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Birth-Cohort Effects in the Association Between Personality and Fertility

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Abstract

The present study investigated whether associations between individuals' personality traits and whether they have children have been modified by birth-cohort effects in the 20th-century United States. Participants were from the Midlife Development in the United States study (n = 6,259) and the Wisconsin Longitudinal Study (n = 3,994) and were born between 1914 and 1974. Data on personality traits of the Five Factor model and fertility history were collected in adulthood. Higher levels of openness to experience in both sexes and higher levels of conscientiousness in women were associated with lower fertility, and these associations strengthened linearly as birth cohorts became younger. In the total sample, high extraversion, low neuroticism, and women's high agreeableness were associated with high fertility rate, but there were no systematic cohort effects. The fertility decisions of people with certain personality traits may be influenced by prevailing societal and cultural circumstances.

Keywords

evolutionary psychology, personality, social behavior, sociocultural factors

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In most developing countries, fertility rates have been declining over the past several decades (Lesthaeghe, 2010; Morgan & Rackin, 2010; but see Myrskylä, Kohler, & Billari, 2009). Theories of fertility behavior have emphasized that both social influences and individual preferences affect individuals' decisions to have children (Newson, Postmes, Lea, & Webley, 2005). Social and individual factors may also have interaction effects; that is, some individuals may be more sensitive than others to cultural and social circumstances.

Personality traits—individuals' relatively stable affective, behavioral, and cognitive dispositions—are associated with various aspects of fertility behavior (Alvergne, Jokela, & Lummaa, 2010; Dijkstra & Barelds, 2009; Jokela, 2010; Jokela, Hintsa, Hintsanen, & Keltikangas-Järvinen, 2010; Jokela & Keltikangas-Järvinen, 2009; Jokela, Kivimäki, Elovainio, & Keltikangas-Järvinen, 2009; Reis, Dörnte, & von der Lippe, 2011; Roberts & Bogg, 2004). For example, in a large U.S. sample, higher extraversion was associated with earlier transition to parenthood and with having a larger number of children (Jokela, Alvergne, Pollet, & Lummaa, 2011). High openness to experience and high neuroticism had the opposite effect. Higher agreeableness and lower conscientiousness were associated with a larger number of children in women but not in men.

In the study presented here, using most of the data analyzed by Jokela et al. (2011), I explored whether birth cohort had effects on the associations between personality traits and fertility in the 20th-century United States. It has been argued that fertility decisions have become increasingly individualized and less determined by social pressures (Lesthaeghe, 2010; Miller, 1983). This argument suggests two sets of hypotheses. First, given that extraversion, neuroticism, and agreeableness may affect emotional perceptions of family formation and having children (Jokela et al., 2011; Jokela et al., 2009; Pinquart, Stotzka, & Silbereisen, 2008), if fertility behavior has become more dependent on people's affective perceptions of parenthood, these three traits could be expected to be better predictors of fertility differences in younger birth cohorts than in older ones. Second, if the conflict between career pursuit and family formation has become more salient among younger birth cohorts than older ones, conscientiousness and openness to experience should have become better negative predictors of fertility, especially in women. This is because these two traits are related to the pursuit of socioeconomic goals and high educational achievement (Judge & Ilies, 2002), which correlate with low fertility rates, especially in women. These cohort effects might also be partly explained by the association between socioeconomic status (SES) and fertility.

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Method

Participants

Midlife Development in the United States (MIDUS). The MacArthur Foundation's MIDUS survey (Brim et al., 2007) includes a nationally representative sample of noninstitutionalized, English-speaking adults who were 25 to 74 years old in 1995 to 1996; all of the adults were selected through random telephone-digit dialing. The original sample (N = 7,108) included main respondents (n = 3,487), their siblings (n = 950), a city oversample (n = 757), and a twin subsample (n = 1,914). There were 6,259 participants who provided data on the measures I used in the present study. In 1995 to 1996, personality was assessed with a model based on the Five Factor model (Lachman & Weaver, 1997). The participants were asked to rate how well various adjectives described them (1 = *not at all*, 4 = *a lot*); each of the five personality traits was assessed with four to eight adjectives. Highest level of education completed was reported on a 12-point scale and recoded into a four-category variable (0 = less than high school, 1 = high school, 2 = college/bachelor's degree, 3 = advanced degree). Parental SES was determined on the basis of the father's score on the Duncan Socioeconomic Index (Hauser & Warren, 1996; the mother's score was used if data on the father were missing).

Sibling sample of the Wisconsin Longitudinal Study (WLS). The WLS[1] (Wollmering, 2007) has followed a random sample of 10,317 individuals who were born between 1937 and 1940 and who graduated from Wisconsin high schools in 1957. This sample is broadly representative of White, non-Hispanic American men and women who have completed at least a high school education. The WLS has also collected data on selected siblings of a subsample of the graduates. The sibling sample is more heterogeneous than the graduate sample in many aspects, especially year of birth (Hauser, Sewell, & Clarridge, 1982). The present study included participants from the sibling sample (n = 3,994) only, because there was not enough variation in the birth years of the graduates.

Personality data were collected by WLS in 1993 to 1995 via a mailed questionnaire including a 29-item Big Five Inventory assessment (John, Donahue, & Kentle, 1991). Participants were asked to use a 6-point scale (1 = *disagree strongly*, 6 = *agree strongly*) to indicate whether they agreed or disagreed that certain personality descriptions fit them. Participants also reported their highest level of education, using a 20-point scale; these ratings were recoded into the same four categories used for the MIDUS ratings. Parental SES was assessed on the basis of a factor-weighted composite of father's number of years of schooling, mother's number of years of schooling, father's occupational status, and average parental income in 1957.

Statistical analysis

The MIDUS and WLS data were first combined for analysis, and then the data from each study were analyzed separately. Associations between personality and having children were examined with multiple-spell discrete-time survival analysis (Willett & Singer, 1995), which is a method for modeling repeated event occurrences. Each child was modeled as a separate *spell* within a single analysis, so that first the model estimated the probability of the birth of the 1st child, then it estimated the probability of the birth of the 2nd child, and so on, up to the 10th child (with twin births being counted as one birth). Timing of the births was modeled with interaction effects between birth order and linear and quadratic effects of time (in years), which allowed me to calculate nonlinear hazard functions for each child. Odds ratios (*OR*s) derived from the hazard functions indicate the difference in the odds of having the nth child (among participants who had not yet had the nth child) associated with 1 unit of difference in the independent variable. Personality variables were standardized separately within men and women (M = 0, SD = 1) in both samples. Parental SES was also standardized before combination of the samples into a single data set. Data on all women were censored at age 45 years; that is, fertility data after this age were not included in the analysis because very few births after that age were reported. The combined sample included 10,253 individuals. In analyses including education and parental SES, the sample decreased to 9,865 individuals because individuals with missing data were excluded. All analyses comparing unadjusted and SES-adjusted associations between personality and fertility rate were fitted to the smaller sample.

Results

Combined sample

Three quarters of the participants were over 40 years of age; thus, most of the participants were followed up to the end of their reproductive age. (For demographic statistics, see Table 1.) Birth cohort was determined on the basis of the decade of the participant's birth. The total number of biological children reported was 9,829 for men and 12,314 for women. Compared with older cohorts, younger birth cohorts had progressively lower fertility rates; this was true for both men, OR = 0.86, 95% confidence interval (CI) = [0.84, 0.87], $p < .001$, and women, OR = 0.84, 95% CI = [0.82, 0.85], $p < .001$.

As has been found previously, high extraversion, low neuroticism, and low openness to experience were associated with higher probability of having children in both men and women; high agreeableness and low conscientiousness were associated with higher probability of having children in women only. (For associations between personality traits and age-specific probability of having children, see Table 2.) Compared with individuals low in extraversion (1 SD below the mean), individuals with high extraversion (1 SD above the mean) had a higher age-specific fertility rate: 10% higher in men and 8% higher in women. Effect sizes for neuroticism, women's agreeableness, and women's conscientiousness were of equal magnitude, but the effect size for openness to experience was somewhat higher than these other effect sizes.

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Table 1. Descriptive Statistics for the Two Samples (N = 10,253)

	MIDUS (n = 6,259)		WLS (n = 3,994)	
Variable	Men (n = 2,971)	Women (n = 3,288)	Men (n = 1,851)	Women (n = 2,143)
Mean age (years)	46.7 (SD = 12.8)	47.0 (SD = 13.0)	53.1 (SD = 7.4)	53.2 (SD = 7.4)
Highest level of education completed (n)				
Less than high school	293 (9.9%)	352 (10.7%)	118 (6.4%)	123 (5.7%)
High school	722 (24.3%)	991 (30.1%)	714 (38.6%)	1,081 (50.4%)
College/bachelor's degree	1,466 (49.3%)	1,574 (47.9%)	671 (36.3%)	693 (32.3%)
Advanced degree	490 (16.5%)	371 (11.3%)	348 (18.8%)	246 (11.5%)
Birth year (n)				
1914–1919	0 (0.0%)	0 (0.0%)	7 (0.4%)	11 (0.5%)
1920–1929	316 (10.6%)	347 (10.6%)	129 (7.0%)	171 (8.0%)
1930–1939	498 (16.8%)	614 (18.7%)	695 (37.5%)	792 (37.0%)
1940–1949	732 (24.6%)	795 (24.2%)	838 (45.3%)	981 (45.8%)
1950–1959	816 (27.5%)	802 (24.4%)	174 (9.4%)	180 (8.4%)
1960–1969	585 (19.7%)	707 (21.5%)	8 (0.4%)	8 (0.4%)
1970–1974	24 (0.8%)	23 (0.7%)	0 (0.0%)	0 (0.0%)
Participants with children (n)	2,234 (75.2%)	2,638 (80.2%)	1,530 (82.7%)	1,842 (86.0%)
Mean number of children across all subjects	1.89 (SD = 1.57)	2.10 (SD = 1.63)	2.35 (SD = 1.68)	2.60 (SD = 1.77)

Note: MIDUS = Midlife Development in the United States (Brim et al., 2007); WLS = Wisconsin Longitudinal Study (Wollmering, 2007).

Openness to experience in both sexes and conscientiousness in women were stronger negative predictors of fertility within younger cohorts than within older cohorts. (For odds ratios for each personality trait and cohort, see Fig. 1.) For women born in the 1920s, openness to experience was weakly associated with fertility, OR = 0.94, 95% CI = [0.89, 0.99], but this association increased for women born in the 1960s, OR = 0.82, 95% CI = [0.76, 0.88]. For men, the corresponding odds ratio increased from 0.97, 95% CI = [0.92, 1.03], to 0.82, 95% CI = [0.75, 0.90]. For women born in the 1920s, conscientiousness was not related to fertility rate, OR = 0.99, 95% CI = [0.94, 1.04], but the association increased linearly from this cohort up to those women born in the 1960s, OR = 0.88, 95% CI = [0.82, 0.94]. Associations between fertility rate and extraversion,

Table 2. Associations Between Personality Traits and Age-Specific Probability of Having Children

Gender and personality trait	Combined sample	MIDUS	WLS
Men			
Extraversion	1.05*** [1.03, 1.08]	1.06** [1.02, 1.10]	1.05** [1.02, 1.09]
Neuroticism	0.97* [0.95, 1.00]	0.97* [0.94, 1.00]	0.98 [0.95, 1.01]
Agreeableness	1.01 [0.99, 1.04]	1.02 [0.99, 1.06]	1.01 [0.97, 1.04]
Conscientiousness	1.00 [0.98, 1.02]	1.00 [0.97, 1.03]	1.00 [0.96, 1.03]
Openness to experience	0.93*** [0.91, 0.95]	0.91*** [0.88, 0.94]	0.94*** [0.91, 0.97]
Women			
Extraversion	1.04*** [1.02, 1.06]	1.05** [1.02, 1.09]	1.03* [1.00, 1.07]
Neuroticism	0.97* [0.96, 0.99]	0.96** [0.93, 0.99]	0.99 [0.96, 1.02]
Agreeableness	1.04*** [1.02, 1.06]	1.03 [1.00, 1.06]	1.04* [1.01, 1.07]
Conscientiousness	0.95*** [0.93, 0.97]	0.93*** [0.90, 0.95]	0.98 [0.95, 1.01]
Openness to experience	0.91*** [0.89, 0.93]	0.92*** [0.89, 0.95]	0.91*** [0.89, 0.94]

Note: The table presents standardized (SD = 1) odds ratios from multiple-spell discrete-time survival analyses, with 95% confidence intervals in brackets. MIDUS = Midlife Development in the United States (Brim et al., 2007); WLS = Wisconsin Longitudinal Study (Wollmering, 2007).
*p < .05. **p < .01. ***p < .001.

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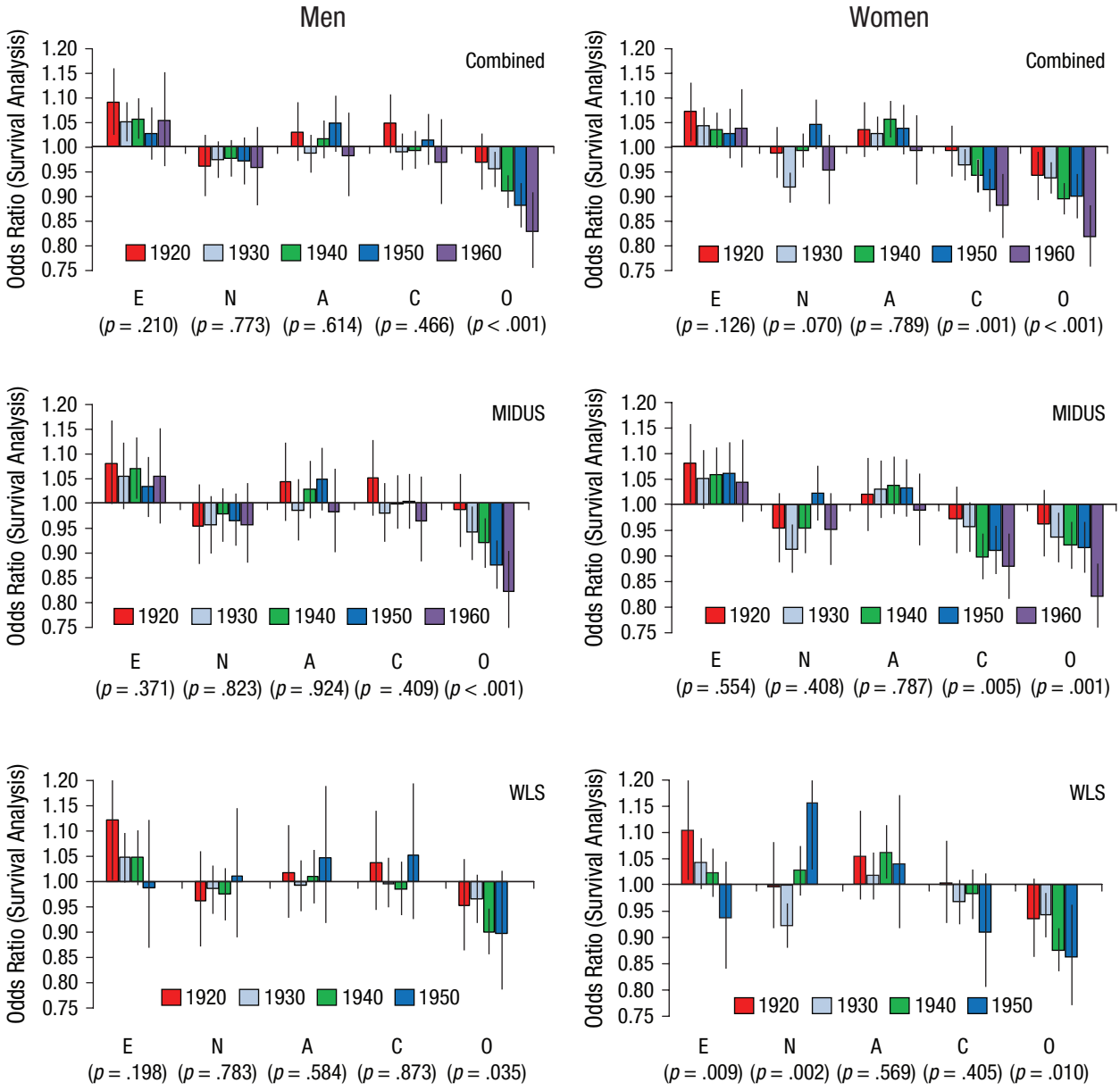

Fig. 1. Cohort effects in the associations between personality traits and life-course fertility. For each of the five personality traits, odds ratios (from discrete-time survival analysis) are given for each of the five birth cohorts. The left column presents results for men, and the right column presents results for women. The top row shows the combined results, the middle row shows results from the Midlife Development in the United States (MIDUS; Brim et al., 2007) survey, and the bottom row shows results from the Wisconsin Longitudinal Study (WLS; Wollmering, 2007). Values greater than 1.00 indicate a positive association, and values less than 1.00 indicate a negative association. Error bars are 95% confidence intervals. All associations are adjusted for the four other personality traits. The *p* values give the statistical significance for linear trends of the cohort effect. E = extraversion; N = neuroticism; A = agreeableness; C = conscientiousness; O = openness to experience.

neuroticism, and agreeableness were not dependent on birth cohort (Fig. 1). In men, adjustment for education, parental SES, and their interaction effects with birth cohort attenuated the interaction effect of birth cohort and openness to experience by 19%. In women, such adjustment attenuated this interaction effect by 9% and attenuated the interaction effect of birth cohort and conscientiousness by 37%.

Separate analyses of MIDUS and WLS

Figure 2 shows the mean number of children as a function of participant's age and birth cohort in the MIDUS sample and the WLS sample separately. The results for the MIDUS sample closely replicated the results for the combined sample (Table 2, Fig. 1). In the WLS sample, not all of the main effects

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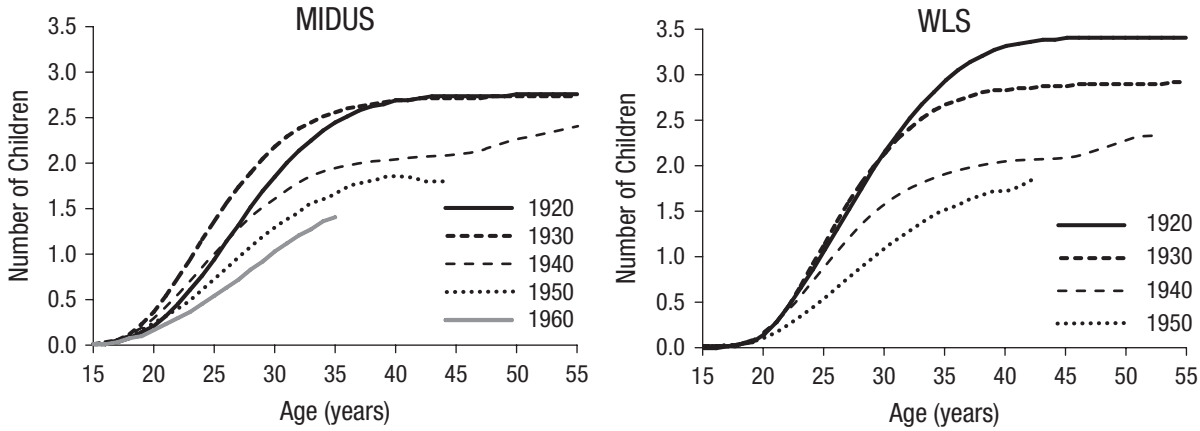

Fig. 2. Mean number of children as a function of participant's age and birth cohort in the Midlife Development in the United States (MIDUS; Brim et al., 2007) sample (left panel) and the Wisconsin Longitudinal Study (WLS; Wollmering, 2007) sample (right panel).

of personality on fertility were significant, but the nonsignificant associations showed trends in the same direction as found in the combined sample (Table 2). Because the WLS data included only 16 persons born in the 1960s, they were combined with the 1950s birth cohort. For that combined cohort, the cohort effect for openness to experience was observed in men and women of the WLS, and women's conscientiousness also suggested a pattern similar to that found in the MIDUS data. However, the lack of participants born in the 1960s precluded a full comparison with the cohort effects observed in the MIDUS data. In addition, the association between fertility and extraversion in women of the WLS attenuated with younger birth cohorts, and the association between fertility and neuroticism was positive for WLS women born in the 1950s (Fig. 1).

Discussion

The present findings demonstrate both stable and changing associations between personality and fertility in the 20th-century United States. In the combined sample of approximately 10,000 men and women, two birth-cohort effects were observed. First, a negative association between openness to experience and fertility rate in both sexes increased in more recent birth cohorts. Second, women's high conscientiousness emerged as a negative predictor of fertility in younger birth cohorts only (i.e., the correlation increased in younger cohorts), although no association between conscientiousness and fertility was observed in men. The birth-cohort effects indicate that social changes that have decreased the fertility rate in recent decades have selectively affected individuals with particular personality characteristics. However, contrary to the first hypothesis, extraversion, neuroticism, and agreeableness were predictive of fertility independently of birth cohort.

As the cultural norms and expectations related to parenthood become weaker and more individualized (Miller, 1983), the internalization of traditional and family-oriented values becomes more dependent on the individual's personal dispositions, such as personality. Openness to experience correlates with nontraditional values and social attitudes (McCrae, 1996), which may help to explain why this personality dimension has become more important as a determinant of fertility decisions in younger birth cohorts. Family structures with no children or only a few children are fairly recent developments. Also, people with lower openness to experience are less likely to adopt nontraditional lifestyles even if they have the opportunity to do so. This cohort effect was largely independent of education and parental SES, which indicates that openness to experience did not simply act as a proxy for socioeconomic determinants of fertility.

Women's conscientiousness was not related to fertility differences in women born in the 1920s but increased in predictive power in younger birth cohorts, so that women with high conscientiousness who were born in the 1960s had a one fourth lower fertility rate compared with their counterparts with low conscientiousness. This cohort effect may reflect the fact that an increasing proportion of women have been able to pursue careers outside the domestic sphere (Brewster & Rindfuss, 2000). This may have led to more trade-offs between work and family, and resulting postponement of parenthood, especially in highly conscientious women, who tend to pursue achievement in the labor market (cf. Elder & MacInnis, 1983). SES accounted for almost 40% of the cohort effect in women's conscientiousness (i.e., the interaction effect of conscientiousness and birth cohort on fertility), and this finding supports the hypothesis of SES mediation.

According to the results from the combined sample and the MIDUS, the three other personality traits—extraversion, neuroticism, and agreeableness—have not become more or less important determinants of fertility behavior over time. Perhaps these traits influence fertility differences via virtually universal aspects of interpersonal behavior—for example,

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finding a partner, maintaining a relationship, and being a nurturing person—that have not changed much over the recent decades. However, in the WLS, the association between fertility and extraversion attenuated in younger birth cohorts, especially in women, and high neuroticism was associated with higher fertility rather than lower fertility in WLS women born in the 1950s. Also, it is difficult to explain why the effect of neuroticism was slightly positive, albeit nonsignificant, in the MIDUS women born in the 1950s; such a relationship between neuroticism and fertility would be unexpected. Given that these cohort effects were observed mainly in the WLS, they need to be interpreted with caution. Future research should explore how the associations between personality and fertility are modified by specifically measured environmental factors, such as economic circumstances, gender equality, or prevailing social attitudes. Such data would be helpful in further clarifying the birth-cohort effects reported here.

The strengths of the current study include its large sample and the use of survival analysis to analyze cohort differences in age-specific fertility patterns. The main limitation is the assessment of personality after the participants had the children that were included in the analysis. Longitudinal studies have shown personality traits to prospectively predict the probability of having children (Jokela et al., 2010; Jokela et al., 2009; Reis et al., 2011), but those studies did not investigate cohort effects. Reverse causality could have biased the cohort effects in the present study if (a) parenthood decreased openness to experience and women's conscientiousness and (b) these effects on personality change with time over the life course, but current evidence concerning parenthood and personality change is still too limited for researchers to judge the plausibility of this scenario (Jokela et al., 2009). Another limitation is that personality was assessed with different and relatively brief instruments in the two studies. This circumstance might explain some of the differences between the results for the two studies, such as the attenuating effect of extraversion in the WLS but not in the MIDUS. The measurement of broad-level traits rather than lower-order facets of personality may have concealed more specific cohort effects. For example, the trait of novelty seeking, which is measured by the Temperament and Character Inventory (Cloninger, Svrakic, & Przybeck, 1993), has been associated with low fertility rather than high fertility (Jokela et al., 2010) even though novelty seeking correlates positively with extraversion (r = .38; Jokela & Keltikangas-Järvinen, 2011).

Social and cultural changes can alter the ways in which people value parenthood in comparison with other lifestyles (Borgerhoff Mulder, 1998). Fertility decisions of individuals with different personality traits seem to be differentially sensitive to such changes in society. The cohort effects observed in the present study were restricted mainly to openness to experience and conscientiousness, probably because these traits influence whether individuals follow social traditions and how much their social investments in other domains of life compete with family formation. Other mechanisms, such as postponement of parenthood and degree of family planning, might also have contributed to the cohort effects. The results of this study demonstrate that personality differences can be used to explore the psychological nature of social and cultural change.

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Declaration of Conflicting Interests

The author declared that he had no conflicts of interest with respect to his authorship or the publication of this article.

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Note

1. A public-use file of data from the WLS is available from the WLS, University of Wisconsin–Madison, 1180 Observatory Dr., Madison, WI 53706, and at http://www.ssc.wisc.edu/wlsresearch/data/.

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