. In general, statisticians suggest not controlling for post-treatment variables as they are typically influenced by the treatment (Elwert and Winship, 2014; Rosenbaum and Rubin, 1984). For example, divorce might be a reason for or a consequence of parenthood. If it is a consequence, then controlling for marital status following the birth of a child would explain away the treatment effect. Therefore, divorce and other post-treatment variables were not controlled for, assuming the absence of reverse causality. Rosenbaum sensitivity analysis also came in useful for estimating sensitivity to this assumption. Future research should also observe the mediating effect of post-treatment events, such as divorce or having an additional child.

Finally, one limitation of the study is that the question used in this paper—'satisfaction with the trajectory of life'—slightly differs to the more frequently used 'satisfaction with whole life' question. Neulinger and Radó (2018) found that satisfaction with the life course is less affected by parenthood than satisfaction with life as a whole. Thus, this paper might underestimate the effect of parenthood compared to those studies which observed life

satisfaction as an outcome variable. However, the conclusion that parenthood lastingly increases subjective well-being should still stand.

Forthcoming studies could analyse the parenthood effect on domain-specific subjective well-being since previous studies have suggested that parenthood has distinct effects on the former (Bernardi et al. 2017; Neulinger and Radó 2018). Furthermore, the analysis described herein could be replicated in other CEE countries where longitudinal data are available to help understand if the results are generalizable to the region.

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Appendix

See Fig. 3 and Tables 4 and 5.

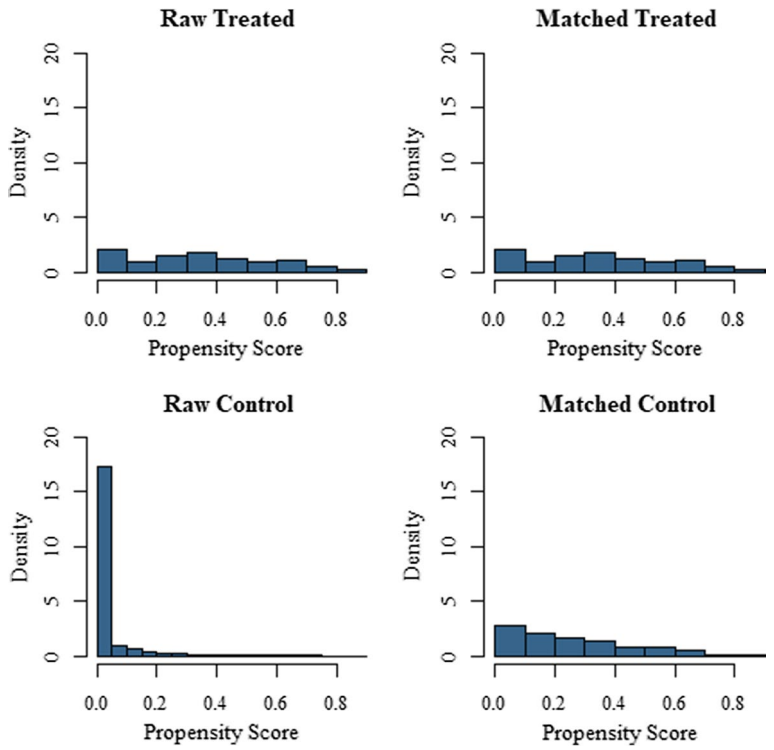

Fig. 3 Difference in propensity score between the treatment group and the control group in estimating the overall effect of parenthood

Table 4 Balance improvement in matching those to whom a child was born between 2003 and 2004/2005 (treatment group) with those to whom no children were born in this period (control group)

		Raw data				Matched data			
		Treatment		Control		Treatment		Control	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Distance		0.34	0.23	0.03	0.08	0.34	0.23	0.32	0.23
Satisfaction with life		6.96	1.81	6.56	1.92	6.96	1.81	6.97	1.57
Recent perceived well-being		6.43	1.67	5.83	1.81	6.43	1.67	6.47	1.54
Sex	Male	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Female	0.56	0.50	0.60	0.49	0.56	0.50	0.55	0.50
Education	Primary or less	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Vocational secondary school	0.36	0.48	0.28	0.45	0.36	0.48	0.39	0.49
	General secondary	0.34	0.47	0.31	0.46	0.34	0.47	0.36	0.48
	Tertiary	0.16	0.37	0.15	0.36	0.16	0.37	0.16	0.37
Satisfaction with housing		6.95	2.12	7.27	2.26	6.95	2.12	7.15	2.10
Age		27.58	5.07	48.06	13.21	27.58	5.07	27.89	6.29
Residence	Capital city	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Bigger city	0.24	0.43	0.22	0.42	0.24	0.43	0.22	0.42
	Smaller city	0.26	0.44	0.30	0.46	0.26	0.44	0.27	0.45
	Village	0.44	0.50	0.36	0.48	0.44	0.50	0.41	0.49
Subjective health status		8.36	1.52	6.86	2.33	8.36	1.52	8.56	1.56
Equivalent household income		50.58	30.77	48.75	34.42	50.58	30.77	46.64	23.57
Labour market status	Employed	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Self-employed	0.08	0.27	0.06	0.24	0.08	0.27	0.04	0.20
	Unemployed	0.08	0.27	0.05	0.21	0.08	0.27	0.06	0.23
	Other non-working	0.13	0.34	0.39	0.49	0.13	0.34	0.11	0.32
Has ever experienced unemployment		0.50	0.50	0.33	0.47	0.50	0.50	0.44	0.50

Table 4 (continued)

		Raw data				Matched data			
		Treatment		Control		Treatment		Control	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Workplace	Owned by the state	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Private	0.55	0.50	0.32	0.47	0.55	0.50	0.58	0.50
	Non respond	0.21	0.41	0.44	0.50	0.21	0.41	0.17	0.38
Last (most important) work	Blue collar	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	White collar	0.33	0.47	0.37	0.48	0.33	0.47	0.34	0.47
Marital status	Single	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Married living together	0.52	0.50	0.69	0.46	0.52	0.50	0.56	0.50
	Married living apart	0.01	0.11	0.01	0.10	0.01	0.11	0.00	0.00
	Widow	0.00	0.00	0.09	0.29	0.00	0.00	0.00	0.00
	Divorced	0.07	0.26	0.10	0.30	0.07	0.26	0.06	0.24
Partner labour market status	Does not have partner	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Employed	0.48	0.50	0.35	0.48	0.48	0.50	0.48	0.50
	Self-employed	0.06	0.25	0.06	0.24	0.06	0.25	0.06	0.24
	Retired	0.00	0.07	0.23	0.42	0.00	0.07	0.00	0.07
	Unemployed	0.06	0.25	0.04	0.19	0.06	0.25	0.06	0.25
	Other non-working	0.11	0.32	0.04	0.20	0.11	0.32	0.10	0.30
	No answer	0.16	0.37	0.04	0.19	0.16	0.37	0.16	0.37

Table 4 (continued)

		Raw data				Matched data			
		Treatment		Control		Treatment		Control	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Satisfaction with partner	Does not have partner	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Dissatisfied	0.01	0.11	0.06	0.23	0.01	0.11	0.01	0.11
	Neutral	0.06	0.23	0.08	0.27	0.06	0.23	0.02	0.15
	Rather satisfied	0.28	0.45	0.26	0.44	0.28	0.45	0.22	0.42
	Very satisfied	0.38	0.49	0.34	0.48	0.38	0.49	0.47	0.50
	No answer	0.15	0.36	0.03	0.18	0.15	0.36	0.14	0.35
Length of current marriage		2.56	3.84	17.35	15.33	2.56	3.84	3.28	5.10
Number of children		0.69	0.99	1.73	1.05	0.69	0.99	0.73	0.90
Does not enjoy working	Completely disagree	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Disagree	0.04	0.19	0.05	0.22	0.04	0.19	0.01	0.11
	Rather agree	0.12	0.32	0.14	0.35	0.12	0.32	0.09	0.29
	Completely agree	0.26	0.44	0.21	0.41	0.26	0.44	0.18	0.39
Trust in the future	Completely disagree	(R)	(R)	(R)	(R)	(R)	(R)	(R)	(R)
	Disagree	0.06	0.25	0.10	0.30	0.06	0.25	0.04	0.20
	Rather agree	0.47	0.50	0.46	0.50	0.47	0.50	0.44	0.50
	Completely agree	0.45	0.50	0.40	0.49	0.45	0.50	0.51	0.50
Sample weights		0.93	0.20	1.00	0.20	0.93	0.20	0.91	0.21

Table 5 Robustness check: Parenthood status in regression models after matching assuming 2-year-long anticipation effect (regression coefficient, and level of significance)

	Estimated coef. (Standard error)	*P* value	N after matching (control/treatment)	N after matching (control/treatment)
Short-term change (between 2001/2002 and 2004/2005)	0.63 (0.22)	0.006	5154/101	79/101
Long-term change (between 2001/2002 and 2012/2013)	0.55 (0.28)	0.048	5154/101	79/101

This table contains only the treatment variable; the entire analysis is available upon request

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