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Abstract

This paper comprehensively describes how lifecycle dynamics of personality differ by sex and socio-economic background. We use survey-based measures of the Big-Five inventory on a large Danish population (age 18-75) and link it with registry data. Our most interesting findings are: (1) Women score significantly higher on each personality trait than men; (2) The sex-gap remains constant over the lifecycle for Conscientiousness, Extraversion, and Agreeableness, while the sex gradient in Openness to Experience emerges and widens from age 40 and the sex gap in Neuroticism, which is sizeable in young adulthood, narrows from mid age onward; (3) Education or income gaps in personality are already wide in late adolescence, but remain constant over the lifecycle. (4) We find no socioeconomic gradient in Conscientiousness, a trait associated with organization, productivity and responsibility; (5) Divergent patterns emerge for some of the facet-level traits. The benefits of our study are that we describe heterogeneity in the lifecycle profiles of personality over almost 60 years, measure socioeconomic status with high-precision data, estimate lifecycle profiles non-parametrically, and adjust for cohort and sample selection biases. The economic implications of our findings are discussed.

JEL Classification: J24, I24, J62, I31, J16.

Keywords: Personality traits, Big-Five facets, life cycle dynamics, heterogeneity by sex, education, and income; intergenerational transmission.

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1 Introduction

Personality critically determines how individuals make decisions in their life (Almlund et al., 2011). Decisions about whether and how much to learn, whom to marry, in which occupation to work, how much to save for a rainy day and whether to exercise regularly and eat healthily. Personality, often measured by the Big-Five personality traits (Goldberg, 1992, 1993), comprises many dimensions, and each dimension is likely to play a different role in individual decision-making. For instance, Extraversion and Conscientiousness, traits that are associated with sociability and high executive function, respectively, have high private returns in the labor market (Fletcher, 2013; Gensowski, 2018; Heineck and Anger, 2010; Mueller and Plug, 2006; Nyhus and Pons, 2005). Conscientiousness has been singled out in the literature as a super-trait because of its predictive power in academic and job performance, healthy living, and health outcomes (Roberts et al., 2014). Agreeableness, a trait describing self-less and cooperative behavior, has been linked to economic preferences such as reciprocity and altruism (Becker et al., 2012), or pro-sociality (Hilbig et al., 2014), which are at the basis of socioeconomic development (e.g. Bigoni et al., 2016) and population wellbeing (Post, 2005). Openness to Experience, a trait describing intellectual curiosity, imagination and aesthetics, has been linked to intelligence, and thus is a critical component in the human capital accumulation process (Almlund et al., 2011). Neuroticism, a trait that describes the disposition to experience and express negative affect, is associated with lack of emotional wellbeing (Widinger, 2011).

Because of their predictive power in key economic, social, educational, and health outcomes, it is not surprising that scientists from all sorts of disciplines, medical practitioners, and nowadays even policymakers are keen to understand *how personality develops from adolescence to adulthood and old age*. According to the so-called plaster theory of personality, personality stabilizes by the age of 30 (McCrae and Costa Jr., 1996) and is fixed thereafter. Yet many argue that personality traits are not exclusively influenced by genetic predisposition and thus can change over time, even in older adulthood. Even though a strong genetic component has been shown empirically, at least 50 percent of the variation in personality traits can be attributed to personal experiences (Borkenau et al., 2001; E. et al., 2003; Klimstra et al., 2009; Krueger et al., 2008; Turkheimer, 2000). This contextualist perspective of personality development therefore assumes that

personality changes should be more varied and persist throughout stages of adulthood (Haan et al., 1986; Helson et al., 2002). This latter perspective has motivated a burgeoning literature – which we will fully review in Section 2 – exploring the age dynamics (e.g. Allemand et al., 2008; Branje et al., 2007; Donnellan and Lucas, 2008; Soto et al., 2011; Srivastava et al., 2003) and the malleability of personality to life events (Cameron et al., 2013; Cobb-Clark and Schurer, 2012; Elkins et al., 2017; Fletcher and Schurer, 2017; Specht et al., 2011) and education opportunities (Kassenboehmer and Schurer, 2018; West et al., 2016).

We contribute to this literature from a contextualist perspective, by studying the mean-level differences in the Big-Five personality traits between late adolescence and old age in a large Danish sample. We assume that personality may change throughout the lifecourse, but in unknown and possibly non-linear ways. Although many studies before us have described the age-related maturation process of personality, *we extend this literature in three important ways regarding focus and methodology*:

First, we carefully model heterogeneity in the age-personality maturation process. We focus on differences across the sexes and differences across the socioeconomic spectrum. To the best of our knowledge, we are the first to describe age-related personality differences by both education and income. We can do this because we are able to link a high-quality survey that we have collected on 38,711 individuals in Denmark – a survey which included the 30/60-item BFI-2 (Soto and John, 2017a,b) – with high-precision administrative data. We can classify even young individuals according to their background, using their parents' education and income information. This is important, as the young sample members have not yet completed their education and their earnings are not representative of lifetime earnings. The large sample helps us to precisely estimate lifecycle profiles of personality separately for different demographic groups where other studies have failed to reject equality of profiles due to large standard errors in smaller samples. Because of the administrative data, we are able to identify demographic groups with minimal measurement error.

Second, we pay careful attention to modeling the potential non-linearities in the age-personality maturation process. To estimate these profiles as flexibly as possible, we apply bivariate kernel regression methods, which also require sufficient observations for each age and demographic. Kernel regression methods are flexible as they do not impose a functional form for the relationship between personality and age (Wand and Jones,

1995). The estimated mean-levels and their confidence intervals are plotted graphically from age 18 to 75, separately for men and women and for high and low education/income groups. Our approach is comparable to studies which estimate non-parametrically the lifecycle profiles in pain (Krueger and Stone, 2008; Schurer et al., 2014) or risk tolerance (Schurer, 2015). This approach improves upon previous literature, which assumed linear or higher polynomials in the age-personality profiles (e.g. Anusic et al., 2012; Donnellan and Lucas, 2008) that cannot detect non-linearities.

Third, we are able to study the self-selection of sample members into our study. Survey participation is likely to be linked to a person's personality, but also to her opportunity cost (Kassenboehmer and Schurer, 2018). It is highly likely that our survey component attracted a certain demographic and personality profile, which, if left unadjusted, will bias our estimates of gradients in personality maturation. As we have information on the full sample of all survey decliners from the administrative records, we can assess the representativeness of our survey sample in terms of age, sex, ethnicity, health and socioeconomic background. Adjusting the average traits by age for selection into the sample, on the basis of a wide array of important covariates, does neither alter the lifecycle profiles of these traits, nor their gradients by sex, income, or education.

Our findings produce a collection of stylized facts. First, we find a significant negative age gradient in Neuroticism and significant positive age gradients in all other traits. Second, important non-linearities in age gradients become visible when using non-parametric estimation methods. For instance, we find that Conscientiousness only grows until age 50, but then flattens out. The age gradient is strongly positive for Extraversion between the ages of 25 and 60, but flat or declining otherwise. The age gradient in Neuroticism flattens out fully from age 65 onward. Third, women score on average higher on each personality trait, with differences ranging between 0.12 standard deviations (Extraversion) and 0.56 standard deviations (Agreeableness). Sex-personality gradients are observed at almost every stage of the life cycle. Fourth, the sex-gap in personality remains constant over the life cycle, except for Openness to Experience and Neuroticism. Sex gaps in Openness widen over the lifecycle, while they close almost entirely in old age for Neuroticism. Fifth, better educated or high-income groups score higher on all personality traits, with differences being negligibly small, if not absent, for Conscientiousness (less than 0.1 standard deviations) and relatively large for Openness to Experience (0.40 standard deviations). Sixth, the socioeconomic gradients in person-

ality remain constant over the lifecycle. The only exception is Openness to Experience, for which the gradient significantly widens from age 45 onward. Seventh, our conclusions about the average sex- and socioeconomic gradients are sensitive to the type of BFI facets. For instance, we find no sex difference in Assertiveness or Creative Imagination, although we find strong sex-differences overall for Extraversion and Openness to Experience, respectively. These findings raise a series of questions about factors that shape personality and measurement heterogeneity. They also allow for speculation about economic implications. We will discuss these in detail in Section 5.

A critical limitation to our study is that although we interpret age-personality profiles as evidence of changes in personality as people age, these may just be differences in personality by birth cohorts. There has been increasing evidence that personality profiles may be significantly different for individuals exposed to different public policies. For instance, children affected by China's One-Child-Policy tend to become more neurotic (Cameron et al., 2013), and so do birth cohorts who grow up in times of low levels of social connectedness (Twenge, 2000). In this study, we are not able to solve this problem as we rely on a cross-sectional study design. However, we can argue that our empirical setting is less vulnerable to random changes in cohort effects, as Denmark has experienced few radical policy changes and macroeconomic fluctuations since World War II. Our data is taken from a single social and institutional context, in contrast to worldwide online samples such as Soto et al. (2011) or Srivastava et al. (2003), or samples from countries with a large number of immigrants who were raised in a different institutional context (e.g. Donnellan and Lucas, 2008). In a robustness check, we are able to demonstrate that our conclusions hold when excluding immigrants (about 10 percent) and other demographic groups that may be more sensitive to cohort effects (e.g. rural populations). Another practical solution is to abandon the nonparametric model and parameterize some of the explanatory variables. This approach relies on finding suitable proxies for cohort specific factors. For example, it has been established in the literature that initial conditions experienced in childhood and adolescence can have long-lasting effects on beliefs (see e.g. Giuliano and Spilimbergo (2013). Proxies for cohort effects that have previously been used in the literature include unemployment rates when the subject was 18 (Schwandt and von Wachter, 2019), inflation rates (Dohmen et al., 2017) for the identification of age-dependency in risk attitudes), and GDP growth rates (Kapteyn et al., 2005). Using macroeconomic conditions to which our sample members

were exposed to in late adolescence, as proxies for cohort effects, results in slightly less steep age gradient in middle age for some personality traits. Yet, our conclusions about sex- and socioeconomic gradients remain the same.

The remainder of the manuscript is as follows. We review the main literature on the economics of personality psychology in Section 2. We present our linked survey and administrative data in Section 3. The main results are presented in Section 4. We discuss our findings and their economic implications in Section 5. An Appendix provides supplementary material.

2 Existing Evidence

Economists view personality as a type of noncognitive skill that can have important consequences for the economic decisions that individuals make and the outcomes they achieve (Almlund et al., 2011; Borghans et al., 2008; Bowles et al., 2001). This conceptualization of personality as a set of skills motivates their incorporation into economic decision-making models —-a development which enriches our understanding of the complex manner in which personality, in addition to cognitive abilities, drives human capital investments and returns. Although there are many different concepts of personality, the five-factor personality structure – Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism – is generally accepted by psychologists as a meaningful and reliable mechanism for describing and understanding human differences (Goldberg, 1992, 1993; John and Srivastava, 1999; McCrae et al., 1999).

Extraversion assesses the extent to which a person actively engages with the world or avoids intense experience. Agreeableness assesses the interpersonal nature of the person and can range from warm and committed (e.g. friendly) to others versus antagonistic. Conscientiousness assesses the degree of organization, persistence and motivation during the fulfilment of goal-directed task behaviors. Neuroticism measures the reverse of the regulation of emotions or the extent to which the person is worrying about unpleasant experiences and distressing emotions. Openness to Experience assesses the depth, complexity and quality of a person's mental and experiential life, tolerance for and exploration of new ideas and the enjoyment of cultural experiences.

An extensive array of the literature has demonstrated the importance of the Big-Five traits in the labor market (Fletcher, 2013; Heineck and Anger, 2010; Mueller and Plug, 2006; Nyhus and Pons, 2005), even for highly educated and high IQ men and

women (Gensowski, 2018). Some personality traits are more productive than others. Conscientiousness, for example, is frequently credited as a super-trait, that should be studied in its own right (Roberts et al., 2014). The reason is that higher levels of Conscientiousness are associated with better academic performance in both high school (Noftle and Robins, 2007) and at university (Chamorro-Premuzic and Furnham, 2003; Edwards et al., 2020; Kappe and van der Flier, Kappe and van der Flier; Trapmann et al., 2007). Some argue that Conscientiousness is considerably more powerful in predicting grade point averages than intelligence (Kappe and van der Flier, Kappe and van der Flier). It has also predictive power in career success and longevity (Kern et al., 2009), and is associated with higher wages at both the beginning of young people's careers (Fletcher, 2013; Heineck and Anger, 2010; Mueller and Plug, 2006; Nyhus and Pons, 2005) and in later stages of the career (Gensowski, 2018). Other personality traits – e.g. Agreeableness – are related to economic preferences such as reciprocity and altruism (Becker et al., 2012), or prosociality (Hilbig et al., 2014), which are at the basis of socioeconomic development (e.g. Bigoni et al., 2016) and population wellbeing (Post, 2005). Openness to Experience is linked to creativity and intelligence, and thus is a critical component in the human capital accumulation process (Almlund et al., 2011), although research on this trait is relatively sparse. Lundberg (2013) has proposed that this trait may be instrumental for helping young people from disadvantaged backgrounds to graduate. Neuroticism is a disposition to experience and express negative affects, and thus high values on the scale are linked to mental health problems, lack of emotional wellbeing and personality disorders (Widinger, 2011).

Because of their importance in human capital formation and labor market outcomes, policy-makers, psychologists and economists alike have started to ask the once impossible question: Can we shape personality, for instance as part of the curriculum in schools (Kautz et al., 2015; Schurer, 2017)? According to the so-called plaster theory, it was assumed that personality has a strong genetic component, is shaped in predictable ways through childhood, and stabilizes before the age of 30 (McCrae and Costa Jr., 1996). This assumption has been challenged more recently by the contextualist perspective, which assumes that personality changes should be more varied and should persist throughout adulthood (Haan et al., 1986; Helson et al., 2002). This latter perspective has motivated a growing literature that investigates the dynamics and the malleability of personality at various stages of the lifecourse.

Researchers have used a number of different strategies for evaluating personality change. First, and foremost, many studies explore the mean-level changes in personality as individuals age. This literature aims to better understand the normative changes that occur as a result of typical maturational or social processes (Roberts et al., 2006). Second, some studies explore personality change as rank-order consistency, which is about the relative position of individuals' personality scores over time (Roberts and DelVecchio, 2000). A third type of literature studies intra-individual personality changes. This literature focuses on how traits change within the same individual over time and to what degree these individual-specific changes depend on a range of life events (Cobb-Clark and Schurer, 2012; Elkins et al., 2017; Specht et al., 2011), exposure to parental maltreatment (Fletcher and Schurer, 2017) or radical public policy changes (Cameron et al., 2013).

The most obvious starting point is to understand how personality changes as people age. This literature explores mean-level differences across age groups. It is this literature, we are contributing to in this paper. Most of the existing previous work uses a cross-sectional study design, plotting mean-level differences in personality by age, asking whether the age-personality profile is moderated by for instance sex. Closest to our study design is Soto et al. (2011) and Srivastava et al. (2003), both of which use cross-sectional data collected on individuals from English-speaking countries, although predominantly from the US through a web survey. Both studies describe the age-personality gradient over the full lifecycle, and demonstrate how these gradients are moderated by sex. Srivastava et al. (2003) use a sample of web survey participants aged between 21 and 60, while Soto et al. (2011) extend their sample to include childhood participants (ages 10-65). Soto et al. (2011) furthermore disaggregate the personality-age gradients into the facets of the Big-Five. Both studies attempt to flexibly model the non-linearities in the age-personality profiles, allowing for higher order polynomials in the age variable, to allow for instance for curvilinear age profiles.

From these two studies a number of stylized facts can be derived for an adult population: First, women score higher on every personality trait at any point in the lifecycle, with the exception of Openness to Experience, where men score higher. This means that women score more highly on Conscientiousness, Agreeableness and Extraversion, which are all considered positive traits, but they also score higher on Neuroticism, a trait considered as negative because of its association with mental health problems (Widinger, 2011).

Second, both men and women increase substantially their Conscientiousness and Agreeableness scores over the lifecycle (from age 30 onward). Third, both men and women tend to reduce their Neuroticism scores throughout the lifecycle, although the reduction is particularly strong for women. Fourth, the age-personality profiles are relatively flat for Extraversion. Fifth, mixed results are obtained for Openness to Experience.

Soto et al. (2011) furthermore demonstrates that children starkly reduce their scores on almost all personality traits between the ages 10 and 15, but adolescents increase their scores between the ages 15 and 20. The only difference is observed for Neuroticism which increases strongly for women from age 10 to 15, and that Extraversion drops significantly in this age range, without immediate recovery. Finally, Soto et al. (2011) explores the age-personality gradient separately for the Big-Five facets. The main conclusion is that the age-personality profiles are very similar for each facet as for the overall domain, with the exception of Openness to Experience. For this trait, the authors obtain quite different lifecycle profiles when considering the Aesthetics facet, while the Ideas facet yields the same lifecycle profile as the domain.

These two studies are critical for bringing together the large evidence from previous studies, which explored age-personality changes separately for adolescents, young adults, adults, and older people, other country, and smaller samples. The finding that Agreeableness and Conscientiousness increase over the lifecourse, and that Neuroticism declines, has been found in many different studies. For instance, Allemand et al. (2008) calculated the personality means for six different age groups (starting from age 16) for a sample of about 2,500 Dutch study participants. Branje et al. (2007) calculates growth curves for 244 Dutch boys and girls, who were interviewed three times.

We build on this literature in various ways. We contribute to a burgeoning literature on age-personality profiles over the lifecourse, and contribute further in three critical ways. First, we carefully model the heterogeneities in the age-personality maturation process. We focus not only on differences across the sexes but also on differences across the socioeconomic spectrum. To the best of our knowledge, we are the first to describe age-related personality changes by education and income. We are able to do this because we have collected a high-quality survey on personality for a large population from Denmark, a survey that we are able to link with registry data on both own and parental socioeconomic status. Second, we pay careful attention to modeling the potential non-linearities in the age-personality maturation process. To estimate these profiles

as flexibly as possible, we apply bivariate kernel regression methods, which also require sufficient observations for each age and demographic. Third, we are able to study the self-selection of sample members into our study, and thus we can comment on the degree to which sample selection will bias our findings. This is possible because we sampled from the whole universe of Danish social security number holders and have permission to use the administrative records of everyone who declined to respond to the survey.

3 Data Description

3.1 Survey Collection

The data on personality traits for this project stems from a tailor-made online survey for which a random sample of 121,390 individuals in Denmark were invited.

Survey Design The largest component of the survey was an item battery for the Big Five personality inventory. We used the BFI-2, of which we both implemented the full 60-item version (Soto and John, 2017a) and an abbreviated 30-item instrument (Soto and John, 2017b).[1] These instruments hierarchically assess the traits of Openness (Open-Mindedness), Conscientiousness, Extraversion, Agreeableness, and Emotional Stability (Negative Emotionality), together with three sub-facets for each of these traits: Open-Mindedness facets of Intellectual Curiosity, Aesthetic Sensitivity, and Creative Imagination; Conscientiousness facets of Organization, Productiveness, and Responsibility; Extraversion facets of Sociability, Assertiveness, and Energy Level; Agreeableness facets of Compassion, Respectfulness, and Trust; and Negative Emotionality facets of Anxiety, Depression, and Emotional Volatility. The BFI-2 has a reasonably short response time, with repeated statements to agree/disagree with (for example, I am someone who ... "Is outgoing, sociable" or "Can be somewhat careless"). See the full list of items in Table S.4 and Table S.5. The availability of sub-facets addresses the bandwidth-fidelity tradeoff, in that broadly defined traits tend to predict a wider range of criteria, whereas narrowly defined traits tend to predict closely aligned criteria more accurately. Facets from a hierarchical model are not typically available in economics research, as surveys are kept too short to be able to break down traits. Another advantage from administer-

[1]The personality assessment was placed relatively at the beginning of the survey, but did not lead to drop-out from responses. There was (surprisingly) no differential drop-out from the longer version. The survey also assessed health behaviors, economic preferences and beliefs about the health production function and satisfaction with the public health system. This data will not be used in the current paper, however.

ing a longer instrument is that it can prevent the measurement problem of acquiescent responding, the tendency of some individuals to consistently agree (yea-saying) or disagree (nay-saying) with items regardless of their content. The BFI-2 contains an equal number of true-keyed and false-keyed items, in both the long and abbreviated form. The reliability is high. For the short version, for example, the alpha reliabilities are reported to have a range of 0.81 to 0.90 across samples in Soto and John (2017b).

For maximum comparability, the analyses presented here use the short version from all respondents (because the short version contains a sub-set of the items in the long version, it is easy to construct the short version for respondents to the long). Since this survey was administered in Denmark, we used the Danish translation suggested and validated by Vedel et al. (2019).

Survey Implementation We obtained a random sample of individuals in Denmark from Statistics Denmark, approximately representative of each cohort from 1944-2001. For the cohorts of 1956-1998, we also obtained the siblings of all non-singleton individuals.[2] The sample of 121,390 individuals aged 18 and older, living in Denmark, was then contacted in May and August 2019 via a secure messaging system ("e-boks"), which is linked to everyone's social security number and which is exclusively used for official communication (including pay slips etc.). Every secure letter contained an invitation to participate, which explained briefly the purpose of the study, and that there would be a lottery among all respondents with 200 prizes of 1,000 Danish Crowns each (approximately 130 Euro). The letter also contained information on privacy, such as GDPR laws being observed by our study. After 10 days, all non-respondents were sent reminders (79%), as were partial responders (1.4%, with a different text acknowledging their partial response). The response rate including partial responses was 33.7%, and complete responses 30%.

The completed survey data was anonymized and merged to the administrative registers on a secure server by Statistics Denmark.

[2]Note that only individuals currently living in Denmark can be identified this way, as the civil registration system is used for this procedure. Some individuals were younger than 18 at the time of the survey, who were not contacted because we would have required parental consent. For a few individuals, there is no name or address recorded with their social security number, who cannot be contacted either.

3.2 Administrative Register Data

Having access to linked survey-register data allows us to obtain background information such as education, own income, income of parents, and health care use at the individual level for all respondents who participated in the survey. Survey and register data were linked by Statistics Denmark through the unique personal identifier for all individuals in Denmark. The linked survey-register data were anonymized by Statistics Denmark and made available for research through Statistics Denmark's secure research server.

Table S.3 shows descriptive statistics for personality traits and background information for the survey sample.

Having access to socioeconomic background information for all respondents from the unique high-quality Danish register data has several important advantages. First, the register data allows us to link respondents to their parents (coverage of child-parent links are almost complete for individuals born after 1965) and to their children. Secondly, socioeconomic characteristics such as education, income, marriage status, family structure, etc. are measured with precision, thus avoiding measurement error and bias due to self-reported measures which sometimes contaminate other surveys. Thirdly, the register data is a longitudinal panel, which potentially allows us to control for background characteristics in the past. Several socioeconomic characteristics are observed from 1980 and onwards. Fourthly, it is possible to link the entire sample of individuals that were initially drawn from Statistics Denmark's registers for the survey to background information in the registers. Hence, we are able to compare the socioeconomic background of individuals who completed the questionnaire with that of the entire sample of randomly selected potential respondents. This allows us to assess potential bias in responses due to non-random selection into answering the survey. Moreover, having access to register information not only for the survey sample but also for the entire Danish population allows us to calculate sample weights for the respondents.

Our **income** measure contains both (gross) labor income and income transfers. Labor income includes salary income and income for self-employed. Income transfers includes unemployment benefits, disability pension, pensions etc. We divide the sample into two **education groups**, low and high education, with high education defined as upper secondary education ("short continuing education") and beyond.

Table 1 shows the proportion of respondents in each age group for which the register data contains a parent identifier (column 1), for which there is income and education

information for the parents, conditional on having identified the parent in the register data (column 2 and 3), and column 4-5 show proportion of the total sample for which we have parental income and education information available.

Table 1: Data Availability Parent-Child Pairs

Age	(1) Parent	(2) Parent Income cond'l on Parent	(3) Parent Ed cond'l on Parent	(4) Parent Income	(5) Parent Ed
20	0.986	0.999	0.971	0.984	0.957
25	0.927	1.000	0.991	0.927	0.918
30	0.893	1.000	0.992	0.893	0.886
35	0.887	1.000	0.991	0.887	0.879
40	0.901	0.999	0.992	0.901	0.894
45	0.925	0.999	0.991	0.924	0.916
50	0.930	0.999	0.990	0.929	0.921
55	0.939	0.995	0.986	0.934	0.926
60	0.901	0.989	0.954	0.891	0.859
65	0.611	0.974	0.845	0.595	0.516
70	0.168	0.943	0.556	0.159	0.094
75	0.133	0.901	0.313	0.120	0.042

Note: Showing share of available data in our sample (columns 1,4,5) and conditional on observing parents (columns 2 and 3).

Tables S.6 to S.8 in the appendix (Section S) compare main socioeconomic background characteristics of our survey sample with non-respondents to the survey for ages 18-27, 28-47 and 48-75. For all three age groups, we observe that our sample of respondents on significantly more months of education, although the difference is numerically small (around 3 percent). Moreover, for those aged 28+, incomes are around 8-9 percent higher in the respondent group that in the group of non-respondents. Finally, we find that the respondents are slightly less likely to visit their GP or having been admitted to the hospital in the last year, and respondents generally have slightly less siblings.

4 Results

We start our discussion by presenting average personality differences by sex socioeconomic status, and age. We then illustrate the lifecycle dynamics in personality in graphical form. Age gradients are estimated non-parametrically, without controls, separately by sex and socioeconomic status. Robustness checks are presented in a supplement.

4.1 Average Personality by Sex, Socioeconomic Status, and Age

Table 2 shows how personality varies by sex, education, income and age for the five higher-level BFI traits, for the constituting elements of each of these five main personality traits, and for the two main socioeconomic outcomes, income and education. A number of interesting findings immediately stand out. Firstly, in terms of the gender gap in personality traits (column 1), women's BFI scores are significantly higher than men's for all five main personality measures, Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, and for most of the facets. The only exceptions are that we find no sex-gap in Creative Imagination, a facet of Openness to Experience, and Assertiveness, a facet of Extraversion. In terms of magnitude, the sex gaps are largest for Agreeableness (0.56 standard deviations (SD)), which is driven by the facet Compassion (0.60 SD). The sex gaps are also large for Neuroticism (0.38 SD, mainly driven by the facet Anxiety) and Conscientiousness (0.30 SD, mainly driven by the facet Responsibility).

Secondly, the education gradient in personality traits suggests that Openness, Extraversion and Agreeableness are increasing in education, while Conscientiousness and Neuroticism are higher for people with relatively lower education levels. The differences are particularly large for Openness to Experience (0.4 SD, mainly driven by Intellectual Curiosity) and Extraversion (0.18 SD, mainly driven by Assertiveness), and relatively small for all other traits (around 0.10 SD). Regarding the facets, we find no education gradient in Responsibility (facet of Conscientiousness).

Thirdly, the income gradient works in the same direction as the education gradient for Openness, Extraversion, Agreeableness, and Neuroticism, but not for Conscientiousness (column 3). Thus, people with higher income report higher levels of Conscientiousness than people with lower income. Furthermore, we observe important magnitude difference as well. While the education-Openness gap is 0.4 SD, it is only 0.11 SD for the income-Openness gap. A similar magnitude difference, but in opposite direction, is observed for Neuroticism, for which we find a four times larger gap across income than across education. In terms of facets, we find no income gradient in Compassion (facet of Agreeableness).

Finally, we confirm age gradients in personality that are expected from the literature (column 4, testing a simple linear age effect). The estimated signs indicate that individuals become more open, conscientious, agreeable, and extraverted over the lifecourse,

and less neurotic. The magnitudes of the age effects are generally small, indeed less than a 0.01 SD change for every additional year, except for Conscientiousness (0.014 SD). The latter implies that for each decade, individuals score about 0.14 SD higher on Conscientiousness.

Table 2: Differences in BFI by Gender and SES

	(1) Diff. Male-Female	(2) Diff. Low-High Ed	(3) Diff. Low-High Inc.	(4) Coeff. Age
Openness	-0.153***	-0.400***	-0.112***	0.002***
	(0.010)	(0.010)	(0.010)	(0.000)
Openness, Intellectual Curiosity	-0.160***	-0.446***	-0.139***	-0.004***
	(0.010)	(0.010)	(0.010)	(0.000)
Openness, Aesthetic Sensitivity	-0.183***	-0.325***	-0.073***	0.003***
	(0.010)	(0.010)	(0.010)	(0.000)
Openness, Creative Imagination	-0.005	-0.152***	-0.049***	0.004***
	(0.010)	(0.010)	(0.010)	(0.000)
Conscientiousness	-0.299***	0.086***	-0.101***	0.014***
	(0.010)	(0.010)	(0.010)	(0.000)
Conscientiousness, Organization	-0.283***	0.138***	-0.015	0.011***
	(0.010)	(0.010)	(0.010)	(0.000)
Conscientiousness, Productiveness	-0.111***	0.032**	-0.154***	0.012***
	(0.010)	(0.010)	(0.010)	(0.000)
Conscientiousness, Responsibility	-0.314***	0.008	-0.081***	0.010***
	(0.010)	(0.010)	(0.010)	(0.000)
Extraversion	-0.115***	-0.186***	-0.285***	0.006***
	(0.010)	(0.010)	(0.010)	(0.000)
Extraversion, Sociability	-0.202***	-0.090***	-0.140***	0.002***
	(0.010)	(0.010)	(0.010)	(0.000)
Extraversion, Assertiveness	-0.010	-0.198***	-0.243***	0.006***
	(0.010)	(0.010)	(0.010)	(0.000)
Extraversion, Energy Level	-0.032**	-0.140***	-0.270***	0.006***
	(0.010)	(0.010)	(0.010)	(0.000)
Agreeableness	-0.558***	-0.111***	-0.018	0.006***
	(0.010)	(0.010)	(0.010)	(0.000)
Agreeableness, Compassion	-0.593***	-0.087***	0.025*	0.005***
	(0.010)	(0.010)	(0.010)	(0.000)
Agreeableness, Respectfulness	-0.405***	-0.127***	-0.040***	0.003***
	(0.010)	(0.010)	(0.010)	(0.000)
Agreeableness, Trust	-0.321***	-0.052***	-0.030**	0.007***
	(0.010)	(0.010)	(0.010)	(0.000)
Neuroticism	-0.374***	0.119***	0.312***	-0.011***
	(0.010)	(0.010)	(0.010)	(0.000)
Neuroticism, Anxiety	-0.488***	0.106***	0.284***	-0.008***
	(0.010)	(0.010)	(0.010)	(0.000)
Neuroticism, Depression	-0.148***	0.061***	0.258***	-0.012***
	(0.010)	(0.010)	(0.010)	(0.000)
Neuroticism, Emotional Volatility	-0.300***	0.127***	0.231***	-0.007***
	(0.010)	(0.010)	(0.010)	(0.000)
Above-Median Personal Income	0.120***	-0.297***		
	(0.005)	(0.005)		
Higher education	-0.051***		-0.293***	
	(0.005)		(0.005)	
Observations	38,711	37,877	38,270	39,036

Note: Testing differences between groups (pooling across all ages), and reporting standard errors of the difference in parentheses. P-values indicated with $^{*}(p < 0.05)$,$^{**}(p < 0.01)$,$^{***}(p < 0.001)$. Definition of income and education is pooled here: The variable uses parents income or education until the focal individual is age 40, after which the individual's own income or education measure is used.

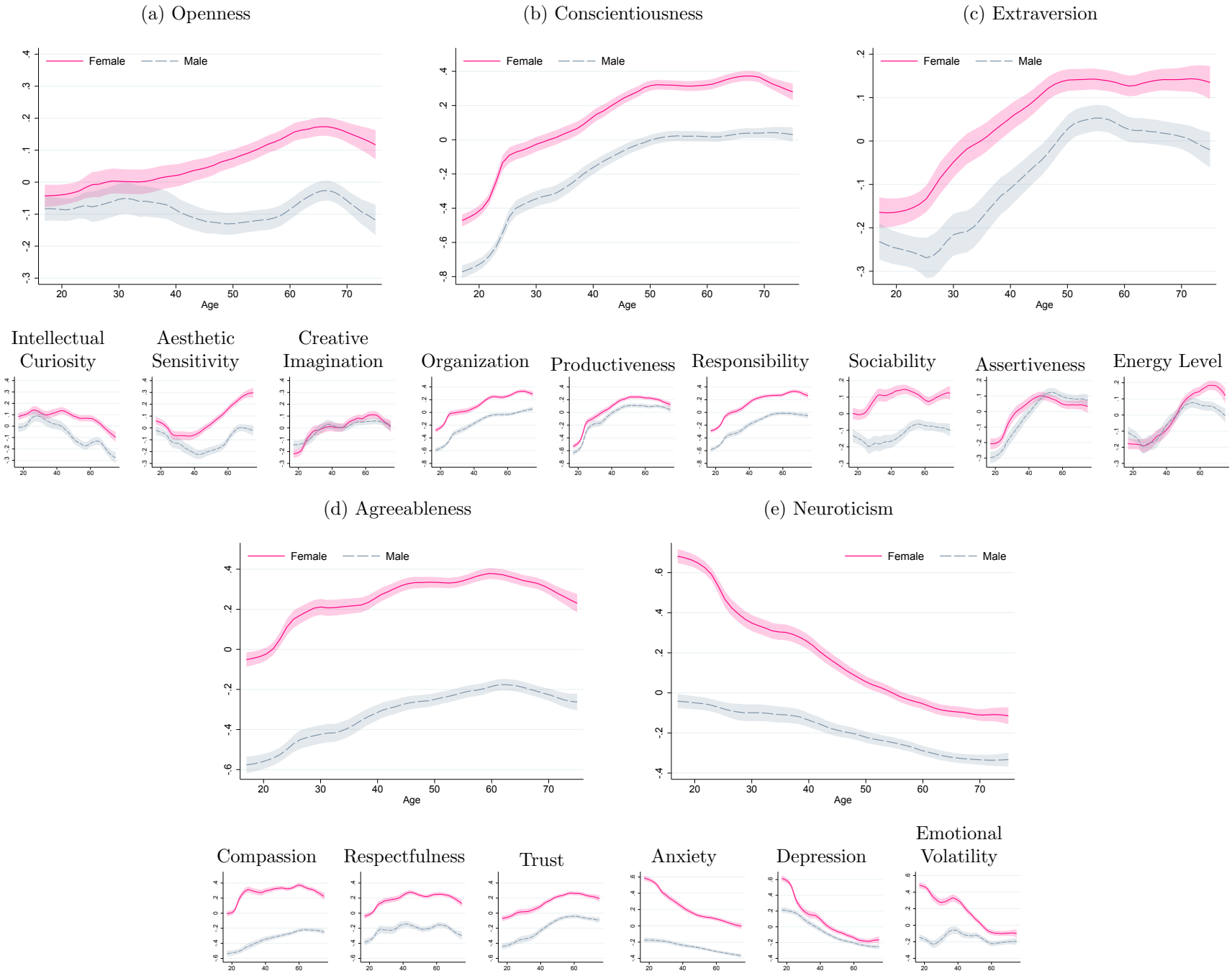
4.2 Sex Gradients in the Age Profiles of Personality

As noted from Table 2, females score on average more highly on all BFI traits than males. We now examine how these sex difference develop by age, in Fig. 1. For for Conscientiousness, Extraversion and Agreeableness, a sex gap is already present in late adolescence and remains constant throughout the lifecycle. The sex gap in Conscientiousness is mainly driven by Responsibility and Organization, while Productivity levels are fairly close for men and women, although significantly in favor of women. The sex gap in Extraversion is driven by a significant female surplus in Sociability and Energy Levels in older age. In contrast, differences in Assertiveness and Energy Level between men and women are small for most parts of the lifecycle, although women have significantly higher Energy levels in old age than men. The sex gap in Agreeableness is present in all three facets, including Compassion, Respectfulness and Trust. Our findings are in line with Soto et al. (2011) and Srivastava et al. (2003), who show that both men and women increase substantially their Conscientiousness and Agreeableness scores over the lifecycle (from 30 and onwards).

Remarkable exceptions are Openness to Experience and Neuroticism. Fig. 1a shows that men and women do not differ significantly in their Openness to Experience scores until age 35. Starting already at age 30, women increase in their Openness scores almost linearly, up until age 65, when the profile declines. For men, the Openness profile is flat until age 30, weekly U-shaped between age 30 and 65, and declining thereafter. Thus the sex gap in Openness is mainly driven by the middle to older age groups in our sample. A closer look at the facets of Openness shows that the sex gap is mainly driven by gaps in Intellectual Curiosity and Aesthetic Sensitivity. Creative Imagination is not statistically different for any age group except in adolescence, where the gap is in favor of men. Our results on Openness deviate somewhat from Soto et al. (2011) and Srivastava et al. (2003), who both find that men score higher than women in Openness to Experience.

Neuroticism is significantly higher for women for all age groups. Most interestingly, the women score almost 0.75 SD higher in Neuroticism than men in adolescence and young adulthood. This gap narrows over the lifecourse, and ends up to be only 0.2 SD from age 60 onward. Moreover, we see that for two of the sub elements of Neuroticism, namely Depression and Emotional Volatility, the gender narrows significantly around the age of 30 and 50, respectively. Our results on Neuroticism confirm previous findings by Soto et al. (2011) and Srivastava et al. (2003).

Figure 1: Personality Traits by Age and Gender



4.3 Education Gradients in the Age Profiles of Personality

We next describe the education gradient in personality traits. Figure 2 shows average personality traits by age, separately for high/low own or parental education. Education is classified as high for all with more than upper secondary education ("short continuing education"). Up until age 35, education refers to parents' human capital, and from age 35 onwards, education refers to survey participants' own human capital.[3] Overall, we find a sizable education gap in four of five traits, namely Openness to Experience, Extraversion, Agreeableness, and Neuroticism. We find no significant education gap in Conscientiousness (Fig. 2b). Interestingly, for all personality traits, the education gradient in parental and own education are closely aligned.

Openness to Experience (Fig. 2a) displays large differences by own/parental education. The biggest contributor to the gap is Intellectual Curiosity. While Openness is increasing steadily with age for the highly educated, Openness is fairly stable for those with low own/parental education, thus leading to a widening gap over time. Furthermore, we observe that Aesthetic Sensitivity drops at age 25 for those with lower parental education, followed by a gradual increase after age 40. Most remarkable is the widening gap Intellectual Curiosity between the high and low educated groups over the lifecycle. High educated groups keep their Intellectual Curiosity constant over the lifecycle, while low education groups drop in Intellectual Curiosity from age 40 onward. While the gap was 0.3 SD in late adolescence, it widens to 0.6 SD in old age.

The strong socioeconomic gradient in Extraversion is driven by differences in Assertiveness and Energy level that emerge strongly between age 30 and 40 (Fig. 2c), while there is only a small difference in Sociability throughout the lifecycle. The gap tends to be larger when considering own education rather parental background as proxy for socioeconomic status. than background (parental) education. the fact that Extraversion steadily until age 50, until it stabilizes, is entirely driven by lifecycle increases in Assertiveness and Energy Level. Sociability remains constant throughout life.

The socioeconomic gradient in Agreeableness is present in adolescence, especially for facets of Compassion and Respectfulness (Fig. 2d). Yet, low education groups appear

[3] According to this classification, 38.3% of our respondents had high education, vs 25.8% in the Danish population. As shown in Table 2, parents could be identified in the register data for more than 90 percent of the population up until the age of 60, and for these age groups, parental education was observed in the register data for more than 85 percent. The younger part of the sample, up until age 35, is only classified by parental education because they may not yet have completed their own education, while individuals above age 35 are also classified by own education.

to be "catching up" until the mid-20s. the gap widens significantly in mid-age, especially when considering own education as proxy for socioeconomic status. There are no significant socioeconomic gradients in trust between late adolescence and mid-age, but significant gaps emerge in mid age that remain relatively constant.

Finally, the education gap in Neuroticism (Fig. 2e) is constant across the lifecycle and this holds equally for all facets, including Anxiety, Depression, and Emotional Volatility.

4.4 Income Gradients in the Age Profiles of Personality

Figure 3 shows average traits by age of the respondent, classified into above/below median own income or parental income. Own income is defined as total personal income including transfers, in Danish crowns (DKK). Parental income represents the sum of the biological parents' total personal incomes including transfers. If a parent is not identified in the data (or income data is not available), this income is simply counted as zero.

Generally, Fig. 3 replicates the overall trends in the socioeconomic gradient in personality traits shown in Fig. 2 for education. Interestingly, while we find larger education gaps than income gaps for two traits - Openness and Agreeableness - we find that income gaps are larger than education gaps for the three remaining traits - Conscientiousness, Neuroticism, and Extraversion. Openness to Experience (Fig. 3a) thus shows much less difference by income than education, but the gap is still widening over time, especially in the first two facets. This widening gap is comparable to the widening education gap. There are no income gradients in Conscientiousness (Fig. 3b), with the exception of Productiveness, and Agreeableness (Fig. 3d), with the exception of Compassion. The income gaps for Extraversion are similar to the gaps by education (Fig. 3c); they mirror a large and persistent gap with high-income earners scoring much higher on Extraversion. At high ages, past age 60, we observe a narrowing of this gap (especially in Energy Level).

Neuroticism age trends by income are similar to those by education (Fig. 3e), but the gap between high and low income groups is more sizable than between high and low education.

Figure 2: Personality Traits by Age and Education

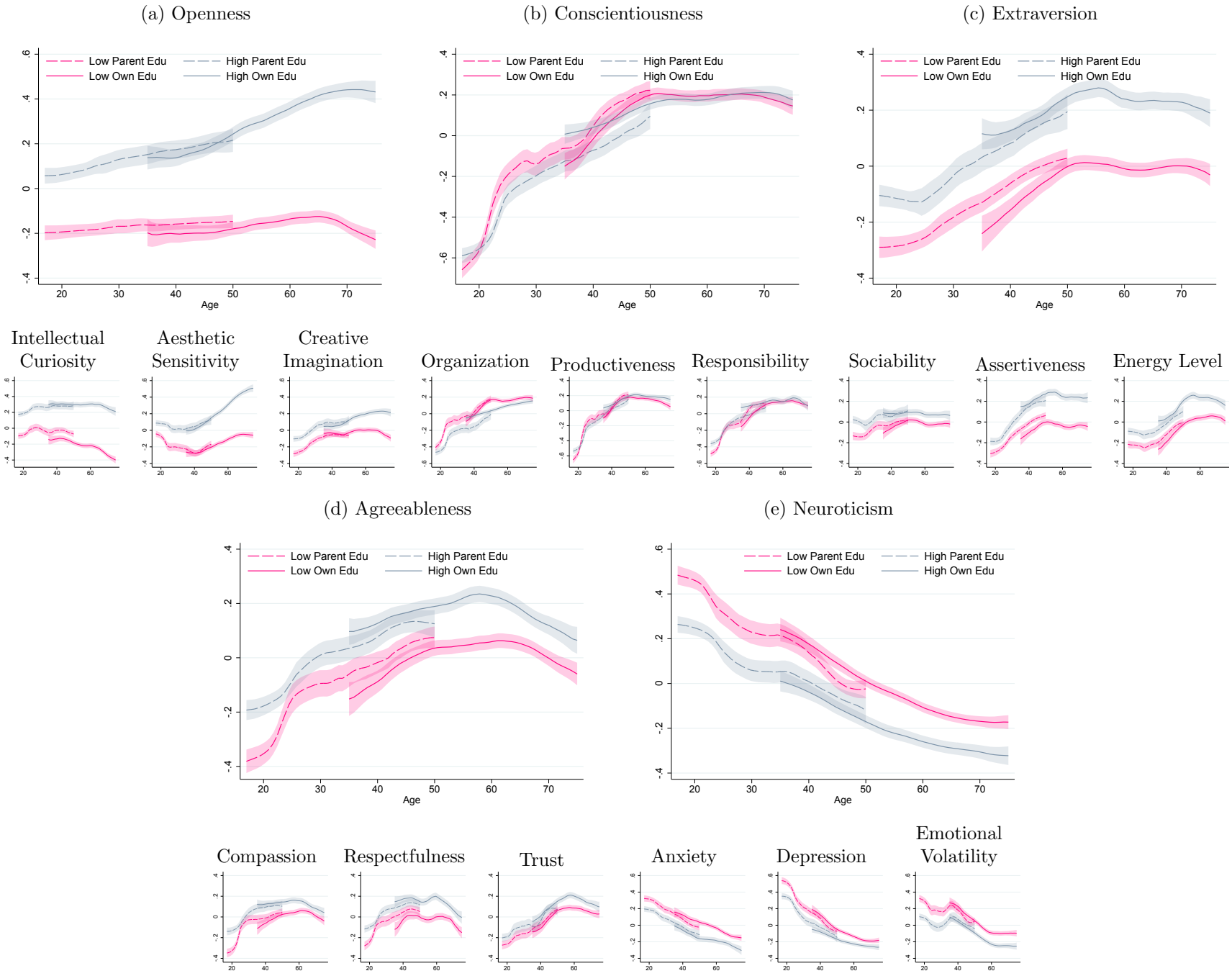
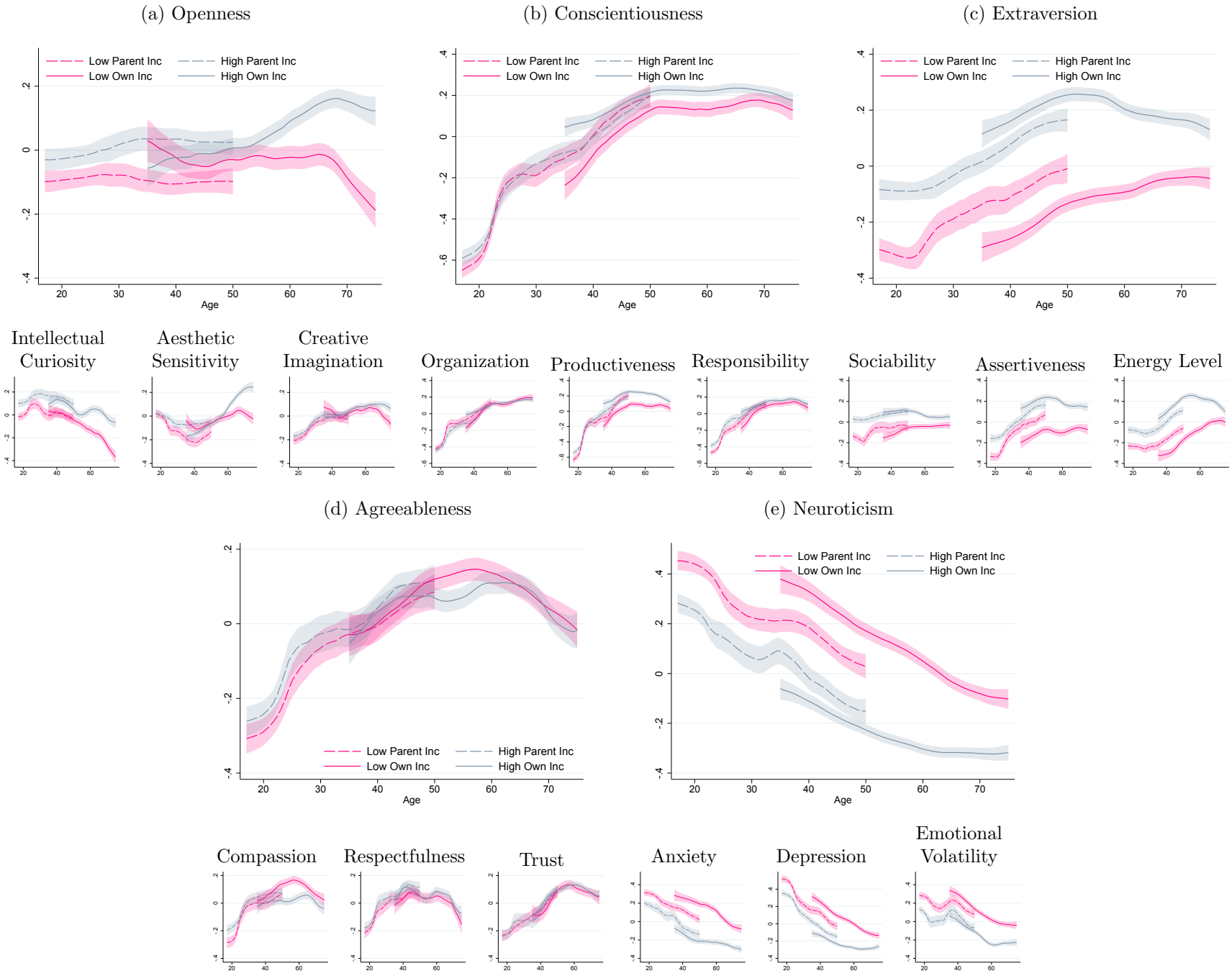


Figure 3: Personality Traits by Age and Income



4.5 Controlling for Age, Cohorts and Time Effects

Although we interpret personality profiles over age groups in the survey as evidence of changes in personality as people age, these patterns may very likely partly reflect differences in personality by birth cohorts. The problem of identifying age, period and cohort effects is well-known in the literature discussing the so-called apc model ("apc" for age, period and cohort) (Browning et al., 2012; Clark, 2007; Deaton and Paxson, 1994; Dohmen et al., 2017; Heckman and Roeb, 1985; Kapteyn et al., 2005). The interest in this literature lies in separating, for some outcome of interest, the influences of aging processes, the period of observation, and the cohort (date of birth) of the individual in question. As our data contains only one wave so far, we cannot follow individuals over time, and there is only one period of observation. However, as noted in e.g. Heckman and Roeb (1985), even with panel data, it is impossible to identify e.g. age profiles as it is not simultaneously possible to control for age, birth year and period of observation, as age is by definition a perfect linear combination of birth year and survey year.

Given that our period is fixed (one wave of the survey), our challenge is to identify variation in personality traits that is due to the ageing process, separately from variation that is due to effects attributable to one's birth cohort. In dealing with cohort effects, the previous literature has suggested different approaches to achieve identification of the other effects. One solution may be to place restrictions on some of the parameters to achieve identification. As explained by Browning et al. (2012), we only need one restriction to achieve identification. In fact, one may be able to achieve identification with rather weak assumptions, for example assuming that the effects of two adjacent cohorts are the same. A practical solution is to abandon the nonparametric model and parameterize some of the explanatory variables. This approach relies on finding suitable proxies for cohort specific factors. For example, it has been established in the literature that initial conditions experienced in childhood and adolescence can have long-lasting effects on beliefs (see e.g. Giuliano and Spilimbergo (2013). Proxies for cohort effects that have previously been used in the literature include unemployment rates when the subject was 18 (Schwandt and von Wachter, 2019), inflation rates (Dohmen et al., 2017) for the identification of age-dependency in risk attitudes, and GDP growth rates (Kapteyn et al., 2005).

In order to disentangle age from cohort effects, we investigate to which extent cohort characteristics may explain the variation we find over age groups, by controlling for some

of the cohort proxies that have been used in previous papers. Specifically, we regress the five higher-order personality traits in the BFI-2 on two specific cohort controls: average unemployment rate in the year the person turned 18, and average GDP growth rate in the year the person turned 18. We then plot the standardized residuals against age.[4]

Figure 4 and Fig. 5 contrast the age profiles with and without cohort controls. Controlling for each of these two cohort measures in turn, changes to a small degree the age-personality profiles in three out of five personality traits. While age-gradients in Openness and Neuroticism remain unaffected by cohort controls, age gradients in Conscientiousness, Extraversion, and Agreeableness controlled for cohort effects increase somewhat less steeply, or slower, in middle age. Yet our broad conclusions on the age profiles by sex and education/income gradients remain the same. Thus, under the strong assumption that macroeconomic conditions are a reliable and sufficient proxy for cohort effects, we could argue that the age-personality profiles that we observe represent true lifecycle maturation process.

Obviously, it is possible that other cohort proxies than macroeconomic conditions may lead to a different outcome. Our approach does not deliver bullet-proof evidence that the variation in personality traits that we observe over age is entirely an age effect. As the "apc" model explains, due to the linear relationship between age, period and cohorts, we may essentially be capturing a combination of an age and cohort effect (Heckman and Roeb, 1985). Yet, even if we had access to panel data, we would experience an identification problem as we would then have to control for period effects as well. But when we control for factors that should influence cohorts' initial levels of traits when entering adulthood, there is still a clear age profile to be observed. This additional variation over cohorts is consistent with e.g. Donnellan and Lucas (2008).

[4] Available upon request are the regression results of this first-stage regression. We find significant but modest effects of these business-cycle-related proxies measured at age 18 for all five traits. For Conscientiousness, Extroversion, Agreeableness and Neuroticism, unemployment and GDP growth rates recorded at age 18 have the same signs, being positively associated with Conscientiousness, Extroversion and Agreeableness, and negatively related with Neuroticism. Openness is negatively related to unemployment rates and positively related to GDP growth rates. Numerically, the effects of unemployment and GDP growth rates at 18 are very small compared to the effects of being one year older. We tested for different measures of the unemployment rate; e.g. including a gender specific unemployment rate instead of the average unemployment rate. And we tested different functional forms, e.g. including a quadratic term of the unemployment rate. Neither of these variations changed the overall picture.

Figure 4: Cohort checks: Age and Gender

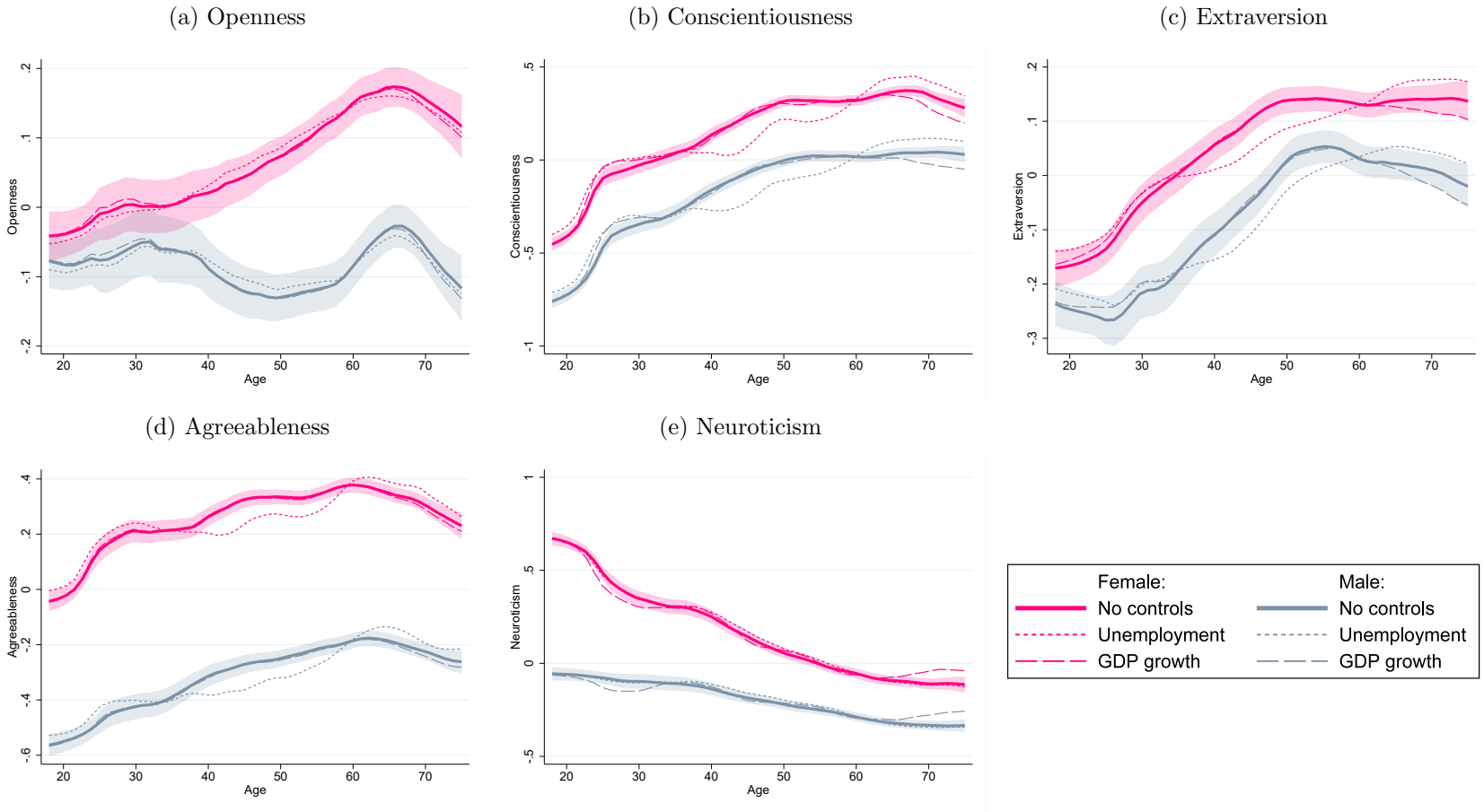
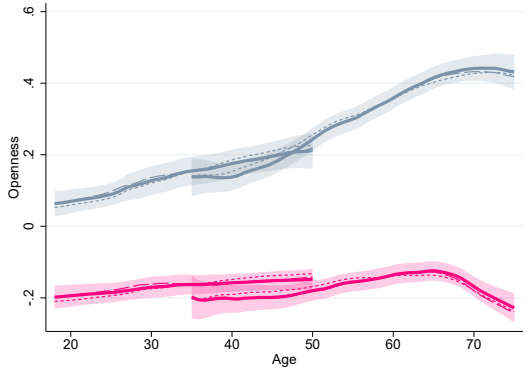
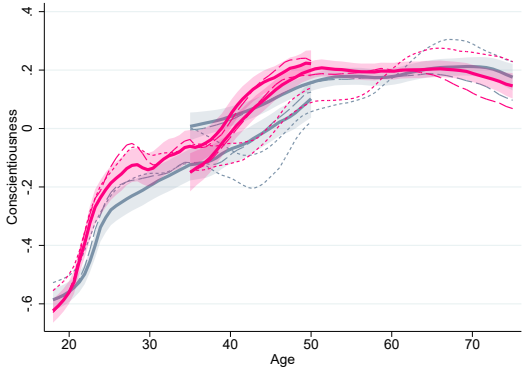


Figure 5: Cohort checks. Age and Education

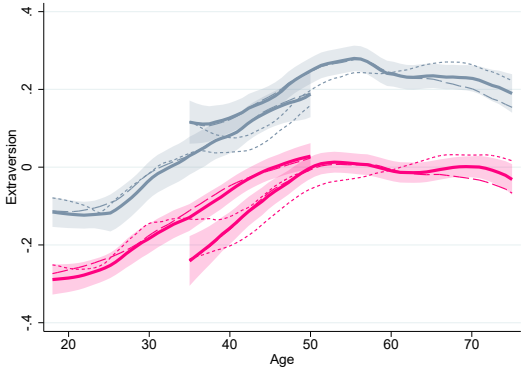
(a) Openness



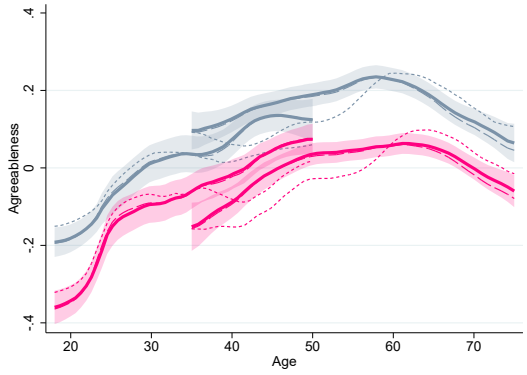
(b) Conscientiousness



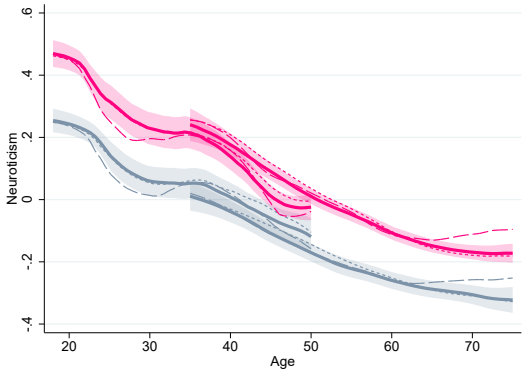
(c) Extraversion



(d) Agreeableness



(e) Neuroticism



4.6 Controlling for Sample Selection

Even though our baseline sample that was invited to participate was extraordinarily large and truly representative of the population, our estimates can only reflect representative population-wide age patterns to the extent that they are not biased because of self-selection into our voluntary survey. Yet we can provide evidence that the age-and-SES gradients we observe are not driven by selection into the sample.

Our data allows us to easily estimate selection into participation on the basis of observable covariates, because we have administrative records on all individuals who were invited to participate, regardless of survey completion status. We thus construct inverse probability weights for participation by age, using information on: own/parents income and education, number of siblings, whether an individual is married or cohabiting, the number of days admitted to a hospital in the past year, and the number of times individuals visited their general practitioner. As the detailed results in Section S.2 show, the selection into our survey sample is standard, and as is observed in other surveys: individuals are more likely to participate if they more highly educated, live more stable lives (as proxied here with cohabiting), if they have a greater interest in health, but not if they are in bad health.

While it is inherently impossible to control for the role of personality traits in the selection into the survey, one would expect personality traits to be correlated with the covariates we have controlled for. Therefore, the role of personality can only indirectly be taken into account, yet given the breadth of types of background characteristics that are observed, a large component of this should be incorporated already.

We thus adjust for attrition or non-response by re-weighting our respondent sample to reflect the representative population in terms of a wide array of important covariates. Our results show that adjusting the average traits by age for selection into the sample does *not* alter the lifecycle profile of these traits. The gradients by sex, income, or education are all virtually unchanged.

5 Conclusion

In this study, we provide a comprehensive heterogeneity analysis of the dynamics of personality over the lifecourse. We contribute to a burgeoning literature on age-personality profiles in three critical ways. First, we carefully model heterogeneity in the age-

personality relationship. We focus not only on differences across the sexes but also on differences across the socioeconomic spectrum. To the best of our knowledge, we are the first to describe age-related personality changes by education and income. We are able to do this thanks to a recently collected, high-quality survey on personality for a large population from Denmark, which we linked with registry data on both own and parental socioeconomic status (among others). Second, we pay careful attention to modeling the potential non-linearities in the age-personality relationship. To estimate these profiles as flexibly as possible, we apply bivariate kernel regression methods, which also require sufficient observations for each age and demographic. Third, we are able to explore and adjust for the self-selection of sample members into our study. We are able comment on the degree to which sample selection will bias our findings.

Our findings produce a collection of stylized facts. First, in our Danish sample, we find a significant negative age gradient in Neuroticism and significant positive age gradients in all other traits. Second, important non-linearities emerge in these age gradients that are only visible when using non-parametric estimation methods. For instance, we find that Conscientiousness only grows until age 50, but then flattens out. The age gradient is strongly positive for Extraversion between the ages of 25 and 60, but flat or declining otherwise. The age gradient in Neuroticism flattens out fully from age 65 onward. Third, women score on average higher on each personality trait, with differences ranging between 0.12 standard deviations (Extraversion) and 0.56 standard deviations (Agreeableness). Sex-personality gradients are observed at almost every stage of the life cycle. Fourth, the sex-gap in personality remains constant over the life cycle, except for two traits – Openness to Experience and Neuroticism. For the former, the gaps widen dramatically over the lifecycle, while for the latter they close almost entirely in old age. Fifth, better educated or high-income groups score higher on all personality traits, with differences being negligibly small, if not absent, for Conscientiousness (less than 0.1 standard deviations) and relatively large for Openness to Experience (0.40 standard deviations). Sixth, the socioeconomic gradients in personality remain constant over the lifecycle. The only exception is – again – Openness to Experience, for which the gradient significantly widens from age 45 onward. Seventh, our conclusions about the average sex- and socioeconomic gradients are sensitive to the type of BFI facets. For instance, we find no sex difference in Assertiveness or Creative Imagination, although we find strong sex-differences overall for Extraversion and Openness to Experience, respectively.

Adjusting the average traits by age for selection into the sample, on the basis of a wide array of important covariates, does not alter the lifecycle profile of these traits, or their gradients by sex, income, or education.

Socioeconomic gaps in these traits have important economic implications, as there are significant education and labor market returns to these skills. Observing how skills are unevenly distributed in the population, and differentially so by age, enhances our understanding of the sources of inequality. These findings can also be helpful in explaining social immobility, because of the aforementioned returns. Openness to Experience has been shown to be linked to intelligence (Almlund et al., 2011) and greater propensities to graduate from college for disadvantaged populations (Lundberg, 2013). In this sense, demonstrating the existing gaps in these traits in both late adolescence, when they are the result of parental background, and at later stages of the lifecourse, when they are the result of own background, may explain why economic inequalities persist over the lifecourse and across generations.

Of course, our study cannot comment on why the socioeconomic gaps in some of the traits have emerged in adolescence already. They may be the result of parenting styles and investments, which differ by socioeconomic status. For instance, Falk et al. (2020) explore the mechanisms that explain strong socioeconomic gradients in childhood intelligence and economic preferences. They document that children from more advantaged families are more intelligent, patient and altruistic, as well as less risk-seeking. The study models socioeconomic status to influence both parental time investments and parenting styles, and the productivity of investments. Importantly, the study finds that inequalities in parental investments are strongly predictive of socioeconomic gaps in preferences, and less so for gaps in intelligence. Elkins and Schurer (2020) demonstrate a strong socioeconomic gradient in a personality trait associated with success at age 10. The main conclusion is that inequalities in parental engagement with a child's education, over and above the influence of socioeconomic disadvantage, is the key facilitator of positive personality development from childhood into middle age.

This leaves us with the surprising result that we do not find a socio-economic gap in Conscientiousness or any of its facets. If anything, individuals from lower education backgrounds tend to score higher on Conscientiousness in young age than individuals from better educated backgrounds. Often termed as a super-trait, it is most strongly associated with academic and job performance, earnings, and favorable health

outcomes (Roberts et al., 2014) – outcomes that have strong socioeconomic gradients. Research into the origins of Conscientiousness suggests that one can see already in children the precursors to what psychologists term as Conscientiousness in adulthood, such as self-regulation, motivation, and norm adherence (Eisenberg et al., 2014). We can think of several plausible explanations, although speculative, for this unexpected finding. On the one hand, it may simply be that individuals from different socioeconomic backgrounds use different anchors against which they compare themselves, when asked about their dependability. For instance, it is possible that individuals from better education backgrounds rate themselves more humbly, while individuals from poorer education backgrounds may exaggerate their self-assessments. This possibility has been reported elsewhere (West et al., 2016). If this were true, variations in Conscientiousness would be meaningless and consequently Conscientiousness should have little predictive power in lifetime outcomes. Yet, this is not what is observed, instead Conscientiousness is repeatedly found to have strong effects in a multitude of settings. Furthermore, Conscientiousness is not the only socially desirable trait that would be subject to biased reporting. Thus, we would expect the same mechanism of under-reporting of more humble individuals in advantaged settings for other personality traits, such as low Neuroticism? A second explanation is that variation in Conscientiousness does not reflect variation in access and use of information and financial resources, which we associate with socioeconomic advantage. The consequence of this hypothesis would be that the predictive power of Conscientiousness in lifetime success is not moderated by socioeconomic status information. Conscientiousness is important in its own right. In fact, this is shown in many studies which find the beneficial effects of Conscientiousness over and above the influence of education, intelligence, money (Heineck and Anger, 2010). A third explanation is that, even if socioeconomic gradients in Conscientiousness emerge early in life, it may be the case that public education institutions compensate for such gradients by training every school student facets of Conscientiousness. This study cannot answer these questions, but they illustrate the complexity of assessing personality and identifying its predictors.

Some of our findings are closely aligned with what we would have expected from the literature. First and foremost, we replicate the average age gradients in personality that have been documented frequently in the literature. As individuals age, they tend to become more agreeable and conscientious, and less neurotic (Allemand et al., 2008;

Denissen et al., 2008; Donnellan and Lucas, 2008; Hopwood et al., 2011; McCrae et al., 1999, 2000; McGue et al., 1993; Roberts et al., 2006; Soto et al., 2011; Srivastava et al., 2003; Terracciano et al., 2005; Vaidya et al., 2008). We also replicate the finding that Conscientiousness, Agreeableness and Neuroticism have their steepest growth or decline rates before the age of 30 (Hopwood et al., 2011; Pullmann et al., 2006; Roberts and DelVecchio, 2000; Terracciano et al., 2005). In other aspects, however, our findings differ remarkably. In our setting, Openness to Experience follows a very unusual path of lifelong growth for women. The same is found for Extraversion, even though the literature reports a flat or a declining age profile in Extraversion over the lifecourse (e.g. Donnellan and Lucas, 2008; Soto et al., 2011; Srivastava et al., 2003).

Where we also differ noticeably, is that we find sex differences in the maturation process of personality, while the literature does not (Branje et al., 2007; Donnellan and Lucas, 2008; Klimstra et al., 2009; Roberts et al., 2001). Roberts et al. (2006) suggested that "there is very little support for the idea that men and women change in distinct ways" over the lifecourse (p. 15). Yet, we find that sex moderates the age-personality profile for Neuroticism and Openness to Experience.[5] In fact, women appear to be heavily disadvantaged early in life. Their Neuroticism scores are almost 0.75 standard deviations higher than for men in late adolescence, a time where important human capital decisions are being made. Over the lifecourse, sex-based inequality in Neuroticism shrinks continuously until it stabilises at 0.2 standard deviations. Although true for all facets of Neuroticism, the converging age profiles are most remarkable for Emotional Volatility. Another intriguing finding is that men and women start out with the same levels of Openness to Experience in late adolescence, but women grow in their Openness to Experience over the life course, while men remain pretty much on the same level. Men and women do not differ in their Creative Imagination, but in their Aesthetic Sensitivity and their Intellectual Curiosity, all facets of Openness. Women are protected against the steep declines in Intellectual Curiosity over the lifecourse, which we observe for men.

Although our findings must be understood as description of what is, they allow some speculation on their economic implications. For instance, finding significant sex gaps in traits that the literature considers as productive, raises the question of why there is still a gender gap in earnings. Some of the Big Five personality traits, for instance Extraversion, are considered important "soft skills" with a high labor market return

[5] It should be noted that our sex differences in the age profiles of personality are similar to Soto et al. (2011), but the authors do not discuss this finding.

(e.g. Gensowski, 2018; Heineck and Anger, 2010; Mueller and Plug, 2006), growing in importance considering the emergence of automation and artificial intelligence (Deming, 2017). Observing that women score higher on these traits, implies that maybe we need to revisit models of household production and specialization, and who should participate in the labor market. Another implication of our finding is that education and family policy may have to adapt to differential ability pathways for men and women over the lifecourse. Women experience high psychic costs in late adolescence due to excessively high levels of Emotional Volatility, Depression, and Anxiety (Neuroticism), which are likely to reduce their investment in human capital and participation in the labor market. Men, on the other hand, face high ability inequalities in late adulthood due to hefty declines in Intellectual Curiosity (Openness to Experience). Under the assumption that Intellectual Curiosity is critical in learning and training, men are less likely to adjust to changing labor markets in older age.

The implication of this finding is that men and women may have different productivity in the labor market and labor supply elasticities. Optimal taxation theory postulates that policymakers should tax persons with higher labor supply elasticities less. Others have proposed that tax schedules should be based on innate ability and all other observable, personal characteristics which affect income potential, but which are not due to effort. What is referred to in the literature as "tagging", means that all information on innate ability should be used to identify "groups of persons who are on the average needy" (Akerlof, 1978, p. 8). A system of tagging permits relatively high transfer payments and relatively low marginal rates for needy persons, and relatively high marginal tax rates for less needy persons. This literature acknowledges that marginal tax rates may differ between men and women (Alesina et al., 2011), over the lifecourse (**?**), or by characteristics such as height (Mankiw and Weinzierl, 2010). Our results are consistent with the idea to impose differential marginal tax rates for men and women at different stages of their lifecycle.

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S Appendix

S.1 Descriptive Statistics

Table S.3: Descriptive Statistics for Full Sample

	mean	sd
Openness	0.00	0.99
Openness, Intellectual Curiosity	0.00	1.00
Openness, Aesthetic Sensitivity	0.00	1.00
Openness, Creative Imagination	0.00	1.00
Conscientiousness	0.01	0.99
Conscientiousness, Organization	0.00	1.00
Conscientiousness, Productiveness	0.01	0.99
Conscientiousness, Responsibility	0.01	0.99
Extraversion	0.00	1.00
Extraversion, Sociability	0.00	1.00
Extraversion, Assertiveness	0.00	1.00
Extraversion, Energy Level	0.00	1.00
Agreeableness	0.00	0.99
Agreeableness, Compassion	0.00	1.00
Agreeableness, Respectfulness	0.00	0.99
Agreeableness, Trust	0.00	1.00
Neuroticism	-0.00	1.00
Neuroticism, Anxiety	0.00	1.00
Neuroticism, Depression	-0.00	1.00
Neuroticism, Emotional Volatility	-0.00	1.00
Total Parental Income	451,126.92	709,289.54
Income	330,486.84	396,990.32
Age on May 1 2020	47.37	17.59
Female	0.55	0.50
Observations	38,711	

Table S.4: List of Short BFI-2 Instrument, see Soto and John (2017a)

Extraversion	Sociability	Tends to be quiet Is outgoing, sociable
	Assertiveness	Is dominant, acts as a leader Prefers to have others take charge
	Energy Level	Is full of energy Is less active than other people
Agreeableness	Compassion	Is compassionate, has a soft heart Can be cold and uncaring
	Respectfulness	Is respectful, treats others with respect Is sometimes rude to others
	Trust	Assumes the best about people Tends to find fault with others
Conscientiousness	Organization	Tends to be disorganized Keeps things neat and tidy
	Productiveness	Is persistent, works until the task is finished Has difficulty getting started on tasks
	Responsibility	Can be somewhat careless Is reliable, can always be counted on
Negative Emotionality	Anxiety	Is relaxed, handles stress well Worries a lot
	Depression	Tends to feel depressed, blue Feels secure, comfortable with self
	Emotional Volatility	Is emotionally stable, not easily upset Is temperamental, gets emotional easily
Open-Mindedness	Intellectual Curiosity	Has little interest in abstract Ideas Is complex, a deep thinker
	Aesthetic Sensitivity	Is fascinated by art, music, or literature Has few artistic interests
	Creative Imagination	Has little creativity Is original, comes up with new Ideas

Table S.5: Full List of BFI-2 Items, see Soto and John (2017b)

Extraversion	Sociability	Tends to be quiet Is talkative Is outgoing, sociable Is sometimes shy, introverted
	Assertiveness	Is dominant, acts as a leader Has an assertive personality Prefers to have others take charge Finds it hard to influence people
	Energy Level	Is full of energy Shows a lot of Enthusiasm Rarely feels excited or eager Is less active than other people
Agreeableness	Compassion	Is compassionate, has a soft heart Can be cold and uncaring Is helpful and unselfish with others Feels little sympathy for others
	Respectfulness	Is respectful, treats others with respect Is polite, courteous to others Is sometimes rude to others Starts arguments with others
	Trust	Assumes the best about people Has a forgiving nature Tends to find fault with others Is suspicious of others' intentions
Conscientiousness	Organization	Tends to be disorganized Is systematic, likes to keep things in order Keeps things neat and tidy Leaves a mess, doesn't clean up
	Productiveness	Is efficient, gets things done Is persistent, works until the task is finished Tends to be lazy Has difficulty getting started on tasks
	Responsibility	Can be somewhat careless Sometimes behaves irresponsibly Is reliable, can always be counted on Is dependable, steady
Negative Emotionality	Anxiety	Is relaxed, handles stress well Worries a lot Rarely feels anxious or afraid Can be tense
	Depression	Often feels sad Tends to feel depressed, blue Feels secure, comfortable with self Stays optimistic after experiencing a setback
	Emotional Volatility	Is emotionally stable, not easily upset Is temperamental, gets emotional easily Keeps their emotions under control Is moody, has up and down mood swings
Open-Mindedness	Intellectual Curiosity	Has little interest in abstract Ideas Is complex, a deep thinker Avoids intellectual, philosophical discussions Is curious about many different things
	Aesthetic Sensitivity	Is fascinated by art, music, or literature Has few artistic interests Values art and beauty Thinks poetry and plays are boring
	Creative Imagination	Has little creativity Is inventive, finds clever ways to do things Is original, comes up with new Ideas Has difficulty imagining things

S.2 Adjusting for Attrition with Inverse-Probability Weighting

We first define an indicator for whether an individual who was invited to our study responded to any of the BFI-2-S traits (higher level, not facets).[6] Since we observe the full population from administrative registers (and can identify everyone who was invited to participate in our survey), and the registers contain information on background characteristics, we can compare respondents and non-respondents characteristics—see Tables S.6 to S.8. These tables show that the selection in our survey sample is standard, as is observed in other surveys: individuals are more likely to participate if they more highly educated, live more stable lives (as proxied here with cohabiting), if they have a greater interest in health (as indicated by number of visits to general practitioners, GPs), but not if they are in bad health (number of days admitted to a hospital).

Table S.6: Comparison of Respondents' and Non-Respondents' Characteristics, Age 18-27

	Mean Non-Resp.	Mean Respondents	Difference	Observations
Personal income	63.34	58.44	4.90	7,203
Mother personal income	374.56	384.50	-9.95	7,130
Father personal income	469.79	539.57	-69.77	7,041
Months of education	115.14	118.74	-3.60*	2,541
Mother months of education	166.70	172.88	-6.18***	6,991
Father months of education	167.57	173.27	-5.69***	6,884
Days admitted to a hospital	1.32	1.10	0.22	7,226
Nr. of GP visits	0.83	0.61	0.22***	7,226
Married/Cohabiting	0.63	0.65	-0.02	7,151
Nr. of biological siblings	1.84	1.61	0.22***	7,084

Note: All income measures are in 1,000 Danish Crowns of 2019.

Table S.7: Comparison of Respondents' and Non-Respondents' Characteristics, Age 28-47

	Mean Non-Resp.	Mean Respondents	Difference	Observations
Personal income	352.92	382.59	-29.66*	9,465
Mother personal income	271.23	272.46	-1.23	8,926
Father personal income	305.00	321.80	-16.80	8,798
Months of education	168.88	173.44	-4.55***	9,119
Mother months of education	151.17	156.32	-5.15**	8,797
Father months of education	157.80	159.10	-1.30	8,604
Days admitted to a hospital	3.20	2.12	1.08**	9,488
Nr. of GP visits	1.10	0.87	0.23**	9,488
Married/Cohabiting	0.71	0.71	0.00	9,381
Nr. of biological siblings	1.93	1.78	0.16**	8,879

Note: All income measures are in 1,000 Danish Crowns of 2019.

We next perform an inverse-probability weighting (IPW) adjustment for attrition or non-response. We use the variables in Tables S.6 to S.8 to predict an individual's probability of responding to the survey: the number of days the individual spent in hospital in

[6] There are only 49 individuals who responded partially to the 5 traits if they responded to any of them. 39,158 individuals responded to all 5 factors.

Table S.8: Comparison of Respondents' and Non-Respondents' Characteristics, Age 48-75

	Mean Non-Resp.	Mean Respondents	Difference	Observations
Personal income	372.25	408.46	-36.21*	21,488
Mother personal income	140.09	146.63	-6.54	14,217
Father personal income	122.05	142.54	-20.49	12,962
Months of education	165.18	170.00	-4.81***	21,277
Mother months of education	123.11	125.00	-1.89	13,533
Father months of education	135.87	137.27	-1.40	11,988
Days admitted to a hospital	2.59	2.82	-0.23	21,490
Nr. of GP visits	1.40	1.36	0.04	21,490
Married/Cohabiting	0.71	0.76	-0.05***	21,434
Nr. of biological siblings	1.79	1.76	0.03	14,755

Note: All income measures are in 1,000 Danish Crowns of 2019.

2017, their number of visits to the general practitioner, their number of siblings, and an indicator for whether they are currently married or cohabiting. Additionally, we control for these background variables by age:

- **For individuals up to 29 years old:** educational attainment of father and mother, father's and mother's total personal income before transfers
- **For individuals 30-50 years old:** educational attainment—own and that of father and mother, own and father's and mother's total personal income before transfers
- **For individuals 51 years and older:** own educational attainment , own total personal income before transfers

Educational attainment is measured in months, as reported by the statistics office on the basis of the standard length of study for the degree one obtained.

Within 5-year age bins, we predict response to the BFI-2-S on the basis of these covariates for each individual, from binary probit regressions. The inverse probability weight is computed as the inverse of this predicted probability. We then regress the individual BFI-2-S score on age indicators (in the same 5-year age groups), separately by SES-groups (defined by either own or parents' education or income, on the appropriate age ranges as described in the main text), weighting the regressions with the IWP as a "pweight" in Stata. The resulting predicted averages (and 95% confidence bands) are presented inFig. S.6 and Fig. S.7.

For an easier direct comparison, we also present average traits by the age groups of Tables S.6 to S.8, with and without adjustment for non-response with IPW, in Tables S.9 to S.12.

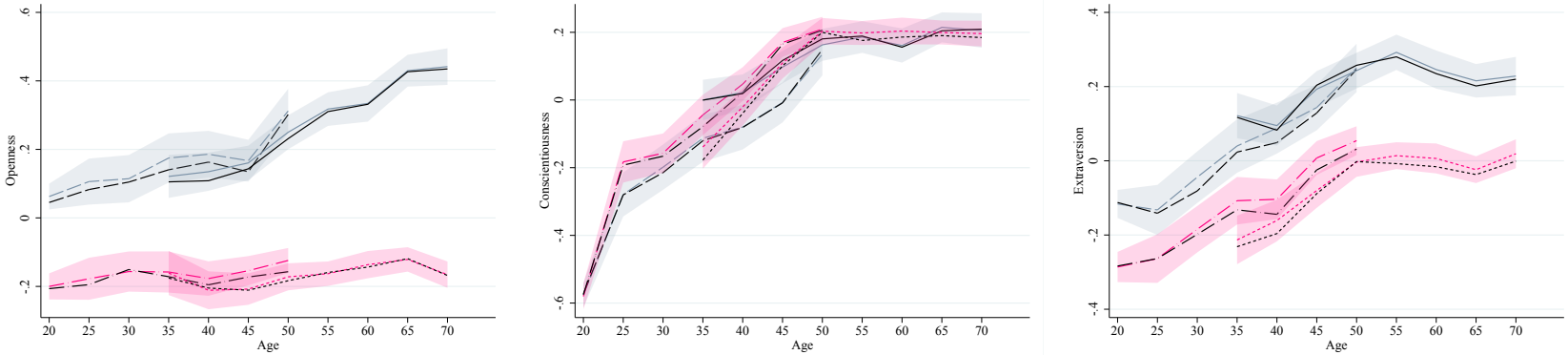
Adjusting the average traits by age for selection into the sample, on the basis of a wide array of important covariates, does not alter the lifecycle profile of these traits, or their gradients by sex, income, or education.

Figure S.6: Personality by Age and Education, Adjusted for Attrition

(a) Openness

(b) Conscientiousness

(c) Extraversion



(d) Agreeableness

(e) Neuroticism

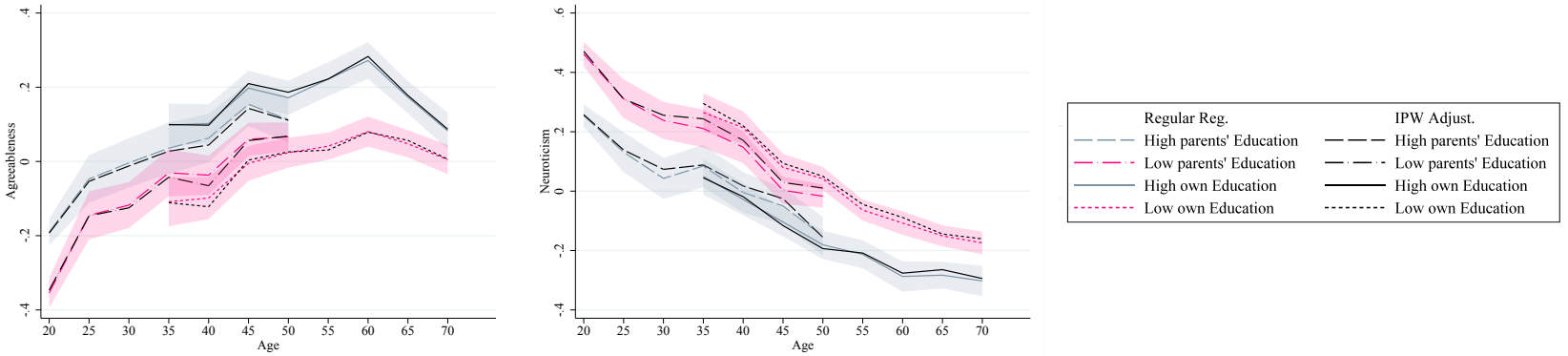


Figure S.7: Personality by Age and Income, Adjusted for Attrition

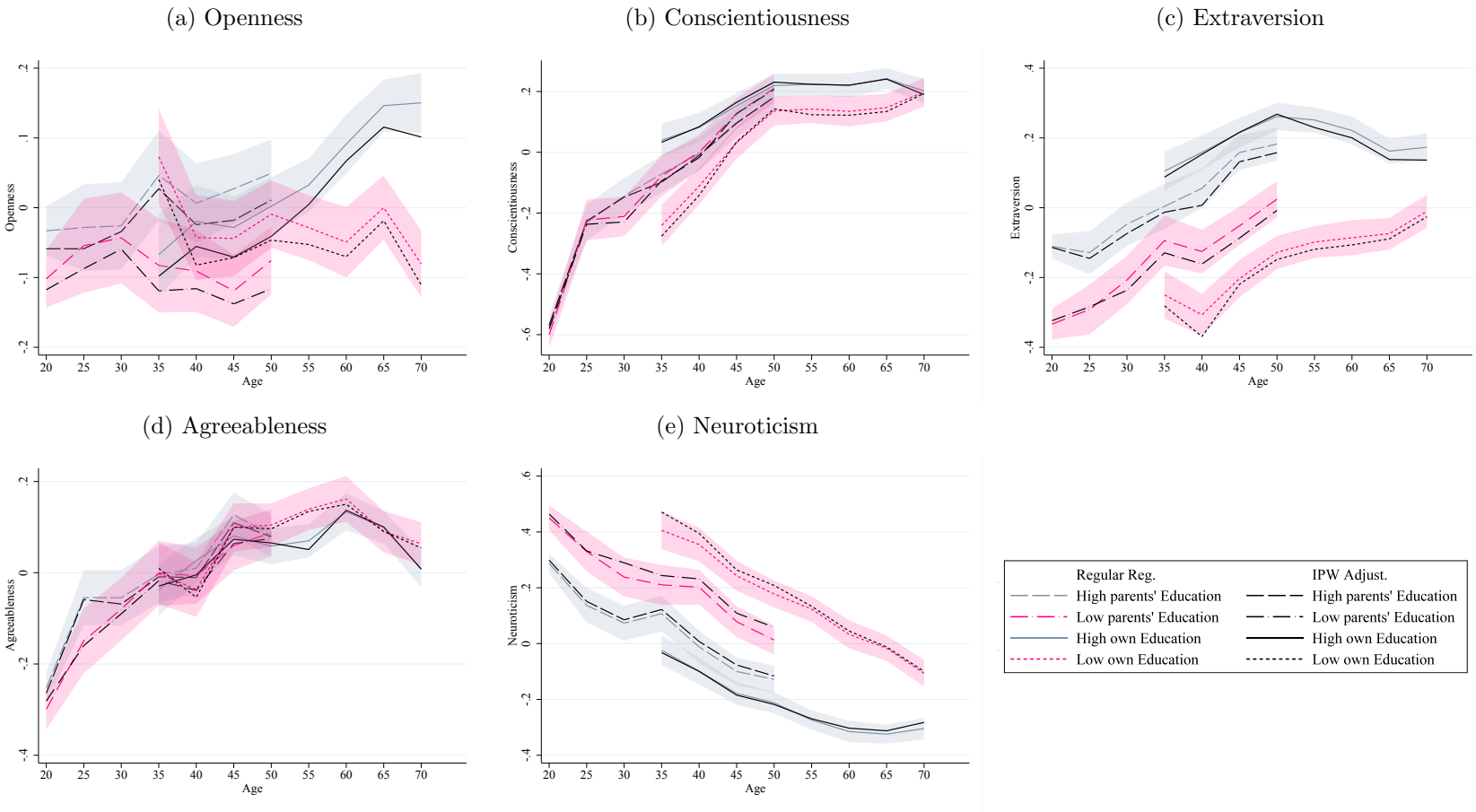
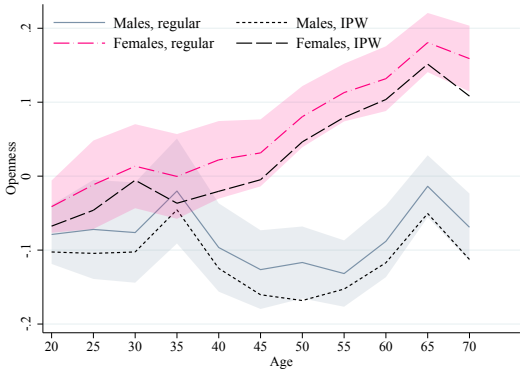
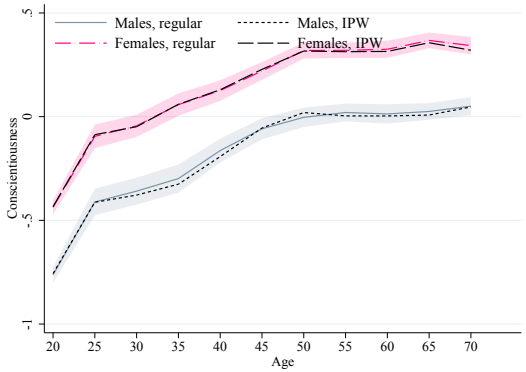


Figure S.8: Personality by Age and Sex, Adjusted for Attrition

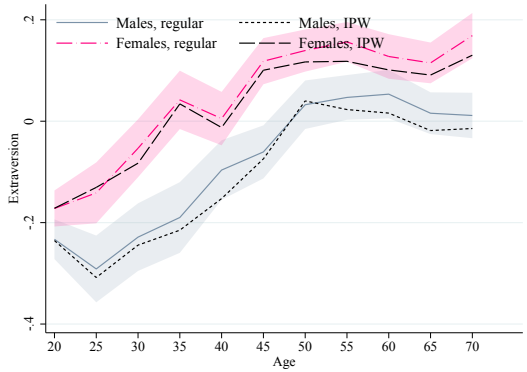
(a) Openness



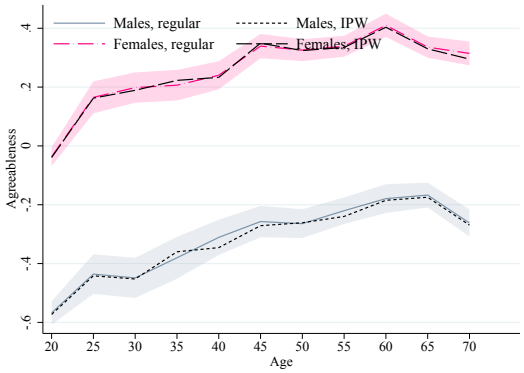
(b) Conscientiousness



(c) Extraversion



(d) Agreeableness



(e) Neuroticism

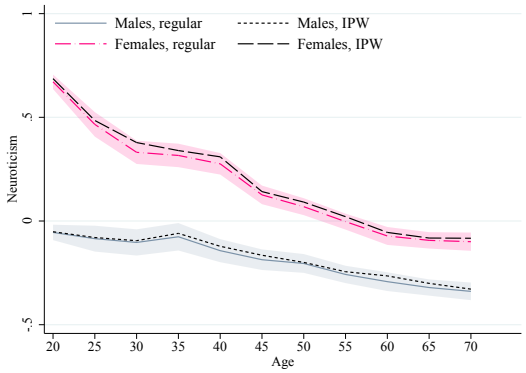


Table S.9: Average Traits by Age, Low Parental Income: Regular vs IPW-adjusted

	Openness		Conscientiousness		Extraversion		Agreeableness		Neuroticism	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW
20	−0.10***	−0.12***	−0.60***	−0.58***	−0.33***	−0.32***	−0.30***	−0.28***	0.45***	0.46***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
25	−0.05	−0.09**	−0.22***	−0.24***	−0.29***	−0.28***	−0.15***	−0.16***	0.33***	0.33***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
30	−0.04	−0.06*	−0.21***	−0.23***	−0.21***	−0.24***	−0.08**	−0.09**	0.24***	0.29***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
35	−0.08**	−0.12***	−0.08**	−0.09**	−0.09***	−0.13***	−0.00	−0.02	0.21***	0.24***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
40	−0.09***	−0.12***	0.00	−0.02	−0.13***	−0.16***	−0.01	−0.04	0.20***	0.23***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
45	−0.12***	−0.14***	0.13***	0.13***	−0.05*	−0.09***	0.06**	0.06**	0.08***	0.11***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
50	−0.08***	−0.12***	0.21***	0.21***	0.02	−0.01	0.09***	0.08***	0.01	0.06**
	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
N	8636	7734	8639	7735	8640	7735	8640	7735	8641	7735

Note: "Reg" = average trait by age, or coefficients from regular regression, unweighted. "IPW" = coefficients frmo regression adjusted for non-response with inverse probability weights. Standard errors in parentheses. *($p < 0.10$),** ($p < 0.05$),*** ($p < 0.01$)

Table S.10: Average Traits by Age, High Parental Income: Regular vs IPW-adjusted

	Openness		Conscientiousness		Extraversion		Agreeableness		Neuroticism	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW
20	−0.03*	−0.06***	−0.57***	−0.57***	−0.11***	−0.11***	−0.25***	−0.26***	0.29***	0.30***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
25	−0.03	−0.06*	−0.23***	−0.23***	−0.13***	−0.15***	−0.05*	−0.06*	0.14***	0.15***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
30	−0.03	−0.03	−0.14***	−0.15***	−0.05	−0.07**	−0.05*	−0.07**	0.07**	0.09***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
35	0.05	0.03	−0.07**	−0.10***	0.00	−0.01	−0.00	−0.01	0.11***	0.12***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
40	0.01	−0.02	−0.01	−0.01	0.06*	0.01	0.01	−0.01	−0.01	0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
45	0.03	−0.02	0.10***	0.10***	0.16***	0.13***	0.13***	0.11***	−0.10***	−0.08***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)
50	0.05**	0.01	0.18***	0.18***	0.18***	0.16***	0.08***	0.08***	−0.13***	−0.12***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
N	10800	10537	10801	10538	10801	10538	10800	10537	10800	10537

Note: "Reg" = average trait by age, or coefficients from regular regression, unweighted. "IPW" = coefficients frmo regression adjusted for non-response with inverse probability weights. Standard errors in parentheses. *($p < 0.10$),** ($p < 0.05$),*** ($p < 0.01$)

Table S.11: Average Traits by Age, Low Own Income: Regular vs IPW-adjusted

	Openness		Conscientiousness		Extraversion		Agreeableness		Neuroticism	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW
35	0.07**	0.04	−0.24***	−0.28***	−0.25***	−0.28***	−0.00	0.01	0.41***	0.47***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)
40	−0.04	−0.08**	−0.11***	−0.14***	−0.31***	−0.37***	−0.04	−0.05	0.35***	0.39***
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
45	−0.04	−0.07**	0.03	0.03	−0.20***	−0.22***	0.10***	0.10***	0.24***	0.26***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
50	−0.01	−0.05*	0.14***	0.14***	−0.13***	−0.15***	0.10***	0.10***	0.18***	0.21***
	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)
55	−0.03	−0.05**	0.14***	0.12***	−0.10***	−0.12***	0.14***	0.13***	0.12***	0.13***
	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
60	−0.05*	−0.07***	0.13***	0.12***	−0.09***	−0.11***	0.16***	0.15***	0.03	0.04*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
65	0.00	−0.02	0.15***	0.13***	−0.07***	−0.09***	0.09***	0.09***	−0.02	−0.01
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
70	−0.08***	−0.11***	0.20***	0.19***	−0.01	−0.03	0.06***	0.05**	−0.11***	−0.10***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)
N	11556	10619	11558	10618	11559	10620	11563	10624	11552	10614

Note: "Reg" = average trait by age, or coefficients from regular regression, unweighted. "IPW" = coefficients frmo regression adjusted for non-response with inverse probability weights. Standard errors in parentheses. *($p < 0.10$),** ($p < 0.05$),*** ($p < 0.01$)

Table S.12: Average Traits by Age, High Own Income: Regular vs IPW-adjusted

	Openness		Conscientiousness		Extraversion		Agreeableness		Neuroticism	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW	Reg	IPW
35	−0.07**	−0.10***	0.04	0.03	0.10***	0.09***	−0.04	−0.03	−0.02	−0.03
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
40	−0.02	−0.06*	0.08***	0.08***	0.16***	0.15***	0.03	−0.00	−0.10***	−0.10***
	(0.03)	(0.03)	(0.02)	(0.03)	(0.02)	(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
45	−0.03	−0.07***	0.15***	0.16***	0.22***	0.22***	0.08***	0.07***	−0.18***	−0.18***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
50	0.00	−0.04*	0.22***	0.23***	0.26***	0.27***	0.06***	0.07***	−0.21***	−0.22***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
55	0.03*	0.00	0.22***	0.22***	0.25***	0.23***	0.07***	0.05***	−0.27***	−0.27***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
60	0.09***	0.07***	0.22***	0.22***	0.22***	0.20***	0.13***	0.14***	−0.32***	−0.30***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
65	0.15***	0.12***	0.24***	0.24***	0.16***	0.14***	0.10***	0.10***	−0.32***	−0.31***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
70	0.15***	0.10***	0.20***	0.19***	0.17***	0.14***	0.01	0.01	−0.30***	−0.28***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
N	16104	15454	16107	15457	16107	15456	16105	15454	16108	15457

Note: "Reg" = average trait by age, or coefficients from regular regression, unweighted. "IPW" = coefficients frmo regression adjusted for non-response with inverse probability weights. Standard errors in parentheses. *($p < 0.10$),** ($p < 0.05$),*** ($p < 0.01$)