Partner + Children = Happiness?

An Assessment of the Effect of Fertility and Partnerships on Subjective Well-Being

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Abstract

Economic and rational choice theories suggest that the relationship "Partner + Children = Happiness" holds: individuals form unions or have children because these decisions increase their subjective well-being or "happiness". But existing estimates do not identify whether having partners and children cause happiness or are only proxies for underlying factors, such as optimistic preferences, that may tend to cause happiness and partnerships and fertility. In this paper we therefore investigate this relation using within-MZ (identical) twin pair estimates based on Danish twins aged 25–45 and 50–70 years old. The findings include: (1) Currently being in a partnership has large positive effects on happiness, and these gains are not affected by the partnership history or the presence of children. (2) A first child substantially increases well-being, and males enjoy an almost 75% larger happiness gain from a first-born son than from a first-born daughter. (3) Additional children beyond the first child have a negative effect on subjective well-being for females, while there is no effect for males. (4) An early onset of childbearing is associated with large negative effects on well-being for females but not for males. (5) Ever having had children does not contribute to variation in the subjective well-being of males or females aged 50–70 years.

1 Introduction

The global transition from high to low levels of fertility has been a remarkable "success story". At the beginning of the 21st century, the majority of the world's population is, or soon will be, living in countries or regions with fertility levels below replacement fertility (Wilson 2004). In addition, earlier notions that fertility levels may naturally stabilize close to replacement level at the end of the demographic transition have been shattered. In Southern, Central and Eastern European countries, for instance, total fertility rates (TFRs) have fallen to unprecedentedly low levels below 1.3 (e.g., Kohler et al. 2002). This diffusion of low fertility has been closely integrated with a transformation of the family. While stable unions continue to be the by far most typical family context in which children are born (Heuveline et al. 2003), men and women spend an increasing period of their life outside co-residing unions, many unions remain childless

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for extended periods of time (or even permanently), cohabitation has increased, and union-dissolutions have become commonplace (Billari 2003). Most experts agree that low fertility—if not very low fertility—is likely to prevail for prolonged periods into the future, and the transformation of the family is unlikely to be reversed (e.g., Bongaarts and Bulatao 2000; Bumpass 1990). This remarkable global fertility transition implies rapidly aging societies and a transformation of the life-course, and it has profound implications for virtually all aspects of society and individuals' lives. Not surprisingly, these trends have rendered low fertility a challenging topic for social scientists. After decades of research on the determinants of fertility decline (e.g., see Bulatao and Casterline 2001), for instance, an increasing number of studies have started to address the question of "Why do individuals in developed countries continue to form unions and have children?" (Foster 2000; Morgan and King 2001; Schoen et al. 1997). This question is important because the case for low fertility in developed countries is convincing: the explanations include increases in the costs of children (partially as a result of simultaneous decisions to increase female labor force participation and human capital investments), the often problematic combination of child-rearing with labor force participation, the diffusion of low fertility norms, low costs of fertility limitation, the withering of benefits from children in terms of economic or social support (e.g., Becker 1981; Hotz et al. 1997; Willis 1973).[1] To the extent that reproduction constitutes an important motivation to engage in long-term partnerships, these trends in fertility have also lessened the motivation to form and maintain stable unions.

To explain continued childbearing and partnership formation in low fertility contexts, most economic and rational-choice approaches to fertility and union formation assume that individuals derive "utility" from having children or being in unions (e.g., Becker 1981). Decisions about fertility and union formation are therefore based on the utility gains attained by having children and/or being in unions as compared to the utility gains that are incurred from alternative allocations of resources, like income or time, that are required to raise children and maintain partnerships.

The basic implication of this conceptual framework is that individuals engage in marriage or have children because this increases their utility and makes them better off. This implication of economic and rational-choice theories can be empirically investigated. In particular, several recent studies suggest that the concept of utility can be measured using information about subjective well-being or "happiness" (e.g., Frey and Stutzer 2002). If individuals (*i*) do not have systematic misconceptions about the benefits of children and partnerships, and (*ii*) make conscious and informed choices about the formation of partnerships and their level of fertility, one would expect that the relation "Partner + Children = Happiness" holds: individuals form unions or have children because these decisions increase their subjective well-being or "happiness".[2]

Despite this centrality of subjective well-being for understanding the motivation to have children or form partnerships, there are very few empirical tests of whether children and partnerships indeed increase individuals' "happiness".[3] This lack of studies may partially be related to problems of empirical inference. In particular, while analyses of the relation "Partner + Children = Happiness?" may initially seem straight

[1] Though these last benefits may increase with the aging of these populations because current pay-as-you-go pension systems may not be sustainable unless other mechanisms facilitate policy to transfer resources to older generations or to increase working-age populations (e.g., through increased immigration).

[2] Some recent psychological research, however, suggests that humans forecast relatively badly the changes in subjective well-being that result from important life events due to "impact biases" or "projection biases" (Gilbert et al. 2002; Loewenstein et al. 2003).

[3] Exceptions, sometimes with only minor discussions of this aspect, include Argyle (2001); Blanchflower and Oswald (2004b); Clark and Oswald (2002); Diener et al. (1999); Easterlin (2001); Hilleras et al. (2001); Kahneman et al. (1999); McLanahan and Adams (1987); Myers (1993); Nomaguchi and Milkie (2003); Rogers and White (1998) and Waite and Gallagher (2000).

forward using data on subjective well-being, fertility and partnerships, this straight-forward approach is not likely to be satisfactory. A number of recent studies, for instance, indicate that (*i*) well-being is very stable over the life course and remarkably insensitive to income once income exceeds some "minimally sufficient" level, (*ii*) "happiness" is much more similar to a trait rather than to a state, and (*iii*) happiness is related to stable personality characteristics that have a substantial genetic etiology (for recent summaries of this literature, see for instance Argyle 2001; Frey and Stutzer 2002; Kahneman et al. 1999; Lykken 1999). A substantial fraction of variation in well-being and related personality traits across individuals is therefore likely to be due to social or biological endowments that are unobserved in social science data sets. For example, Lykken and Tellegen (1996) report that variation in the well-being component of the Multidimensional Personality Questionnaire (MPQ) for twins in the Minnesota Twin Register in the 1980s is primarily associated with genetic variation: genetic effects account for about 50% of the variation in one-time survey reports of well-being, and up to 80% of the variance in happiness indicators obtained by averaging repeated measures of well-being. Moreover, neither socioeconomic status, schooling, family income, marital status, nor religious commitment account for more than 3% of the variance in these averaged measures of well-being. Since unobserved traits not only influence well-being, but potentially also the probability of unions, the desires to have children and the socioeconomic incentives/conditions affecting marriage and fertility decisions (like wages), the analysis of happiness and its demographic determinants based on standard survey data is likely to be biased and misleading. A similar concern that unobserved variable bias results in distorted estimates of the determinants of subjective well-being applies to many other studies on the economics and psychology of happiness (Argyle 2001; Blanchflower and Oswald 2004a,b; Di Tella et al. 2001; Diener et al. 1999; Easterlin 2001; Kahneman et al. 1999), with some studies pointing to important biases resulting from unobserved endowments (Ferrer-i Carbonell and Frijters 2004).[4]

In this paper we overcome several limitations of earlier studies on the economic and social determinants of happiness. In particular, we estimate the contributions of fertility and marriage to subjective wellbeing—or "happiness"—using a unique data set from Denmark that includes monozygotic (MZ, identical) and dizygotic (DZ, fraternal) twins. These twins have been asked in a recent survey about socioeconomic and demographic background as well as their subjective well-being. The specific features of our data allow us to control for unobserved endowments (e.g., preferences and capabilities due to genetic dispositions, family background, neighborhood in which grew up, etc.) that affect the fertility/marriage behavior and happiness, and conditional on our model, these estimates reveal the *causal* contributions of fertility and marriage to individuals' subjective well-being.

2 Happiness, Children and the Biodemography of Fertility

In a general sense, the recent research on the motivations to have children has lead to a renewed interest in the value of children approach of the 1970s that argues that children (and also marriage) contribute to individuals' well-being (e.g., Fawcett 1988; Friedman et al. 1994; Hoffman and Manis 1979; Hoffman et al. 1978; Jones and Brayfield 1997; Schoen et al. 1997). In a recent review paper on "Why have children in the 21st century?", for instance, Morgan and King (2001) relate the motivations to have children in contempo-

[4] In response to this criticism, some studies have started to use longitudinal panel data on happiness (e.g., Clark et al. 2003; Clark and Oswald 2002; Schwarze 2004; Stutzer and Frey 2003; Winkelmann and Winkelmann 1998), with sometimes finding important differences between longitudinal and cross-sectional estimates (see also Ferrer-i Carbonell and Frijters 2004).

rary societies to three areas: biological predispositions, social coercion and rational choice. They conclude that humans are likely to have *evolved* preferences for children, and Morgan and King emphasize the opportunity that evolutionary theories and behavioral genetics provide for improving our understanding of human preferences for children. The arguments in Morgan and King are thus closely related to other work that has tried to interpret the preferences for children and related behaviors, such as sexual intercourse and changing fertility rates, in an evolutionary perspective. For instance, Foster (2000) draws on evidence from evolutionary biology, ethology, quantitative genetics, developmental psychobiology, and psychology, and argues that humans' evolved biological predisposition is toward nurturing behaviors, rather than having children per se. In her view, humans also have the unique ability to be aware of such biological predispositions and translate them into conscious, but nevertheless biologically-based, fertility motivation or preferences for children. Consistent with these findings, Kohler et al. (1999) and Rodgers et al. (2001) have interpreted their findings of heritability patterns in fertility and fertility precursors as evidence for systematic genetic influences on fertility motivations and preferences. Several other studies also have proposed relations between evolved dispositions/preferences and desires for children. Carey and Lopreato (1995), for instance, suggest a "two-child psychology" that implies a strong desire for two surviving children. Potts (1997), on the other hand, emphasizes humans' evolved desire to have sexual relations, rather than children per se. In contemporary modern societies with effective contraception, Potts then argues, these inherited predispositions mix with unconscious physiological mechanisms working towards optimal birth spacing to make modern humans seek personal wealth and health rather than large families.

Reproduction is also at the core of many evolutionary explanations for marriage or long-term unions (for recent reviews, see for instance Daly and Wilson 2000; Gangestad 2003; Hrdy 1999; Kaplan and Lancaster 2003). In the context of sexual reproduction, however, evolutionary models also predict marked male-female differences in fertility behavior and motivations to engage in partnerships. A husband is seen as gaining sexual access to his wife and the ability to sire her children, while women obtain support in raising their children. As a consequence, youth and the ability to reproduce is often associated with increased value of women in the marriage market, while social status and wealth enhance the desirability of males. Conflicts over reproduction and resource allocation to children are hence seen as one of the prime causes of tensions within marriage and divorce. For instance, men are profoundly concerned that the children in whose welfare they invest are their own, and infertility is frequently a reason to divorce. Sexual jealousy is also found to be different, with male jealousy more focused on the sexual act and female jealousy focused on the alienation of the partner's attention and material resources. From an evolutionary perspective, these dissimilarities between males and females are rooted in the asymmetrical efforts of males and females in producing egg and sperm cells, and they result in different short- and long-term mating strategies, differences in attachment to children and willingness to invest in offspring. For instance, females commonly invest vastly more time and energy in nurturing each offspring than do males, who can "disappear" after conception and still gain the evolutionary fitness benefit from a successfully raised biological child. This often stronger attachment of women to their offspring puts women at the risk of being "prisoners of love" (England and Folbre 2002): men can exploit the stronger maternal attachment to children in bargaining within the household or in divorce settlements because mothers are likely to take care of their common children even if their mates withdraw resources from the partner or child.

Despite the strong evolutionary arguments linking the motivation for children and partnerships to evolved

preferences and associated levels of subjective well-being, with possibly important differences across gender, studies of the contribution of children and partnerships to happiness are few. For instance, several studies on subjective well-being—including one by a leading economic demographer—do often not address the contributions of fertility to well-being in detail (e.g., Argyle 2001; Diener et al. 1999; Easterlin 2001; Kahneman et al. 1999; Myers 1993). Exceptions include McLanahan and Adams (1987) who conclude that adults with children at home often report lower levels of happiness and life-satisfaction than other groups, and these reports of lower happiness are associated with increased worries and higher levels of anxiety and depression. In a similar vein, Nomaguchi and Milkie (2003) find that becoming a parent is both detrimental and rewarding. Unmarried parents tend to report lower self-efficacy and higher depression than their childless counterparts; on married mothers' lives are marked by more housework and more marital conflict but less depression than their childless counterparts. Parental status is also found to have little influence on the lives of married men. Some of these results change once unobserved factors are taken into account. Clark and Oswald (2002), for instance, find that children are not associated with well-being in longitudinal analyses with controls for fixed effects, except for third or higher-order children that have a negative effect. Further indirect evidence on the contribution of children to well-being is obtained from several psychological studies: Rogers and White (1998), for instance, find that own children give more satisfaction with parenting than adopted children; Buss (2000) argues that humans have evolved mechanisms for mating bonds and close kinship that produce "deep sources of happiness" (see also Miller and Rodgers 2001); and Hilleras et al. (2001) show that having children contributes to the well-being and happiness of the elderly (see also Pinquart and Sörensen 2000). In addition to these studies on overall well-being, there has been an active research on associations between having children and marital satisfaction (e.g., Bradbury et al. 2000; Mizell and Steelman 2000; Russell and Wells 1994), which indicate associations, but at times positive and at time negative ones.

In contrast to the relatively scant evidence on associations between having children and happiness, the literature on associations of marriage with subjective well-being is extensive. Married individuals consistently report greater subjective well-being than never-married individuals, who in turn report greater subjective well-being than previously married individuals (i.e., divorced, separated or widowed) (e.g., Argyle 2001; Clark and Oswald 2002; Diener et al. 1999; Waite and Gallagher 2000). Various reasons for positive associations of marriage with reported well-being, besides the reproductive aspect emphasized in evolutionary theories, have been offered. Marriage may fulfill basic and universal human needs, provide companionship and freedom from loneliness, and confiding in a spouse lesses the strains encountered in life and increases one's ability to cope with these strains. The intimacy and interpersonal support provided within marriage also tends to increase well-being, as do the positive sense of identity and self-esteem that is often associated with marriage. Marriage is also associated with better health, lower mortality and higher levels of wealth (Waite and Gallagher 2000). The implications of these factors on well-being may be substantial. Recent estimates of the monetary value of the happiness gains resulting from marriage, for instance, assess the value of a lasting marriage at $100,000 a year (Blanchflower and Oswald 2004b).

All the reported associations found in the above studies, however, may also reflect reverse causality or that all of these outcomes have some common determinants, such as preferences or capabilities. None of the above studies on the associations of fertility and partnerships with subjective well-being control for potentially important endowments, including preferences and capabilities due to genetic dispositions, family

background, neighborhood in which grew up, etc., that may determine fertility, partnerships and well-being. The findings may therefore result, at least in part, from the fact that innately happier and healthier people may be more likely to become married and their marriages may have longer durations and potentially also more children. This problem of happiness, partnership and fertility all being determined by other prior factors is particularly relevant because some studies, as noted in the introduction, have argued that happiness is much more a trait than a state. If endowments importantly contribute to variation in happiness, as is suggested by the empirical studies discussed above, then standard analyses that interpret associations between reported well-being and observed demographic or socioeconomic characteristics are likely to yield distorted estimates of causal effects. Because of the myriad of unobserved factors that may simultaneously influence happiness, partnerships and fertility and are not controlled for in conventional studies, some claims about the irrelevance of such factors—as for instance in Waite and Gallagher (2000) "[t]he selection of happy and healthy people into marriage cannot explain the big advantage in mental and emotional health husbands and wives enjoy" (p. 68)—have a weak or nonexistent empirical basis. Investigations of the desires for children on the basis of their contribution to well-being and happiness, therefore, require explicit control for endowments, and an interpretation of the results within a life-cycle model that represents the conscious long-term planning of fertility and related behaviors.

The central contribution of this paper is to improve our estimates of the impact (not just the associations) of unions and fertility on subjective happiness through the first estimates of such effects that control for all endowments, and to establish several new results—net of endowments—for the contributions of partnerships and children to subjective well-being that have not been found in earlier analyses.[5]

3 The Danish Twin-Omnibus-Survey 2002

Twins studies long have been used to assess the multiple roles of endowments on demographic and socioeconomic outcomes and on estimates of effects of various variables net of such endowments in both the psychological/behavior-genetic and the socioeconomic literatures.[6] Our analyses are based on the Danish

[5] A number of previous studies attempt to control for family endowments through including commonly observed parental characteristics such as parental schooling attainment, income and occupation. However several recent studies show that these observed family background variables account for a small proportion of the total impact of family background (including intergenerational genetic links) on various outcomes over the life cycle (e.g., Behrman and Rosenzweig 2002, 2004).

[6] While the psychological literature using twins has tended to focus more on estimates of heritabilities, the social science literature has focused more on using twins data to control for endowments and thus to obtain estimates net of endowment effects, dating back at least to Behrman and Taubman (1976). A question arises, however, whether results from analyses of twins can be generalized to the general population. Twins are clearly not a random draw of all children. Twins are more likely to be born prematurely and to have lesser birthweights than non-twins. Twins also grow up with at least one sibling that is of the exact same age. These differences in the family environment in childhood and early adulthood potentially render children growing up as twins distinct from other children, thus limiting the usefulness of twins studies to infer relations that pertain to the general population. Several empirical findings and aspects of our model specification, however, suggest that this is *not* the case. First, the within-twin pair estimates presented in this paper control for unobserved endowments that might be related to any selectivity associated with being twins. Second, analyses with several data sets have not found statistically significant differences between twins and the general population, or between siblings (including twins) with close rather than less close interbirth spacing. Kohler et al. (2002), for instance, estimate the fertility of the general Danish population at age 34, 35 and 40 and combine different fertility indices (number of children, parity-progression measures, and age at first birth) with the corresponding measures for the twin population (combined and separately by zygosity) for same-sex twin pairs born in 1945-65. The comparisons find a very close correspondence between the fertility level—which is also closely linked to patterns of marriage and union formation—and its change across cohorts in both the twin and the general population. In addition, comparisons of twins with non-twins also reveal few significant differences with many other measures, including several important psychological variables (e.g., Kendler et al. 1996; Simmons et al. 1997) or estimated earnings functions (Behrman et al. 1980). Moreover, Olneck (1977) and Behrman and Rosenzweig (1999, 2004) report

Twin Registry that was established in 1954 as the first nationwide twin registry in the world (see Hauge 1981; Hauge et al. 1968; Kyvik et al. 1996, 1995; Skytthe et al. 2002). This registry covers twins born during the period 1870–1982. Data from this twin registry have extensively been used for analyses of health, mortality and aging (e.g., see Christensen 2001), psychological phenotypes (McGue and Christensen 1997, 2001) and fertility (Kohler and Rodgers 2003; Kohler et al. 1999; Rodgers et al. 2001).

In the summer of 2002, the Danish Twin Register conducted a Twin-Omnibus Survey of all registered male and female twins born in 1931-82, resulting in a total of 34,944 completed questionnaires (a response rate of 75.4%). This 2002 survey used a multipurpose omnibus questionnaire addressing issues of health (e.g., diseases, physiological characteristics such as height, weight, etc.), socioeconomic characteristics (e.g., schooling attainment), health relevant behaviors (such as smoking), fertility (e.g., number of biological children for both the twin and the current partner/spouse, age at first birth, and sex of the first child) and partnership behaviors (e.g., number of different marriages/cohabitations, age at first marriage/cohabitation, schooling attainment of partner).

The survey also included a measure of subjective well-being, or "happiness", that was obtained through the question "How satisfied are you with your life, all things considered?" with responses ranging from very satisfied to not satisfied at all. In contrast to other investigations focusing on satisfaction with some particular aspects of life such as marriage or work, this survey question attempts to elicit *overall* well-being. In making this evaluation of their life satisfaction, individuals are thought to examine the tangible aspects of their lives, weigh the good against the bad, and arrive at a judgment of overall satisfaction. This happiness measure based on the above single question has four main advantages that render it particularly useful for the analyses in this paper: (*a*) the global nature of this judgment makes it a relatively stable evaluation that is not strongly dependent on the affective state the person is in at the time of judgment (Lucas et al. 1996); (*b*) despite the fact that subjective well-being is a complex construct, reliability studies indicate that reported subjective well-being is moderately stable and sensitive to life circumstances (Ehrhardt et al. 2000), including with respect to demographic outcomes (see our analyses in Sections 4.2–4.3); (*c*) the above measure of well-being is widely used and hence comparable across many studies, countries and time periods (for instance, the identical question about well-being has also been implemented in the U.S. General Social Survey and the European Euro-Barometer surveys for about 15 years);[7] and (*d*) it requires only a minimal amount of survey time and questionnaire space, which was critical for allowing its implementation in the 2002 twin omnibus survey.

The responses to the question "How satisfied are you with your life, all things considered?" for the twins aged 25–45 and 50–70 in complete same-sex pairs are summarized in Table 1. We report these responses separately for these two age categories that represent different broad stages of the life cycle during which children and partners may contribute to individual's well-being for different reasons. The first category, twins aged 25–45, includes individuals who are still in childbearing years. The second category, twins aged 50–70, includes individuals who mostly have completed reproduction and may have begun to rely on

no significant differences between correlations across siblings that depend on birth spacing, which is relevant in that one aspect of twins is that they are sibling with very close spacing.

[7] Recent analyses of variable usage in the General Social Survey also report that 341 publications have used this question about subjective well-being during the period 1972–93, making the above happiness indicator by far the most frequently used GSS variable about personal evaluations in publications (Smith and Heaney 1996). Moreover, the second and third most frequently used GSS variables in publications are job satisfaction and family satisfaction, which use an almost identical wording as the general question about happiness.

Table 1: Subjective well-being in Danish twins

	Females		Males	
	MZ twins	DZ twins	MZ twins	DZ twins
Age 25–45				
Not particularly satisfied / not satisfied	4.9%	5.1%	4.8%	4.0%
Rather satisfied	44.4%	46.3%	43.7%	46.0%
Very satisfied	49.7%	47.5%	50.1%	49.1%
n/a	1.0%	1.1%	1.5%	0.9%
Mean	1.45	1.43	1.46	1.46
Overall std. dev	(0.59)	(0.59)	(0.59)	(0.57)
Within-twin pair std. dev	(0.52)	(0.55)	(0.52)	(0.55)
Within-twin pair correlation	0.21	0.13	0.21	0.07
N	2,114	2,216	1,314	1,456
Age 50–70				
Not particularly satisfied / not satisfied	3.7%	4.4%	2.6%	4.0%
Rather satisfied	46.0%	47.4%	43.1%	46.0%
Very satisfied	48.8%	45.8%	53.3%	48.4%
n/a	1.5%	2.5%	0.9%	1.7%
Mean	1.46	1.42	1.51	1.45
Overall Std. Dev	(0.57)	(0.58)	(0.55)	(0.57)
Within-twin pair std. dev	(0.49)	(0.54)	(0.48)	(0.54)
Within-twin pair correlation	0.25	0.13	0.24	0.11
N	1,112	1,866	874	1,418

Notes: Data are for twins in complete same-sex twin pairs only. Means, standard deviations and within-pair correlations are calculated by converting the responses into a single happiness indicator using 0 = not satisfied or not particularly satisfied, 1 = rather satisfied and 2 = very satisfied. Within-twin pair standard deviation is estimated using a one-way analysis of variance (ANOVA) of this happiness.

children for social and possibly also economic support.[8] For both age groups partnerships and children may constitute important sources of social support. The responses in Table 1 show that males and females in Denmark are generally quite satisfied with their life, with remarkably small differences in overall satisfaction with life by gender, age or zygosity (for similar findings of high levels of subjective well-being in Denmark and other Nordic countries, see Argyle 2001). The comparison of the overall and within-twin pair standard deviation of subjective well-being indicates that in the age group 25–45 years, between 7–13% (DZ twins) and 22% (MZ twins) of the overall variation in well-being occurs between twin pairs, reflecting the

[8]There are relatively more females in the younger than in the older age group due to differential survey response rates. While survey response rates are about equal for men and women in the cohorts born 1931–52 (75–77%), the response rate for women is about 10 percentage points higher than that of males in younger cohorts (80% vs. 69%). In addition, there has been a decline in the twinning rate over time, which is also reflected in the total number of MZ and DZ pairs in the two cohorts in Table 1, from about 15 per 1000 around 1945 to 10 per 1000 around 1975. This decline has primarily occurred for DZ twinning, whereas the MZ twinning rate has remained stable throughout the period (Kyvik et al. 1995). This finding is confirmed in hospital data where zygosity is determined clinically. Moreover, this decline in the DZ twinning rate is not specific to Denmark, but a relatively widespread pattern that has also been found in other countries. The reasons are currently not well-known (James 1995; Kyvik et al. 1995).

Table 2: Descriptive statistics for partnership and fertility behavior in Danish twins

	Females		Males	
	MZ twins	DZ twins	MZ twins	DZ twins
Age 25–45				
Prop. with at least one partnership	0.86	0.86	0.79	0.77
# of partnerships	1.36	1.40	1.27	1.16
	(1.13)	(1.37)	(1.54)	(1.12)
Prop. currently in a partnership	0.74	0.75	0.71	0.69
Prop. with at least one child	0.60	0.65	0.54	0.55
# of children	1.17	1.32	1.05	1.07
	(1.15)	(1.15)	(1.15)	(1.14)
First birth before or at age 21	0.11	0.13	0.06	0.05
N	2,114	2,212	1,312	1,453
Age 50–70				
Prop. with at least one partnership	0.93	0.92	0.95	0.91
# of partnerships	1.21	1.20	1.29	1.23
	(0.97)	(0.69)	(0.76)	(0.81)
Prop. currently in a partnership	0.76	0.74	0.84	0.83
Prop. with at least one child	0.89	0.87	0.86	0.84
# of children	1.99	2.01	1.97	1.86
	(1.10)	(1.15)	(1.17)	(1.13)
N	1,112	1,865	874	1,418

Notes: Means with standard deviation in parentheses. Data are for twins in complete same-sex twin pairs only. The variable "first birth before or at age 21" is only reported for respondents with at least one child.

between-twin pair variation in the endowments that affect happiness.[9] This relevance of common endowments slightly increases in the age group 50–70 years to 11–13% (DZ twins) and 24–25% (MZ twins) of the total variance in well-being. At the same time, the within-twin pair correlation in subjective well-being is approximately twice as high in monozygotic twin pairs as compared to dizygotic twin pairs for both sexes and in both age categories. This pattern of within-twin pair correlations suggests an important influence of genetic dispositions on the variation in happiness across individuals, and a small relevance of shared influences resulting from parental households and other common socialization experiences.

In Table 2 we additionally report summary statistics for several measures of partnership and fertility behavior. Because the distinction between marriage and cohabitation has increasingly lost importance in Denmark and other Scandinavian countries, the twin-omnibus survey—and hence all our analyses in this paper—does not distinguish between these two union types. For instance, the proportion of out-of-wedlock births increased from 7.8 per cent to 44.6 per cent during the period from 1960 to 2001, cohabitation prior to marriage has become commonplace in recent decades, and more than 50 per cent of first births are born to women outside of marriage in recent cohorts (Carneiro and Knudsen 2001; Council of Europe 2002). We therefore use to the term "partnership" in this paper to refer to *both* marriage and cohabitation, excluding

[9]The fraction of variance between twin pairs is calculated as $1 - (\text{within std. dev})^2/(\text{overall std. dev})^2$; for female MZ twins, for instance, the between twin pair variation accounts for $1 - .52^2/.59^2 = .22$ of the total variance in subjective well-being.

only non-cohabiting and/or non-marital relations.[10]

Table 2 shows that the vast majority of twins aged 25–45 and 50–70 report at least one partnership prior to the survey, and the mean number of partnerships ranges from 1.16 to 1.40. Because cohabitation and divorce have become more common over time, twins aged 50–70, despite their older age, do not report more partnerships than twins aged 25–45. The fraction of twins who are in partnerships at the time of the 2002 survey ranges from .69 to .84. Females are more likely to be in partnerships at the time of the survey in the younger cohorts aged 25–45, while males are more frequently found in partnerships in the older cohorts aged 50–70 (resulting, most likely, from differential male-female survivor probabilities and the lower probability of men to become widowers). The fertility questions in the survey asked explicitly for *biological* children of the respondent and his/her current partner, leaving aside any adopted children or stepchildren. Between one half and two thirds of twins aged 25–45 have at least one biological child, and the mean number of children is between 1.17–1.32 for females and 1.05–1.07 for males. The fraction of respondents who have children increases to .84–.89 in twins aged 50–70, and the average number of children increases to 2 for females and 1.86–1.97 for males. These fertility and partnership patterns for the twins in Table 2 agree with the corresponding patterns for the overall population (e.g., see Carneiro and Knudsen 2001; Council of Europe 2002). There are also no relevant differences between MZ and DZ twins with respect to their fertility and partnership behaviors (see also footnote 6).

4 The effect of partnerships and fertility on happiness

The major advantage of using twin studies to identify the effect of partnerships and fertility on happiness is that twins studies provide a possibility to remove the influence of unobserved endowments affecting both subjective well-being and partnership/fertility behaviors. In particular, the key problem in estimating the causal effect of fertility and partnerships on subjective well-being is that unobserved endowments—including the genetic dispositions and shared home and community influences—potentially affect both the subjective well-being of individuals as well as the explanatory variables that are included on the right side of the regression analyses. For instance, behavior genetic analyses[11] of our data, not reported here in detail, have shown that men aged 25–45 who tend to be happier based on their biological dispositions are more likely to have a partner, tend to have had more partnerships, and tend to have more children. Despite this effect of genetic endowments on the selection into partnerships and on fertility outcomes, differences in partnership experiences and in the number of children may constitute an important determinant of differences in subjective well-being among individuals. More importantly, this additional effect of fertility or partnerships on happiness, net of endowments, is the effect that is most relevant to study: it constitutes—conditional on our model in Section 4.1—the causal contribution of fertility and partnerships to subjective well-being. Only this causal effect can reveal the extent to which different partnership and fertility histories result in different levels of well-being across individuals, and only this causal effect allows an assessment of how programs

[10] The survey asked "How many times have you been married or cohabited with different partners?," and respondents were asked to give the number of marriages/cohabitations. Similarly, the respondents were asked about their current partnership status with the question "Are you married or living together with a partner today?"

[11] Behavior genetic models, frequently used in combination with data on monozygotic (MZ) and dizygotic (DZ) twins, provide a decomposition of the within-population variance of a trait or outcome into genetic variance (heritability, h^2) and shared environmental variance (c^2). Conditional on the underlying additive genetic model, the former measures the proportion of total phenotypic variance attributable to variation in (additive) genetic factors across individuals in a population, and the latter reflects the proportion of the total variance related to differences in shared-environmental conditions, such as parental background, socialization, etc.

that promote stable unions—such as the Marriage Movement (see http://www.MarriageMovement.org/) and the Personal Responsibility and Work Opportunities Act (PRWORA)—and/or provide incentives for childbearing—such as many family policies in low fertility countries (e.g., see Gauthier 1996)—affect individuals' subjective well-being. Standard regression (or similar) analyses that do not account for this effect of endowments are potentially biased because the unobserved endowments result in correlations of the right-side variables with the disturbance term of the regression, and they may thus not identify the true relevance of partnerships and or children for the variation in subjective well-being across individuals.

4.1 Endowments and within-MZ twin estimates

Two primary approaches exist to overcome the estimation problems caused by unobserved endowments that affect the left-side variable—in our case, subjective well-being—and the right-side explanatory variables—in our case, measures of fertility and partnership behaviors—in regression analyses. Fixed-effect estimations difference out common determinants of behaviors or outcomes over time (in the case of multiple observations over time) or across individuals (in the case in which individuals share common endowments, prices and other determinants of behavior). Instrumental variable estimations purge right-side variables of their correlation with the disturbance term (in which the unobserved endowments are embedded) by using suitable instruments that are correlated with the endogenous right-side variables but not with the disturbance term.

In our analyses we pursue the former strategy, utilizing the fact that monozygotic (identical) twins share the same genetic endowment as well as the same parental background and various social or economic endowments related to parental households (e.g., neighborhoods, schools). We can therefore use fixed-effect analyses within monozygotic (identical) twins in order to control for a wide range of unobserved factors that affect both subjective well-being and fertility and partnerships. In particular, these *within-MZ twin pair analyses* can eliminate the influence of unobserved endowments resulting from genetic dispositions (MZ twins share the same genetic information) and shared parental households (the vast majority of MZ twins in our data grow up together) and other common socioeconomic contexts (e.g., cohort influences). A similar approach has been used extensively in the analysis of the returns to education (e.g., Ashenfelter and Krueger 1994; Ashenfelter and Rouse 1998; Behrman and Rosenzweig 1999; Behrman et al. 1996; Behrman and Taubman 1976) or household allocations and marriage market effects (Behrman and Rosenzweig 2002, 2004; Behrman et al. 1994; Conley et al. 2003). Controlling for endowments has substantially changed the estimates and therefore the conclusions in most of these studies.

Subjective well-being is included in our regression analyses by constructing a "happiness indicator" that is obtained from the twin's responses to the question "How satisfied are you with your life, all things considered?" as 0 = not satisfied or not particularly satisfied, 1 = rather satisfied and 2 = very satisfied. Summary statistics for this happiness indicator are reported in Table 1. All of our analyses of this happiness indicator use within-MZ twin pair regressions to control for unobserved endowments. We also report standard OLS analyses, and the comparison with the within-MZ estimates reveals the extent to which the presence of unobserved endowments distorts the results of "standard" analyses.[12] For illustration of our within-MZ

[12] In further analyses, not reported here in detail, we used a dichotomous indicator of happiness (0 = not satisfied / not particularly satisfied / rather satisfied, 1 = very satisfied) and estimated fixed and random effect logistic models that correspond to the regression analyses reported below. The results based on regression and logistic models are largely identical. This is consistent with the results in Ferrer-i Carbonell and Frijters (2004) showing that the assumption of cardinality or ordinality of the answers to general

approach, we discuss in detail one specific regression model. This model assumes that happiness of twin *i* in pair *j* can be related to fertility and partnerships of twin *i* in pair *j* in the form

$$\text{Happiness}_{ij} = \beta_0 + \beta_1 \times \text{partner}_{ij} + \beta_2 \times \text{fertility}_{ij} + \beta_3 \times X_{ij} + \mu_j + \varepsilon_{ij} \tag{1}$$

where "partner$_{ij}$" is our representation of partnership behavior—for instance, currently married or the number of marriages—and "fertility$_{ij}$" is our representation of fertility behavior (e.g., at least one child, number of children, etc.). The term X_{ij} is a vector that represents the influence of observed socioeconomic characteristics on happiness, and the term μ_j in Eq. (1) represents the influence of unobserved endowments that are common to both twins in pair j. In MZ twin pairs, the term μ_j thus captures the influence of *all* genetic dispositions as well as the influences of other common factors such as being raised in the same parental household. The term ε_{ij} reflects additional unobserved influences on happiness that are specific to twin *i* in pair j.

The within-MZ twin approach implemented in this paper has the advantage that it identifies the relevant coefficients, namely the coefficients β_1 and β_2 in Eq. (1) that reflect the influence of partnerships and fertility on subjective well-being, even if the unobserved endowments, μ_j, affect also partnership and fertility behavior. Standard analyses with survey data are biased in this context. In particular, our analyses continue to identify the correct parameter for β_1 and β_2 even if fertility and partnership behavior is affected by the endowments μ_j in the form

$$\begin{aligned} \text{partner}_{ij} &= \alpha_0 + \alpha_1 \times Z_{ij} + \alpha_2 \times \mu_j + \nu_{ij} & (2) \\ \text{fertility}_{ij} &= \gamma_0 + \gamma_1 \times Z_{ij} + \gamma_2 \times \mu_j + \eta_{ij}, & (3) \end{aligned}$$

where Z_{ij} are observed and η_{ij} and ν_{ij} are unobserved factors that are uncorrelated with ε_{ij} and that influence partnership or fertility behaviors of twin *i* in pair j. The influence of the endowments μ_j on partnerships and fertility in Eqs. (2–3) distorts standard regression analyses of Eq. (1) because it induces a correlation between the right-side variables of the regression and the disturbance term (inclusive of $\mu_j + \varepsilon_{ij}$). This effect, however, is avoided by including a fixed effect for each twin pair. These fixed-effect analyses are equivalent to differencing both the left-side and right-side variables in Eq. (1) within twin pairs. The resulting within-MZ twin estimates then sweeps out the unobserved endowment terms. The within-MZ estimator is therefore based on the relation

$$\Delta\text{Happiness}_j = \beta_1 \times \Delta\text{partner}_j + \beta_2 \times \Delta\text{fertility}_j + \beta_3 \times \Delta X_j + \Delta\varepsilon_j, \tag{4}$$

where "Δ" denotes the within-MZ twins difference of the corresponding variable in pair j. Most important in this relation is that it identifies the causal contributions of partnerships and fertility to happiness despite the possible influence of unobserved genetic and social endowments on all three of these variables.[13,14]

satisfaction questions is relatively unimportant to results. We prefer the regression analyses reported below because of their easier interpretation and the more direct incorporation of fixed effects.

[13]The causal interpretation of the coefficients obtained by estimating relation (4) assumes that there are no individual-specific unobserved exogenous factors that differ between identical twins and affect both the dependent variable (in our case, happiness) and the right-side variables of interest (in our case, indicators of fertility and partnership behaviors). That is the covariances between ε_{ij} and ν_{ij}, and between ε_{ij} and η_{ij} are assumed to be zero.

[14]An often-mentioned concern with respect to within-MZ twin pair estimation is measurement error in the explanatory

In our within MZ analyses we do not include additional characteristics X_{ij} (see Eqs. 1 and 4) that affect happiness in addition to the partnership and fertility measures.[15] The reason for focusing on fertility and partnership measures as explanatory variables for variation in happiness is that we expect that a substantial part of the effect of fertility or partnerships on well-being is mediated through other variables such as schooling attainment, income, housing, etc. Since the goal of our analyses is to identify the overall effect of fertility or partnerships on well-being, including these additional variables would distort our estimates of the coefficients of interest in this paper: the *overall* causal effect of children and/or partnerships on subjective well-being as they result from a broad variety of pathways.

A major advantage of our within-MZ approach as compared to fixed effects analyses with panel data on subjective well-being (e.g., Clark et al. 2003; Clark and Oswald 2002; Schwarze 2004; Stutzer and Frey 2003; Winkelmann and Winkelmann 1998) is that our approach allows us to study the *long-term* effects of children and partnerships on subjective well-being. For instance, longitudinal observations on well-being in panel data allow the implementation of fixed-effect approaches to investigate the effect of additional births or changes in marital status on well-being with controls for endowments. These individual longitudinal fixed-effect studies are necessarily focused on the changes in well-being that are associated with births or changes in partnerships between the survey waves. However, panel data on well-being that cover long periods of the lifespan are not available. Fixed-effect analyses, therefore, cannot reveal the long-term consequences of fertility and partnerships on well-being. For instance, these analyses cannot reveal the effect of early fertility (like teenage pregnancies) on well-being or the contribution of children to happiness at post-reproductive ages. These limitations of fixed-effect analyses with longitudinal data are avoided in our analyses that are based on within-MZ twin estimates.

4.2 Happiness and partnerships

In this section we begin our empirical analyses with a focus on the relationship between subjective well-being and partnerships. In Table 3 we report the results of different within-MZ twin pair and standard regression (OLS) estimates of the influence of partnerships on happiness for females (top panel) and males (bottom panel) aged 25–45. To avoid variation in the sample size across model specifications, all models in this and the next section are estimated for complete twin pairs with non-missing information on well-being, fertility and partnership indicators. We also report in Table 3 a generalized Hausman test (White 1994) for the null hypothesis that the coefficients of the within-MZ and OLS analyses are equal.[16]

variables—in our case fertility and partnership indicators—because fixed-effect estimations tend to exacerbate problems of measurement error. In particular, measurement error in the right-side variables will tend to distort the coefficient estimates towards zero (Ashenfelter and Krueger 1994; Griliches 1979), and some studies have implemented instrumental-variable estimation (using the co-twins' report of the explanatory variables as instrument) as a possible solution to this problem (e.g., Ashenfelter and Krueger 1994; Behrman and Rosenzweig 1999, 2004; Behrman et al. 1994). In the present study this instrumental-variable approach is not feasible due to the absence of data on good instruments, and we thus cannot control for measurement error. However, the relatively small change in some of the estimates presented below and the fact that in several cases the within-MZ twin pair estimates result in larger coefficients than the corresponding OLS estimates suggest that the biases toward zero owing to random measurement error are probably not all that large. This result also gives us confidence that the differences between the OLS and the within-MZ (or fixed-effects) estimates are substantially due to control for important unobserved fixed effects and are not just an artifact of random measurement error.

[15] In OLS analyses of Eq. (1), which we present below for comparison, we include age and age^2 in addition to the fertility and partnership variables in order to control for patterns in happiness, fertility and partnerships associated with age or birth cohort.

[16] In the within-MZ twin pair and OLS analyses we use robust standard errors (White 1980) to adjust for potential heteroscedasticity, and in the OLS analyses we additionally adjust for correlation of residuals within twin pairs. Due to this robust estimation of the covariance matrix, standard Hausman tests are not applicable because OLS does not constitute the most efficient model under

Our initial analyses focus on the number of partnerships prior to the survey, independent of the current partnership status. Because the fact of having even been in a partnership may be an important aspect of subjective well-being, our analyses separate the effect of the variables "at least one partnership" and "the number of remaining partnerships". The within-MZ estimates of Model 1 for females show that at least one partnership is strongly associated with higher subjective well-being, while additional partnerships after the first do not lead to a higher level of happiness. This situation is almost identical for males. Furthermore, the standard OLS estimates overestimate this effect, and they suggest that additional partnerships (and hence union dissolutions between partnerships) decrease subjective well-being for females. This effect of additional partnership and/or union dissolutions, which is a prominent theme in some recent debates (e.g. Waite et al. 2002), is not confirmed in the within-MZ twin pair estimates.

If the current partnership status is included in addition to the overall number of partnerships in Table 3 (see Model 2 for females and Model 6 for males), the current partnership status exerts a strong influence on well-being. Moreover, this positive effect of the current partnership is stronger for males than for females. Women who are currently in a partnership, for instance, enjoy a happiness indicator that is .23 higher than that of women not currently in partnerships. This effect is equal to .38 for males. Males hence seem to enjoy greater benefits in terms of subjective well-being from a current marriage/cohabitation than females. In addition, individuals who have been in partnerships, but are not currently in a cohabiting or marital union, do not enjoy higher happiness than those never in partnerships. These effects of partnerships are sizable when compared to the overall variance in subjective well-being (see Table 1). A current partnership, for instance, provides an improvement in well-being of 39% (females) and 65% (males) of one standard deviation, and the relative size of this effect increases to 43% (females) and 73% (males) of one standard deviation if it is expressed in terms of within-twin pair variation, that is, variation in subjective well-being that is net of endowments.

In additional analyses we include an interaction of the variable "currently in partnership" with age (Models 3 and 7 in Table 3), and we also include the number of separations (Models 4 and 8 in Table 3). Quite interestingly, the strong effect of "currently in a partnership" does not change in these analyses for either sex, and neither the interaction with age nor the number of separations exerts significant influences on subjective well-being. This further confirms our earlier interpretation that, net of endowments, past separations do not seem to affect subjective well-being in our analyses.

In Table 4 we report the analogous analyses for women and men age 50–70 years old. For women the variable "at least one partnership" is no longer strongly associated with variation in subjective well-being, and the within-MZ estimates reveal even a weak negative influence of additional partnerships (Models 1 and 5). At older ages, therefore, negative effects of additional partnerships—and hence past union separations—exist even in analyses that account for endowments. For males, this negative effect is not statistically significant, and our analyses reveal only an influence of "at least one partnership". If the current partnership status is included in the analyses, a current partner is strongly associated with increases in subjective well-being for both males and females (Models 2 and 6), quite similar to the earlier age group of 25–45 years. This positive effect of a current partnership on well-being does not vary with age for females, whereas the effect does increase slightly with age for males—perhaps indicating that men start to rely more strongly on their spouses for support as their health declines with age. Similar to our analyses for younger twins, the

the null hypotheses. A generalized Hausman test (White 1994), implemented using the `suest` command in STATA, is therefore used to test the equality of coefficients across models.

Table 3: Effect of partnerships (cohabitations/marriages) on subjective well-being, age 25–45:

Females	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
at least one partnership	0.186**	0.198**	0.084	0.023				
	(0.058)	(0.042)	(0.060)	(0.046)				
# of remaining partnerships	0.007	−0.040*						
	(0.019)	(0.017)						
currently in partnership			0.226**	0.255**	0.247**	0.261**	0.261**	0.250**
			(0.048)	(0.035)	(0.048)	(0.033)	(0.046)	(0.033)
currently in partnership × (age - 35)					−0.001	−0.002		
					(0.007)	(0.005)		
# of separations							0.019	−0.023
							(0.017)	(0.016)
N (individuals)	2,050	2,050	2,050	2,050	2,050	2,050	2,050	2,050
Test of H_0: equal coefficients	*		n.s.		n.s.		*	
Males	*Model 5*		*Model 6*		*Model 7*		*Model 8*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
at least one partnership	0.196**	0.213**	0.006	0.007				
	(0.066)	(0.046)	(0.066)	(0.051)				
# of remaining partnerships	−0.019	−0.012						
	(0.021)	(0.014)						
currently in partnership			0.384**	0.321**	0.402**	0.326**	0.378**	0.322**
			(0.055)	(0.046)	(0.053)	(0.041)	(0.055)	(0.041)
currently in partnership × (age - 35)					0.012	0.001		
					(0.009)	(0.007)		
# of separations							−0.014	−0.006
							(0.018)	(0.013)
N (individuals)	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		n.s.	

Notes: Standard errors in parentheses. *p-values:* $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$. Within-MZ models do not include a constant. OLS models additionally include a constant and the variables age and age^2. Robust standard errors (White 1980) are used to adjust for potential heteroscedasticity, and in the OLS analyses additionally for correlation of residuals within twin pairs. The test of the null hypothesis (H_0) of equal coefficients reports the *p*-values of the generalized Hausman test that the reported coefficients are equal between the within-MZ and OLS models (White 1994).

Table 4: Effect of partnerships (cohabitations/marriages) on subjective well-being, age 50–70

Females	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
at least one partnership	0.116	0.112	0.010	−0.009				
	(0.092)	(0.074)	(0.097)	(0.076)				
# of remaining partnerships	−0.037^{+}	−0.042**						
	(0.020)	(0.013)						
currently in partnership			0.259**	0.287**	0.255**	0.279**	0.238**	0.263**
			(0.054)	(0.043)	(0.053)	(0.043)	(0.057)	(0.046)
currently in partnership × (age - 60)					−0.004	−0.006		
					(0.009)	(0.007)		
# of separations							−0.020	−0.019
							(0.017)	(0.013)
N (individuals)	1,038	1,038	1,038	1,038	1,038	1,038	1,038	1,038
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		n.s.	
Males	*Model 5*		*Model 6*		*Model 7*		*Model 8*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
at least one partnership	0.180*	0.079	0.064	−0.068				
	(0.088)	(0.094)	(0.094)	(0.097)				
# of remaining partnerships	−0.022	−0.008						
	(0.043)	(0.028)						
currently in partnership			0.274**	0.250**	0.288**	0.242**	0.297**	0.242**
			(0.074)	(0.059)	(0.069)	(0.059)	(0.074)	(0.062)
currently in partnership × (age - 60)					0.024*	0.005		
					(0.012)	(0.010)		
# of separations							0.012	0.005
							(0.036)	(0.025)
N (individuals)	824	824	824	824	824	824	824	824
Test of H_0: equal coefficients	n.s.		n.s.		$^{+}$		n.s.	

Notes: Standard errors in parentheses. *p-values:* $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$. Within-MZ models do not include a constant. OLS models additionally include a constant and the variables age and age^2. Robust standard errors (White 1980) are used to adjust for potential heteroscedasticity, and in the OLS analyses additionally for correlation of residuals within twin pairs. The test of the null hypothesis (H_0) of equal coefficients reports the *p*-values of the generalized Hausman test that the reported coefficients are equal between the within-MZ and OLS models (White 1994).

current partnership status therefore continues to be the most important influence also at ages 50–70 years old, and conditional on the current partnership status, well-being at ages 50–70 does not vary systematically with the number of partners or the number of separations. This suggests that past separations have negative consequences for the well-being of women primarily because they reduce the probability to be currently in a partnership at the time of the survey.

In summary, for both males and females, and for both age groups 25–45 and 50–70 years old, the primary partnership variable associated with changes in subjective well-being is the *current* partnership status. Males, particularly at ages 25–45, tend to benefit slightly more from a current partnership than females. Nevertheless, current partnerships provide sizable improvements in well-being for both sexes and in both age categories. Moreover, once current partnership status is controlled for, the partnership history in terms of number of partnerships (and hence also the number of separations) does not importantly affect well-being. The lack of important differences between females and males, finally, raises some questions about the possibility discussed in evolutionary biology and psychology (see Section 2) that men value multiple sexual partners (and, therefore, multiple partnerships) more than woman, but it is consistent with recent psychological research that the long-term consequences on well-being of life events that are often perceived as negative and undesirable, such being divorced or seeing one's cohabiting union being terminated, may be lower than anticipated prior to the event (e.g., Gilbert et al. 2002).

The comparison of the within-MZ estimates in Tables 3–4 with the corresponding OLS analyses reveals that the selection with respect to unobserved characteristics (i.e., the term μ_j in Eq. 1) seems to operate in opposite directions for males and females; Figure 1 summarizes these differences for Models 3 and 7 in Tables 3–4. The OLS estimates of subjective well-being *overestimate* the effect of the current partnership on subjective well-being for females as compared to the preferred within-MZ twin pair estimates. Women whose genetic or social endowments tend to increase the persistent part of their subjective well-being, conditional on the current partnership status, are therefore more likely to be in partnerships. Similar conclusions are also obtained for other specifications in Tables 3 and 4. For males, however, Figure 1 shows that OLS estimates tend to *underestimate*—sometimes fairly substantially—the effect of the current partnership on well-being, and OLS estimates would not have revealed the dependence of well-being on age. For males, therefore, endowments that tend to increase the persistent part of a person's subjective well-being, conditional on the current partnership status, are negatively associated with marriage/cohabitation at the time of the survey.

4.3 Happiness and fertility

In Table 5 we report the results of our analyses of children on subjective well-being. While our data do not include detailed longitudinal information on fertility, they nevertheless include several key aspects of childbearing histories: the number of biological children of a respondent, the sex of the first child, and the number of biological children of the current partner. The last of these is interesting because it allows us to construct an indicator of the respondent's minimum number of stepchildren. If the current partner has more biological children than does the respondent, these additional children must be the respondent's step children.[17] In addition, we use the information on the sex of the first child to create two dummy variables

[17] It is possible that the respondent has more stepchildren than revealed by this calculation because not all of the respondent's children may be children with the current partner. Our analyses can therefore reveal the minimum number of step children, but not

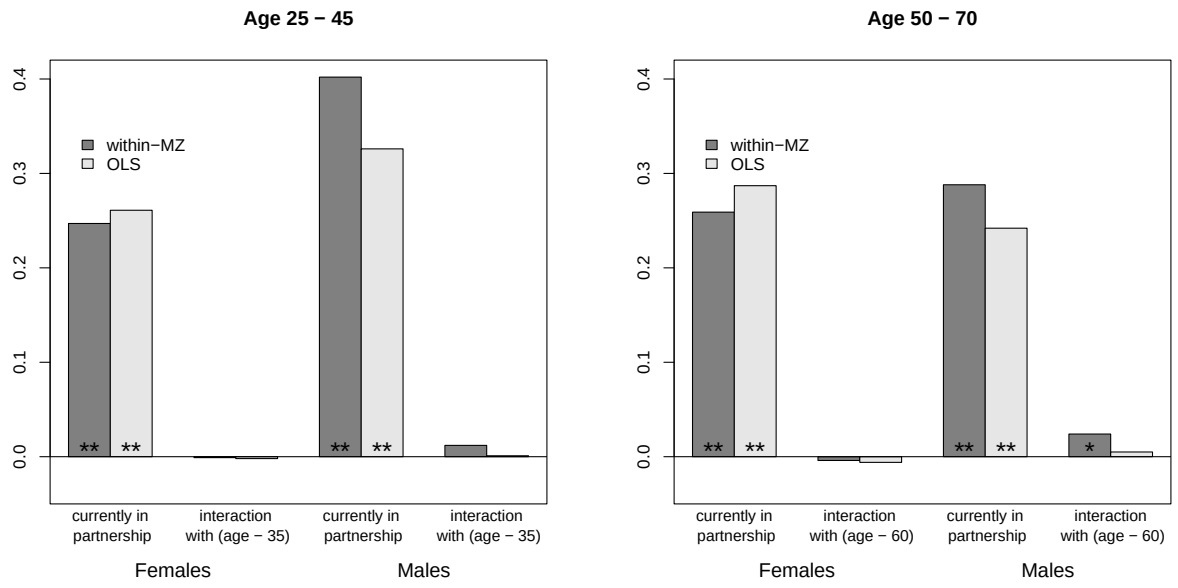

Figure 1: Effect of partnerships on subjective well-being for females and males (based on Models 3 and 7 in Tables 3 and 4).
Note: Significance levels are indicated as + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$.

that indicate whether (1) the respondent has at least one child and the first child is a boy (*first-born boy*), and (2) the respondent has at least one child and the first child is a girl (*first-born girl*).

Models 1 and 5 in Table 5 reveal the effect of the number of biological children on subjective well-being. The striking result of these analyses, especially when compared to the earlier results of partnerships, is that the effect of the number of children on happiness seems to be remarkably unimportant. For females the effect is small and not statistically significant in the within-MZ estimates, and for males the effect is small albeit statistically significant. The reason for this small effect of the total number of children may be partially related to the non-linear influence of children on happiness. In Models 2 and 6 of Table 5 we therefore separate the number of children into three variables: (*a*) whether a respondent has at least one child and the first child is a boy; (*b*) whether a respondent has at least one child and the first child is a girl; and (*c*) the number of remaining children. The results of Models 2 and 6 are also graphically presented in Figure 2.

For females (Model 2) the first-born child—independent of its sex—has a large positive effect on subjective well-being: having at least one child improves happiness by .20–.23, which is equivalent to 35–39% of one standard deviation (and 39–44% of one within-twin pair standard deviation). This effect of the first child is substantially underestimated by standard OLS regressions. In contrast to the large positive effect of the first child on well-being, additional children beyond the first child are not associated with higher levels of happiness; instead, the within-MZ results of Model 2 reveal that additional children beyond the first tend to be associated with *lower* levels of happiness for females. Each child beyond the first decreases the happiness indicator by 13% of one standard deviation for females, and three children almost completely compensate for the positive effect resulting from the first child. The corresponding analyses for males (Model 6) result in a strikingly different pattern. First, there is an important sex difference associated with the happiness

necessarily the exact number.

Table 5: Effect of fertility on subjective well-being, age 25–45

Females	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
# of children	0.030	0.028*			0.000	−0.008		
	(0.023)	(0.014)			(0.022)	(0.014)		
first-born boy			0.232**	0.108**			0.176**	0.032
			(0.055)	(0.039)			(0.054)	(0.039)
first-born girl			0.204**	0.107**			0.142*	0.032
			(0.057)	(0.039)			(0.057)	(0.039)
# of remaining children			−0.068*	−0.011			−0.078*	−0.025
			(0.031)	(0.021)			(0.031)	(0.020)
currently in partner-ship					0.248**	0.269**	0.227**	0.262**
					(0.045)	(0.032)	(0.045)	(0.032)
N (individuals)	2,050	2,050	2,050	2,050	2,050	2,050	2,050	2,050
Test of H_0: equal coefficients	n.s.		*		n.s.		*	
Males	*Model 5*		*Model 6*		*Model 7*		*Model 8*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
# of children	0.057*	0.087**			0.017	0.042*		
	(0.023)	(0.018)			(0.023)	(0.019)		
first-born boy			0.172*	0.241**			0.051	0.125*
			(0.068)	(0.052)			(0.066)	(0.053)
first-born girl			0.099	0.157**			−0.017	0.042
			(0.065)	(0.050)			(0.062)	(0.051)
# of remaining children			0.020	0.028			0.017	0.022
			(0.034)	(0.027)			(0.034)	(0.027)
currently in partner-ship					0.378**	0.292**	0.377**	0.282**
					(0.056)	(0.043)	(0.057)	(0.044)
N (individuals)	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		n.s.	

Notes: Standard errors in parentheses. *p-values:* $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$. Within-MZ models do not include a constant. OLS models additionally include a constant and the variables age and age^2. Robust standard errors (White 1980) are used to adjust for potential heteroscedasticity, and in the OLS analyses additionally for correlation of residuals within twin pairs. The test of the null hypothesis (H_0) of equal coefficients reports the *p*-values of the generalized Hausman test that the reported coefficients are equal between the within-MZ and OLS models (White 1994). The variable 'first-born boy' ('first-born girl') equals one if respondent has at least one child and the first child is a boy (girl).

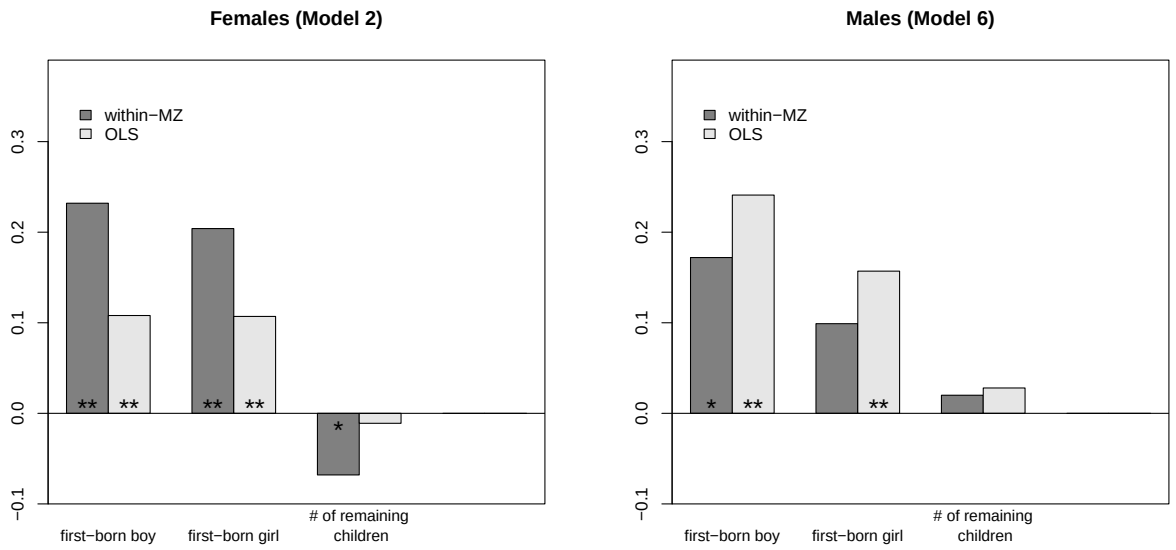

Figure 2: Effect of children on subjective well-being for females and males (based on Table 5).
Note: Significance levels are indicated as + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$.

gains resulting from a first child: first-born boys have an effect on happiness that equal to .172 (29% of one standard deviation of well-being) and almost 75 percent larger than that of a first-born girl (.099 or 17% of one standard deviation). Hence, male children not only tend to increase marital stability (Morgan et al. 1988) and cause fathers to work longer hours at higher wages (Lundberg and Rose 2002), first-born sons also make fathers happier than first-born daughters. This effect is important since there is no revealed sex-preference in parity progression probabilities: the probability of having a second child and the overall number of children do not significantly differ between male twins having a boy or girl as their first child.[18] While males therefore enjoy greater happiness from a first-born son than a first-born daughter, this does not translate into higher levels of fertility—perhaps, because their female partners do not share the same sex-specific pattern of happiness gains derived from the first child. Second, additional children beyond the first child have virtually no effect on subjective well-being. Males therefore do not suffer the same declines in happiness with additional children than do females, but they also do not gain from additional children in terms of their subjective well-being. Third, while OLS underestimate the happiness gains from the first child for females, OLS analyses substantially *overestimate* the increases in male well-being due to a first child.

In additional analyses, not reported here in detail, we also investigated whether the effect of additional children beyond the first child depends on the parity. For this purpose we included on the right side of our regressions dummy variables for at least one child, exactly two children and three or more children. The analyses show clearly that the negative effect of additional children for females begins after the first child: women with exactly two children are less satisfied with life than women who have only one child, and the effect is even stronger for women who have three or more children. For males, the above finding that

[18]For the male MZ twins used in the analyses in Table 5, the probability of having a second child after the first differs by less than one percentage point depending on the sex of the first child, and the overall number of children reported in the 2002 survey differs by less than .03.

additional children after the first child have only small effects on happiness is also confirmed in the parity-specific analyses: the well-being of men who have at least one child is higher than that of men without children, but the well-being levels do not significantly depend on the specific parity.[19]

These findings about the happiness gains from the first child and from additional children are important since they are consistent with evidence from earlier studies of the costs and satisfactions associated with childbearing (e.g., Bulatao 1981; Fawcett 1983). In particular, respondents' motivation for the first child emphasize family status, role, and emotional rewards for the parent, while the values motivating second births are strongly associated with providing companionship for the first child. Consistent with the focus on emotional rewards and family status, first children are associated with significant increases in parents' well-being, with males enjoying higher happiness gains from first-born boys than first-born girls. The differential motivations for higher-order children, which focuses on companionship for the first child, however, is also reflected in the results presented in Figure 2. For females, additional children beyond the first decrease well-being, and for males the effect of additional children is not distinguishable from zero. Hence, motivations other than subjective well-being seem to underly the progression to additional children after the first child. Alternatively, after experiencing the positive happiness gains after the first child, men and, even more so, women, may overpredict the increases in happiness resulting from an additional child. This possibility is suggested by recent psychological research on "projection biases" or "impact biases" in the evaluation of future well-being (Gilbert et al. 2002; Loewenstein et al. 2003), showing that people tend to overestimate the enduring impact—positive as well as negative—of important life events on their future emotional well-being. Gilbert et al. (2002, p. 117), for instance, claims that persons "predictably mispredict" how novel events, like having another child, will unfold. Our results show that particularly expectations about happiness gains from second children are likely to be disappointed.

Models 4 and 8 of Table 5 include the current partnership status in addition to indicators about fertility. The results of these two models are also presented in Figure 3. Two aspects of these additional analyses are particularly noteworthy. First, the effect of partnerships on happiness remains virtually unchanged as compared to our earlier analyses in Table 3 that included only partnership variables. The effect of the current partnership for females is slightly diminished after controlling for fertility, while the effect becomes somewhat larger for males. These changes, however, are relatively small. The effect of partnerships on well-being, therefore, seems to be largely independent of the fertility of respondents. This finding is further confirmed in Table 6, discussed in more detail below, using an interaction between the current partnership status and having at least one child. Second, an important sex-difference emerges between Models 4 and 8 of Table 5 with respect to the effect of fertility on well-being. For females, the effect of children on subjective well-being remains strong and significant in Model 4 even after the current partnership status is included. Similar to our earlier analyses, the first child has a strong positive effect, independent of its sex, and additional children have a negative effect on happiness. For males, however, the effect of children on happiness vanishes once the current partnership status is included. The happines of males increases strongly if they are in a partnership, but after controlling for the current partnership status, children no longer significantly affect subjective well-being. The coefficients for first-born boys and first-born girls are of opposite sign, consistent with our earlier discussion about the influence of the first child on happiness, but neither of the coefficients is significant in Table 5.

[19] Among men with at least one child, men with exactly two children have a slightly—but insignificantly—higher level of well-being, while while men with three or more children enjoy slightly lower levels of well-being.

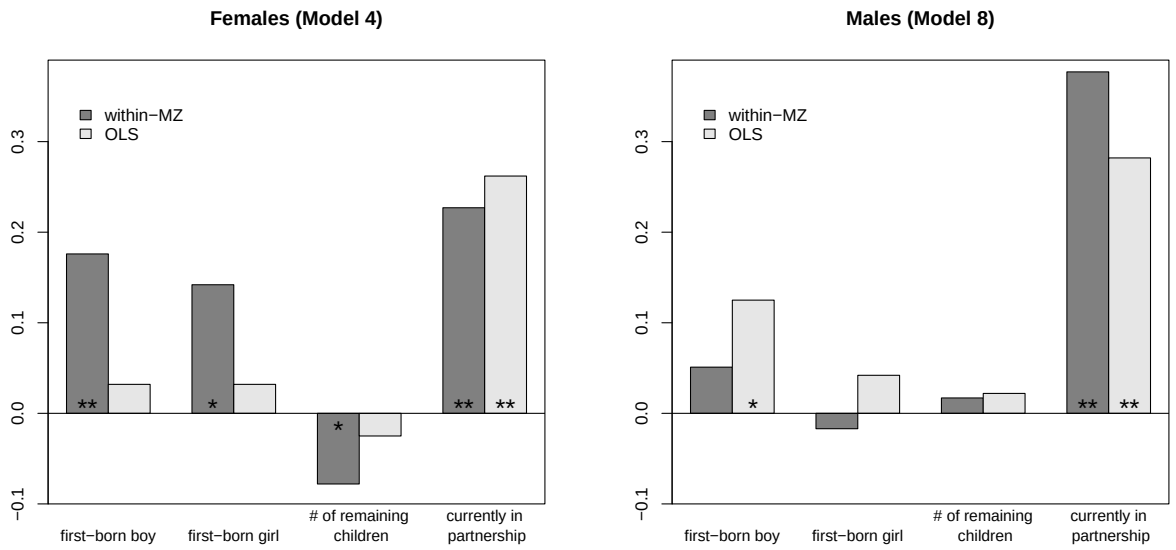

Figure 3: Effect of children and current partnership on subjective well-being for females and males (based on Table 5).
Note: Significance levels are indicated as + $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$.

In summary, Models 4 and 8 of Table 5 reveal a striking male-female difference with respect to the impact of children on well-being after controlling for the current partnership (see also Figure 3). Females derive happiness gains from children even after controlling for the current partnership status. The happiness of males, however, depends primarily on the partnership status; once the current partnership status is controlled, men's happiness does not vary systematically with fertility. These findings suggests a somewhat provocative interpretation about the motivations of men and women to engage in partnerships: in particular, the results can be interpreted to suggest that women are in partnerships, among other reasons, in order to have children that increase their subjective well-being. Males, on the other hand, have children in order to remain in the partnerships that strongly affect their happiness. Having children is a strong predictor of currently being in partnerships for males (as well as for females), but conditional on the current partnership status, children do not contribute to men's subjective well-being. The male preference for boys, revealed by our earlier analyses in Figure 2, may in this context be result of the higher divorce probabilities of couples who have a first-born daughter as compared to a first-born son (Morgan et al. 1988).[20]

Table 6 reports the results of some additional analyses for twins aged 25–45 years old that further illuminate the relation between happiness, fertility and partnerships. For simplicity, we combine in these analyses the sex-specific dummies for a first child into one variable "at least one child". In our first analyses in Table 6, we investigate the interaction between the happiness gains from partnerships with the happiness gains from children. For this purpose we include in Models 1 and 5 an interaction between the current partnership status and at least one child. Surprisingly, this interaction is not significant in the within-MZ

[20]Due to the relative small sample size, we can not identify a systematic and statistically significant relationship in our data between the sex of the first child and separation or current partnership status at age 25–45, where separations are still relatively rare for young respondents. Consistent with the results in Morgan et al. (1988), however, males and females at age 50–70 are more likely to be currently in a partnership (at the time of the survey) if the first-born child was a son as compared to a daughter, and this effect is stronger for males than for females. If MZ and DZ twins aged 50–70 years are combined, the difference is 1.4 percentage points (with a *p*-value of .40) for females and 2.6 percentage points (with a *p*-value of .08) for males.

Table 6: Effect of fertility on subjective well-being, age 25–45: additional results

Females	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
	with-MZ	OLS	with-MZ	OLS	with-MZ	OLS	with-MZ	OLS
at least one child	0.164^{+}	−0.055	0.218**	0.000	0.212**	−0.004	0.182**	0.038
	(0.087)	(0.063)	(0.065)	(0.049)	(0.065)	(0.049)	(0.052)	(0.036)
# of remaining children	−0.084**	−0.027	−0.084**	−0.024	−0.088**	−0.027	−0.078*	−0.011
	(0.031)	(0.021)	(0.031)	(0.021)	(0.031)	(0.020)	(0.032)	(0.021)
currently in partnership	0.221**	0.218**	0.249**	0.248**	0.263**	0.258**	0.209**	0.253**
	(0.055)	(0.040)	(0.049)	(0.036)	(0.050)	(0.037)	(0.045)	(0.033)
currently in partnership × at least one child	0.008	0.113^{+}						
	(0.089)	(0.068)						
same partner as for first child			−0.072	0.042	−0.078	0.038		
			(0.060)	(0.048)	(0.060)	(0.048)		
# of step children					−0.055	−0.048		
					(0.038)	(0.030)		
first birth before or at age 21							−0.227**	−0.167**
							(0.087)	(0.060)
N (individuals)	2,050	2,050	2,050	2,050	2,048	2,048	2,050	2,050
Test of H_0: equal coefficients	**		**		**		**	
Males	*Model 5*		*Model 6*		*Model 7*		*Model 8*	
	with-MZ	OLS	with-MZ	OLS	with-MZ	OLS	with-MZ	OLS
at least one child	−0.080	0.016	−0.007	0.048	−0.016	0.042	0.007	0.096*
	(0.119)	(0.092)	(0.082)	(0.061)	(0.082)	(0.061)	(0.061)	(0.048)
# of remaining children	0.022	0.020	0.022	0.022	0.008	0.012	0.021	0.025
	(0.035)	(0.028)	(0.035)	(0.028)	(0.035)	(0.029)	(0.035)	(0.028)
currently in partnership	0.345**	0.256**	0.374**	0.267**	0.391**	0.282**	0.380**	0.278**
	(0.069)	(0.052)	(0.061)	(0.047)	(0.061)	(0.047)	(0.057)	(0.044)
currently in partnership × at least one child	0.107	0.090						
	(0.122)	(0.095)						
same partner as for first child			0.020	0.056	0.016	0.058		
			(0.071)	(0.054)	(0.071)	(0.054)		
# of step children					−0.112*	−0.103*		
					(0.050)	(0.050)		
first birth before or at age 21							0.016	−0.164
							(0.132)	(0.111)
N (individuals)	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		+	

Notes: Standard errors in parentheses. *p-values:* $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$. Within-MZ models do not include a constant. OLS models additionally include a constant and the variables age and age^2. Robust standard errors (White 1980) are used to adjust for potential heteroscedasticity, and in the OLS analyses additionally for correlation of residuals within twin pairs. The test of the null hypothesis (H_0) of equal coefficients reports the *p*-values of the generalized Hausman test that the reported coefficients are equal between the within-MZ and OLS models (White 1994).

results for both males and females. Hence, the presence of children does not significantly enhance the gains in well-being that men and women derive from being in a partnership at the time of the survey:[21] biological children do not seem to make married or cohabiting partners happier in terms of their overall well-being, and the utility gains from partnerships do not interact with the presence of children.

A further interesting aspect is revealed in Models 2 and 6 of Table 6 that include an indicator about the separation from the partner for the first child. These analyses suggest that remaining with the same partner is not associated with positive effects on subjective well-being. Conversely, separations from the partner for the first child do not seem to associated with negative effects on happiness for either men or women, consistent with our earlier findings about the non-existent (negative) effect of additional unions (or separations) on well-being. In Models 3 and 7 we additionally include an indicator for the number of stepchildren that is calculated as the difference (if positive) between the number of biological children of the respondent and his/her partner (see also footnote 17). The analyses show that stepchildren are associated with declines in subjective well-being for males, but there is no strong or significant effect for females. Hence, the happiness of male respondents is reduced if their current partner has additional children that are not the respondent's biological children, while females seem to be indifferent. These happiness losses due to stepchildren are consistent with the evidence that marital instability damaged the life-prospects of dependent children in ancestral societies as it does today (Daly and Wilson 1996; Hofferth and Anderson 2003), possibly because fathers derive less well-being from non-biological children and hence devote less resources to them or possibly even abuse them. These findings about the well-being effects of becoming a stepfather are consistent with studies suggesting that men accept stepchildren to procure mates and fertility benefits that they would otherwise have been unlikely to obtain (Anderson 2000). For these men, raising other men's children therefore serves as a form of mating that is associated with non-trivial costs, including the reduced subjective well-being as shown in this study. The sex difference in the effect of stepchildren on well-being may be due to the fact that the stepchildren of males are likely to co-reside in their household, while the stepchildren of women are likely to co-reside with their partner's ex-wife.

An additional question in light of the above discussion is whether controlling for endowments through within-MZ twin estimates affects the conclusions from the empirical analyses. The answer is clearly affirmative. Several of the aspects discussed above would not have been identified with standard OLS analyses of happiness that do not control for endowments, and in many cases the equality of coefficients between the within-MZ twin pair and OLS estimation is rejected. Moreover, the comparison between the within-MZ and OLS estimates sheds light on the role of unobserved endowments on fertility and partnership processes. For simplicity, we focus in this comparison on Models 2 and 6 and Models 4 and 8 of Table 5 that are also depicted in Figures 2–3. For females, OLS analyses substantially underestimate the magnitude of the effect of children on subjective well-being, and OLS analyses would not have found any significant effect resulting from children after controlling for the current partnership status. Moreover, OLS analyses for females lead to an overestimation of the happiness gains due to partnerships. This pattern of distortions due to unobserved endowments is reversed in the analyses for men. For males, OLS regressions overestimate the contributions of children and they underestimate the role of current partnerships. Unobserved endowments affecting subjective well-being, represented by the term μ_j in Eq. (1), hence influence the explanatory variables on the right side of Eq. (1) in opposite directions for males and females. For females, the endowments

[21] The data do not allow us to identify whether the children are co-residing in the respondent's household. In addition, we cannot identify in these analyses whether all children of the respondent are with the current partner.

μ_j are negatively correlated with the variable "at least one child" and positively with the the number of remaining children and the current partnership status. For males the relation is reversed. The endowments μ_j are positively related to "at least one child" and negatively to the current partnership. No strong association exists with the number of remaining children.

We conclude our analyses of twins aged 25–45 years in Table 6 with an investigation of early childbearing. Teenage pregnancies are relatively rare in Denmark, and the teenage pregnancy rate and teenage fertility rate in the mid-1990s were equal to 22.7 and 8.2 per 1,000 respectively (as compared to 83.6 and 54.4 per 1,000 for the U.S.) (Singh and Darroch 2000). Instead of teenage pregnancies, we therefore consider first births up to age 21 as a relatively early onset of fertility in Denmark. This definition of an "early onset of fertility" seems reasonable in a country that has low teenage pregnancy rates and that experienced a substantial increase in the period mean age at first birth from 22.7 years in 1965 to 27.5 years in 1996 (Council of Europe 2002). In our data for twins aged 25–45 in 2002, only 3.6% of women with at least one child had experienced their first birth as a teenager and only 12% before or at age 21. Models 4 and 8 in Table 6 show that an early onset of childbearing, defined as having the first child before or at age 21, is associated with strong negative effects on subjective well-being for females, but not for males. This negative effect occurs if a dummy for an early onset of childbearing is included as the only right-side variable in the regression analysis (not reported), and it persists if the fertility and partnership status at the survey are included in the analyses (Model 4): women who experience their first birth below or at age 21 are substantially less satisfied with life than women who had a later age at first birth. The happiness index declines by .227, or 39% of one standard deviation (44% of one within-twin pair standard deviation) if a woman experiences a first birth by age 21, and women with a first birth before or at age 21—independent of their overall fertility—are on average less happy than women who remain childless and have no children at all. The effect of an early onset of fertility is therefore sizable, particularly in light of the fact that the first birth for these women occurred, on average, 17 years prior to the survey. Demonstrating these negative consequences of early childbearing on well-being is important because some studies have reduced the estimated negative assessments of the long-term socioeconomic consequences of teenage childbearing by controlling for unobserved characteristics (e.g., Geronimus and Korenman 1992). Our analyses, however, show that despite the potentially small socioeconomic effects of early pregnancies, there may be important negative effect of early childbearing on long-run subjective well-being, particularly for women.

Our final analyses in Table 7 focus on the effects of having had children and partnerships on well-being at post-reproductive years at ages from 50–70. One of the striking findings of these analyses is that the effectw of having had children on subjective well-being are relatively small—if they exist at all—for men and women at ages 50–70. Neither the number of children ever had has a large or significant effect, nor is there a strong positive effect due to "at least one child" (Models 1–2 and 5–6). If the current partnership is included, a current partner is strongly associated with increases in subjective well-being (Models 3–4 and 7–8), while the number of children does not affect happiness at ages 50-70. These findings are surprising since children are often thought to be a source of social contacts and support at older ages. Our results, however, suggest that the effect on happiness of the social contacts or social support associated with children is quite small for both males and females in the age range 50–70. In part, this small effect of children on well-being may be due ot the fact that respondents aged 50–70 years are not yet old enough to encounter widespread health problems that may be associated with an increased demand for care and support provided by children.

Table 7: Effect of fertility on subjective well-being, age 50–70

Females	*Model 1*		*Model 2*		*Model 3*		*Model 4*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
# of children	0.038^{+}	0.055^{**}			0.028	0.041^{**}		
	(0.021)	(0.015)			(0.021)	(0.015)		
first-born boy			0.064	0.045			0.031	−0.012
			(0.082)	(0.061)			(0.084)	(0.062)
first-born girl			0.023	0.080			−0.011	0.027
			(0.081)	(0.061)			(0.083)	(0.062)
# of remaining children			0.034	0.048^{*}			0.029	0.040^{*}
			(0.028)	(0.019)			(0.028)	(0.019)
currently in partner-ship					0.254^{**}	0.271^{**}	0.255^{**}	0.275^{**}
					(0.054)	(0.043)	(0.054)	(0.043)
N (individuals)	1,038	1,038	1,038	1,038	1,038	1,038	1,038	1,038
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		n.s.	
Males	*Model 5*		*Model 6*		*Model 7*		*Model 8*	
	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS	within-MZ	OLS
# of children	−0.017	−0.009			−0.013	−0.017		
	(0.024)	(0.017)			(0.024)	(0.017)		
first-born boy			0.017	0.014			−0.034	−0.056
			(0.082)	(0.063)			(0.080)	(0.063)
first-born girl			−0.016	−0.008			−0.061	−0.070
			(0.080)	(0.062)			(0.077)	(0.062)
# of remaining children			−0.029	−0.012			−0.011	−0.005
			(0.030)	(0.021)	0.281^{**}	0.241^{**}	(0.031)	(0.021)
currently in partner-ship					(0.070)	(0.057)	0.284^{**}	0.250^{**}
							(0.072)	(0.058)
N (individuals)	824	824	824	824	824	824	824	824
Test of H_0: equal coefficients	n.s.		n.s.		n.s.		n.s.	

Notes: Standard errors in parentheses. *p-values:* $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$. Within-MZ models do not include a constant. OLS models additionally include a constant and the variables age and age^2. Robust standard errors (White 1980) are used to adjust for potential heteroscedasticity, and in the OLS analyses additionally for correlation of residuals within twin pairs. The test of the null hypothesis (H_0) of equal coefficients reports the *p*-values of the generalized Hausman test that the reported coefficients are equal between the within-MZ and OLS models (White 1994). The variable 'first-born boy' ('first-born girl') equals one if respondent has at least one child and the first child is a boy (girl).

Our findings are also consistent with the conclusions obtained from a recent meta analyses of well-being among elderly (Pinquart and Sörensen 2000), stating that the frequency of contacts with friends seem to be more strongly related to subjective well-being among elderly than having contact with adult children, which is possibly related to the fact that contacts with children more often reflect obligations and—in the case of needing care—stressful encounters and feelings of dependency that reduce well-being.[22]

5 Conclusions

Despite the increasing attention devoted to the determinants and implications of low fertility and related family changes, very few studies have investigated the contributions of partnerships and children to subjective well-being or "happiness". Moreover, studies that have addressed this issue have not taken account of the fact that subjective well-being has recently been found to be much more similar to a trait rather than to a contemporaneous state: happiness is surprisingly little influenced by factors such as income, education and occupation, and it depends in important ways on endowments such as stable personality characteristics, genetic dispositions, family and childhood community background, etc. If these usually unobserved endowments that affect well-being also affect the selection into partnerships and the propensity to have children, as is suggested by the literature and our findings, existing studies are likely to provide a distorted—and hence unsatisfactory—view on a central question about determinants and implications of fertility and related partnership behaviors in contemporary societies: *Do children and partnerships indeed contribute to individuals' well-being, and if yes, how much and under which conditions?*

This study overcomes the limitations of existing analyses by using within-MZ twin pair estimation with data on identical Danish twins aged 25–45 and 50-70 years. Indeed, this study constitutes the first investigation to explore the impact of a number of aspects of fertility and partnership histories on general well-being within a model in which unobserved genetic and family background endowments may affect happiness directly as well as indirectly through aspects of fertility and partnerships. Our analyses using this within-MZ twin pair approach establish a number of important relations—all of which are net of the influence of endowments—about the demographic determinants of happiness: First, the current partnership status emerges as the primary aspect of the partnership history that causes variation in subjective well-being for both men and women and in both age ranges 25–45 and 50–70 years. Men and women who are currently in a partnership report substantially higher levels of happiness than those who are not, with men gaining more well-being from partnerships than women. Contrary to some recent literature, with one exception, no relation is found between the number of partnerships or the number of past separations and well-being. The exception is that women aged 25–45 years have slightly less happiness with more partnerships, primarily because separations decrease the probability of being in a union at the time of the survey in 2002. Second, first-born children are an important source of happiness at ages 25–45. Additional children reduce the subjective well-being of females while leaving the well-being of males unaffected. Moreover, our preferred estimates for respondents aged 25–45 reveal that (*i*) men, but not women, experience larger happiness gains from a first-born son than a first-born daughter, (*ii*) children directly contribute to happiness for women,

[22] In contrast, when considering variations in the quality of contacts—defined, for instance, through the ability to get emotional support or through feelings of closeness—Pinquart and Sörensen (2000) find that relationships with adult children appear to play a larger role in well-being than relationships with friends, possibly related to the fact that relations with friends are almost always of high quality due to the ability to terminate friendship relations easily.

but only indirectly through increasing the probability of a current partnership for men, (*iii*) children have no indirect effect on well-being by increasing the happiness gains obtained from a current partnership, (*iv*) stepchildren reduce the subjective well-being of men, but not women, and (*v*) an early onset of fertility, defined as a first birth by age 21, is associated with long-term negative consequences on subjective well-being for females, but not for males. Third, having had children does not affect subjective well-being of men or women at ages 50–70, contrary to the impression that children provide an important source of social, emotional and economic support for the elderly. Fourth, controlling for unobserved endowments affects substantially a number of the estimated effects of fertility and partnership on happiness, and several of the above findings are absent in analyses without such controls. Standard analyses about the contributions of children and partnerships to well-being are therefore subject to biases, often substantial, and in some cases upwards and in other cases downwards.

In some general sense, the above results are consistent with evolutionary psychological and biological theories that claim to provide an evolutionary rationale for the motivation to have children and form long-term partnerships. In particular, besides establishing the basic contribution of children and partnerships to well-being that is predicted by these theories, our analyses additionally show that (*i*) endowments matter significantly, as is expected within a biosocial perspective, (*ii*) this effect of endowments differs by sex, which is consistent with different evolutionary selection pressures for males and females, and (*iii*) important sex differences exist between women and men with respect to the influence on well-being of the number of children, stepchildren, the timing of fertility and the role of current partnerships. Despite this general agreement with biosocial predictions, however, the support for evolutionary perspectives is much less strong in terms of specifics. For example, once there is control for current partnerships, neither do past partnerships increase happiness significantly more for males than for females as would seem to be suggested by the evolutionary approach, nor do our analyses provide evidence that males benefit in terms of well-being from a large number of children. Nevertheless, the differential effect of additional children on well-being is consistent with the evolutionary argument that females and males invest differentially in children, and that females may therefore have a lower "optimal fertility" in terms of subjective well-being than men.

In addition to these interpretations in terms of the evolutionary basis for the motivations for childbearing and union formation, the analyses in this paper are relevant because they provide empirical support about recent speculations about the limits to low fertility and related patterns of union formation (e.g., Foster 2000; Golini 1998; Morgan and King 2001). In particular, the substantial happiness gains associated with first children may limit the extent to which present and future fertility declines are driven by reductions in first-birth childbearing. Our study suggests that couples may be willing to have at least one child even if this child is associated with considerable costs to them. The first child seems to provide an important part of individual fulfillment in life, and childless may remain relatively low even in contemporary industrialized countries with low or lowest-low fertility. Due to the positive effect of current partnerships on well-being, our study also suggests that individuals continue to have strong incentives in terms of well-being to form unions; however, since dissolutions do not seem to have negative well-being consequences in our study, these unions may not necessarily be stable. These findings about the happiness gains from first children and current unions therefore corroborate demographic analyses that (*i*) have found relatively low estimates of childlessness in lowest-low fertility countries with total fertility rates below 1.3 after removing tempo distortions (e.g., Kohler et al. 2002), and (*ii*) have documented a reversal of the positive relation between

marriage and fertility in cross-sectional analyses of European countries during the 1970s towards a negative relation in the 1990s (Billari and Kohler 2004).

Since happiness gains are primarily associated with the first child and not with additional children beyond the first child, however, women's and couples' motivations to have additional children may be less robust with respect to changes in the costs and benefits of children than is the motivation to have at least one child. Fertility for second and higher-order children may thus react strongly in response to altered socioeconomic conditions, family policies, social norms or ideational contexts. While this study suggests a potential lower limit to low fertility due to the strong happiness gains associated with first children, our analysis does *not* suggest that the individual motivation in terms of subjective well-being for second or third children is sufficiently strong to result in a fertility level close to replacement level. As a matter of fact, the emergence of stated sub-replacement fertility preferences found in recent analyses of Eurobarometer surveys (Goldstein et al. 2003) may be an indication that levels of desired fertility decline as they become increasingly motivated by individualistic considerations focused on self-fulfillment and subjective well-being. In addition, our results about the contributions of additional children to happiness also suggest that changes in family or related policies aimed towards increasing fertility, motivated for instance by the substantial positive externalities associated with childbearing in low fertility contexts (e.g., see Lee 2001), may not necessarily result in increases in subjective well-being for parents, at least in the short term. This may make broad support for such policies in a democratic decision process complicated.

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