Personality, Education, and Health-Related Outcomes of High Ability Individuals*

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Abstract

We estimate effects of five latent personality skills and higher education on determinants of longevity, including health behaviors, lifestyles, lifetime earnings, as well as general and mental health. The latent personality skills are closely related to the well-established contemporary Big Five taxonomy of personality. We also provide a theoretical model, which shows possible channels through which personality and education affect health behaviors and lifestyles. We employ the Terman life cycle data of children with high ability (1922–1991), uniquely suited to studying the developmental and behavioral origins of health and longevity. We uncover possible mechanisms behind strong treatment effects of personality and college education on longevity documented in Savelyev (2013). We account for measurement error in the proxies of personality skills via factor-analytic methods, and control for multiple hypotheses using a new version of the Holm-Bonferroni method with superior power proposed by Romano and Wolf (2005). We find strong effects of personality skills and education on health and health-related outcomes. The effects of education and the five personality skills differ by gender and outcome, demonstrating substantial heterogeneity in the role of multiple human skills in generating health. Variance explained by the five latent personality skills is comparable to the variance explained by all observable determinants taken together including education, IQ, early heatlh, and family background.

Key words: health behaviors, health-related consumption, health-related outcomes, lifestyles, earnings, longevity, post-compulsory education, cognitive skills, noncognitive skills, personality skills, soft skills, psychological skills, character skills, Big Five personality taxonomy, Conscientiousness, Openness, Agreeableness, Neuroticism, Extraversion, factor analysis, measurement error, conditional independence assumption, multiple hypothesis testing, stepdown procedure, high ability, Cognition, IQ, Terman life cycle data of children with high ability, gender difference

JEL codes: C33, C38, D91, I12, J24

1 Introduction

There is evidence documented in the literature that psychological skills (both cognitive and non-cognitive) and education investments affect longevity (e.g., Buckles et al., 2013; Savelyev, 2013; van Kippersluis et al., 2011). However, the mechanisms of such effects are still not well understood. This paper offers a theoretical model and empirical results that shed light on the mechanisms. The theoretical model shows multiple channels through which childhood psychological skills and education investments may affect health and longevity. The empirical part of this paper establishes the effects of post-compulsory education, IQ, and personality skills on various health-related outcomes that are plausible determinants of longevity: health-related consumption, lifestyles, and earnings. These outcomes are of interest both in their own right and as known major contributors to health and longevity.

Health economics papers examining the causal effect of education on health, health-related outcomes, or longevity largely use various natural experiments as a source of identification such as changes in compulsory schooling laws (e.g., Clark and Royer, 2009; Grossman, 2004; Grossman and Kaestner, 1997; Lleras-Muney, 2005; Mazumder, 2008; van Kippersluis et al., 2011), war draft avoidance behavior (e.g., Buckles et al., 2013), or twin fixed effects (e.g., Behrman et al., 2011; Lundborg et al., 2012). A number of these papers are at odds with each other even though they use the same identification strategy. For instance, while some papers claim a strong causal effect of education on health or longevity (Grossman, 2004; Grossman and Kaestner, 1997; Lleras-Muney, 2005; Lundborg et al., 2012), some others find that there is hardly any effect (Behrman et al., 2011; Clark and Royer, 2009; Kohler et al., 2010; Mazumder, 2008). In this paper we take an alternative approach from natural experiments, which we believe to be a useful source of additional information given the existing controversy. Instead, our identification strategy is based on explicit factor modeling of latent skills that may contribute to the ability bias. Similar to Heckman et al. (2006), we assume that conditional on Cognition, five latent personality skills, and an extensive set of

theoretically-relevant controls,[1] the health-related outcomes are independent of education. The conditional independence assumption invoked for the identification of causal effects is similar to the one used in the matching literature, but unlike in matching, which only controls for observables, we additionally control for a set of multi-dimensional latent personality skills using factor-analytic methods.

There has been a growing awareness in the economics literature regarding the effect of personality skills on health and education (Almlund et al., 2011; Borghans et al., 2008; Conti and Heckman, 2010; Conti et al., 2010c).[2] Moreover, researchers have documented an association between specific personality skills and discount rates (Daly et al., 2009), which are recognized to be a possible confounding factor in determining the causal effect of education on health (Fuchs, 1982). These threads of research all suggest that personality skills are important potential confounding factors and should be controlled for. We therefore include in our analysis a widely used system of personality skills, namely the Big Five: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. We do this firstly to understand their role as inputs to health, and secondly to strengthen the causal evidence for education's effect on health through the conditional independence assumption.

A large body of literature in psychology documents the correlation between the Big Five personality skills and health without attempting to make causal claims.[3] In particular, Conscientiousness is strongly correlated with positive health behaviors and other health-related outcomes, while Neuroticism is strongly correlated with harmful health behaviors (Friedman, 2000; Goodwin and Friedman, 2006).Our work supplements this literature by providing conditions for a causal interpretation of personality skills on health-related outcomes and by accounting for multiple hypothesis testing.

Recent work by Conti, Heckman, and Urzúa (2010b,c) present results regarding the re-

[1]Our controls include parental occupation, employment, and education information, early parental and private tutoring, early health measures, health rating in childhood, early divorce or death of parents, ratings of family well-being and social status, see Table 3.

[2]Personality skills are also often referred to as non-cognitive skills, or soft skills.

[3]See Friedman (2000, 2008); Friedman et al. (1994, 1995, 1993); Hampson and Friedman (2008); Martin et al. (2007, 2002).

lationship between education, personality, and a similar set of health outcomes using data from the British Cohort Study. The authors calculate the causal effects of education, cognition, and a one-dimensional representation of personality skills on health behaviors. Their findings bolster existing evidence in the psychological literature by considering the issue of causality closely, but the treatment of personality skills is not ideal due to data limitations. Our paper complements this line of research by using a more comprehensive taxonomy of personality skills, emphasizing the multi-dimensional aspect of personality and the heterogeneity of the effects of personality skills that may not be fully captured by lower dimension representations. We also analyze a dataset with richer background information and early health measures and with a much longer follow up (ages 86 in the Terman data vs. 42 in the British Cohort Study used by the coauthors). This allows us to capture the effects of education and personality skills on health-related outcomes over the life-cycle rather than at a specific early age. Further, we address the issue of multiple hypothesis testing due to the large number of similar outcomes explored. We join Conti, Heckman, and Urzúa (2010b,c) in supporting the claim that personality skills play a key role in determining health-related outcomes.

Another closely related paper by Savelyev (2013) based on the same data used in this research shows a causal effect of post-compulsory education on longevity, as well as effects of childhood Cognition, Conscientiousness, and Extraversion. Our paper extends this work by uncovering health-related outcomes that may serve as mediators for the effects of personality skills and education on longevity. It is beyond the scope of this paper to establish the relative role of these outcomes in mediating the effects of education and personality skills on longevity.[4]

We use the Terman life-cycle data of children with high ability that we refer to as "Terman data." Boys and girls born around 1910 were selected from schools in California for their IQ above 140. The data prospectively covers the period from 1922 to 1991, and combines high

[4]A companion paper by Hong, Savelyev, and Tan (2013) examines the mediating role of these outcomes.

quality measures of IQ and personality obtained roughly at age 12 with life-cycle measurements of health-related outcomes. Based on the data, we study the effects of post-high school education and Big Five personality skills on measures of health-related consumption (heavy alcohol drinking, smoking tobacco, physical activity), proxies of health-related consumption (body mass index), lifestyle characteristics (marriage status, social activity), health measures (mental health, general health), and, earnings. These are important health-related outcomes, as they indicate quality of life and generally predict longevity (Carpenter and Dobkin, 2009; Diener and Chan, 2011; Lee, 2000; Manzoli et al., 2007; Sbarra and Nietert, 2009).

For each of these outcomes, we jointly estimate a linear in parameters outcome equation that accounts for education, IQ, latent personality skills, and a set of observable controls with a system of measurement equations that link latent skills to multiple noisy psychological measures.[5] We account for the childhood personality skills, Conscientiousness, Openness and Extraversion, using a set of ratings given by teachers and parents, and augment those with early adulthood Agreeableness and Neuroticism to complete the Big-Five model of personality.[6] Also, given the number of similar outcomes examined in this paper, we strongly control for the family-wise error rate using a modified version of the Holm-Bonferroni stepdown procedure described in Romano and Wolf (2005). The procedure adjusts single hypotheses' p-values to account for multiple hypotheses testing and the associated familywise error rate.

We find that the effects of personality and education differ considerably across genders. In males, education and Conscientiousness consistently improved a wide array of health behaviors and health-related outcomes, including alcohol consumption, mental health, marriage status, and earnings. Openness and Neuroticism had a negative effect on several health behaviors and health-related outcomes, while Extraversion and Agreeableness had mixed effects. In females, education had statistically significant effects on general health, BMI,

[5]The factor model specification is based on exploratory and confirmatory factor analysis, available from the authors upon request.

[6]The adult personality measures are self-reported.

marriage status, group membership, and early life earnings, while Neuroticism had large effects on general and mental health, BMI, and earnings. We also show that personality skills are an important input to health production by comparing the model fit of models that omit them against our full model.

The relations between personality skills, education, and health imply that it is crucial to account for personality skills in studying the effect of education on health. This paper adds to an emerging literature that recognizes the role of personality skills with respect to influencing health and health behaviors. While psychologists have previously analyzed the Terman data for correlations between personality skills and health, this paper shows an association between personality skills and health related outcomes conditional on a substantial set of potential confounding factors. Under the conditional independence assumption, this association can be interpreted as evidence for a causal effect. This paper thus contributes to literatures in health economics and human capital development by bringing together findings on childhood skills and investments that determine human capital and later health outcomes.

The rest of the paper is organized as follows. Section 2 describes the data used, Section 3 elaborates on the Big Five taxonomy of personality used in this paper, Section 4 introduces the theoretical and econometric framework for our estimations, Section 5 presents the results, Section 6 discusses the results, and Section 9 concludes.

2 Data Description

The research presented in this paper is based on the Terman Life-Cycle Data of Children with High Ability (Terman, 1986). This dataset prospectively follows a group of 1583 high IQ individuals from 1922 to 1991. It thus allows us to look at the effect of education and personality at multiple points in the life-cycle. The availability of early childhood and early adulthood personality measures enables the construction of personality traits that are close to the contemporary and well-established Big Five taxonomy of personality (Martin and

Friedman, 2000). The subjects were also surveyed for education data several times over the life-cycle, which improves the reliability of the education data. The dataset includes detailed life histories, early childhood and adolscent health conditions, as well as information on parental and private tutoring and family backgrounds.

The Terman sample consists of 856 males and 672 females from public schools situated in California. The subjects were selected for an IQ of above 140[7] representing roughly the top 0.4% of the general population. While the sample is homogenous in that the subjects are all highly intelligent, the personality skills show a wide variation. In fact, there is no evidence that the subjects differ significantly from the general population with regards to measures of personality (Friedman et al., 1993; Terman and Sears, 2002a).[8] The Terman study has an attrition of less than 10%, low for a 70-year-long prospective study.

The wealth of information in the Terman data, like its low attrition, is remarkable. Some 4,500 measurements made in the period 1922–1991 describe the family background, parental investment, personality, early health, and household economic status, among other important determinants of health behavior and education attainment of the subjects (Burks et al., 1930; Terman et al., 1925; Terman and Oden, 1959; Terman et al., 1947; Terman and Sears, 2002a,b; Terman et al., 2002).

2.1 Health Behaviors, Health Measures, and Lifestyle Characteristics

The health-related outcomes that we explore are presented in Tables 1 and 2. The health behaviors, health measures, and lifestyle characteristics cover a wide range of activities over the life-cycle. Health behaviors are directly related to health production, and include high alcohol consumption and physical activity. Further, there are also direct measures of health

[7] To be more precise, 187 children had IQ in the range 126-139, with most of them being in the range 135-139 (180 children).

[8] With the possible exception of Openness, which is known to be linked to IQ unlike other personality skills (Ackerman and Heggestad, 1997; Borghans et al., 2011; DeYoung et al., 2005).

such as general health measures and mental health measures. The lifestyle choices such as marriage, earnings, and social connections indirectly contribute to health production function in various ways. Most of these outcomes were observed at multiple points of the life-cycle. Some data were collected retrospectively, including marriage status and number children. Earnings profiles are constructed over the life-cycle.[9]

2.2 Main Regressors and Background Variables

The variables used are described in Tables 3, including education and IQ, but excluding personality measures to be discussed in Section 3.

Education in this paper refers to whether or not the subject received a college degree, namely a Bachelor's degree or above. Although this was a particularly high IQ sample, there were still a sizeable number of subjects (about 30% of the sample) who did not achieve a college degree. The average IQ is approximately 149 for both genders. Subjects were tested using either the Stanford Binet Test or the Terman Group Test. The IQ variable is constructed by survey organizers from the two tests used, and corrects for differences between them, as well as the age of subjects at the time of testing. The rest of the variables are the background controls, which cover a wide range of underlying characteristics of the subjects, including early childhood health, key parental characteristics, parental investment in children, and cohort.

We restrict the regression sample as described in Savelyev (2013). The exclusions are as follows: subjects who were not born in the period 1904–1915; subjects who never participated or were lost or dropped out before 1940; subjects who are missing both parent and teacher personality trait ratings in 1922; subjects who are high school dropouts; subjects who died in service during World War II; subjects with serious diseases in their early life, such as chorea

[9]We thank Miriam Gensowski for providing her calculations of earnings profiles. Subjects with missing information received imputed earnings based on their occupation and wages in periods not covered by the survey waves were imputed by piecewise linear interpolation. The life-cycle earnings measures that we use are net of tuition paid for schooling and taxes in 2010 dollars (see the Web Appendix of Gensowski (2012) for more details).

or Hodgkin's disease; subjects without education level information; and subjects who did not survive through age 30. The base estimation sample contains 1209 people, 680 males and 529 females. All models are estimated using this *base sample*, but the actual estimation sample is generally somewhat smaller due to missing information in measures of health, health-related outcomes, and health behaviors. Aside from subjects excluded due to missing data, these restrictions remove outliers[10] in the sample and help reduce reverse causality[11] between education and health.[12]

2.3 Data Limitations

The Terman sample is selected based on the IQ of subjects. This brings into question the external validity of our paper in terms of its relation to the general population. However, it is still useful to examine the effects of education and personality in a 'limiting case' where IQ is exceptionally high. First, it reduces the potential of IQ confounding the effects of education and personality on health. Second, if health choices are not specific to extraordinarily high IQs, we can expect similar results to hold for less exceptional populations to some degree.

3 Understanding Personality Skills

The literature in personality psychology explores many varying ideas of what personality traits are and how they ought to be measured. However, perhaps the most established contemporary categorization of personality is the Big Five taxonomy (John and Srivastava, 1999). This taxonomy reduces the dimensionality of human personality to just five latent factors: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (see Table 4 for a description by John and Srivastava (1999)).[13] This paper borrows from person-

[10] For example, a few subjects who were high school dropouts despite extraordinary IQ.

[11] For example, subjects with serious early health problems that may have severely affected schooling choice.

[12] See Savelyev (2013) for a more detailed justification of the restrictions.

[13] See Digman (1990); McCrae et al. (1986) for evidence regarding the comprehensive and rigorous nature of this taxonomy.

ality psychology and uses this definition of personality traits to represent personality skills. This system of five personality skills is flexible enough to capture the multi-faceted nature of human personality, whilst remaining computationally tractable.

Personality skills are not directly observed and are therefore modelled as latent factors. They are proxied by psychological ratings, which are measures of specific behaviors that are deemed to be manifestations of the latent factors. In this paper, we use a set of measures that are constructed as an average of parent and teacher ratings of child behavior and measures from early adulthood that are self reported, presented in Table 5.

These measures are then summarized into a smaller set of *factors*, which we also refer to as personality skills, through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The EFA establishes the dimensionality of the personality skills making no *a priori* assumptions about the number of factors. It also provides evidence for the structure of the factor model through the estimated correlations between constructed factors and the measures. This allows us to build a factor structure that associates each psychological measure with the factors in an empirically justifiable way. The CFA in turn estimates a specified factor model given the number of factors and the factor structure to determine model fit.

This paper uses the childhood measures that were found by Savelyev (2013) to best represent Conscientiousness, Openness and Extraversion[14] and further augments these with early adult personality skills represented by Agreeableness and Neuroticism to complete the Big Five system of personality.[15] Skills of Conscientiousness, Agreeableness and Neuroticism that are used in this paper strongly correlate with those used by Martin and Friedman (2000) based on the same data and are shown to be closely related to their Big Five counterparts. Martin and Friedman (2000) also establish a strong link between a factor they call Sociability with Big Five Extraversion. Savelyev (2013) demonstrates that his Extraversion factor is

[14]See Savelyev (2013), Web Appendix, for a detailed explanation.

[15]Unfortunately, the personality measures during childhood were not rich enough to account for Agreeableness and Neuroticism and using adult measures serve as a second-best solution to this problem.

close to Sociability and should therefore be also related to the Big Five Extraversion. Openness in this paper is theoretically related to Big Five Openness, but no empirical evidence is available to support this hypothesis yet. The constructed personality skills are similar in internal consistency reliability[16] to those used by Martin and Friedman (2000).

4 Methodology

4.1 Theoretical Model

In line with Becker's approach (Becker, 2007), this project can be motivated by a generalization of a model suggested in Savelyev (2013). Consider a two-period model with time-separable utility. A young adult makes decisions about college education and consumption patterns over his life-cycle. He survives to the first and second periods with probabilities 1 and $S \leq 1$ respectively. In this simple model IQ and personality are exogenous variables that can be influenced by parents, school teachers, or certain interventions earlier in life.[17] The model can be easily generalizable to more periods, but a two period model is sufficient to demonstrate the key features of the problem. Let utility in both periods depend on health-related consumption C^H, health-neutral consumption C^N, and health H. In addition, due to the possibility of addiction to the health-related good, utility in the second period also depends on health-related consumption in the first period. The second period utility is discounted with discount factor B, which is assumed to depend on cognitive and personality skills $\boldsymbol{\theta}$, and the survival function S, which is assumed to depend on health stock in the second period of life, H_2.

$$\max u_1(C_1^N, C_1^H, H_1) + B(\boldsymbol{\theta}) \cdot S(H_2) \cdot u_2(C_2^N, C_2^H, H_2, C_1^H), \tag{1}$$

[16] Measured by Cronbach's Alpha (see technical appendix available from authors upon request).

[17] A possible generalization of this model is suggested in Becker and Mulligan (1997), where individuals may rationally invest in their skills with the aim of reducing the discount on future utilities.

where $H_2 \equiv H_1(1-\delta(C_1^H, I, D, \boldsymbol{\theta}))$, in which δ is the health depreciation rate that depends on initial health C_1^H, health investment I, education D, and $\boldsymbol{\theta}$. The dependence on education is in line with the Grossman (1972) hypothesis, suggesting that education increases the efficiency of health production. Effects of C_1^H and I on health are well-known. The dependence on $\boldsymbol{\theta}$ is in line with recent evidence from the literature, such as the productive role of Conscientiousness in resisting diseases with complex rules to follow at home (Almlund et al., 2011; Turiano et al., 2013).

Assume perfect capital and annuity markets. Let the cost of educational investment f depend on the chosen highest education level D, health in the first period H_1, and cognitive and personality skills $\boldsymbol{\theta}$.[18] Let earnings depend on health and skills.[19] In the second period let earnings also depend on education level. The individual maximizes utility (1) subject to budget constraint

$$C_1^N + p^H C_1^H + f(D, H_1, \boldsymbol{\theta}) + p^I I + \frac{S(H_2)}{1+r}(C_2^N + p^H C_2^H) = A + Y_1(H_1, \boldsymbol{\theta}) + \frac{S(H_2)}{1+r} Y_2(D, H_2, \boldsymbol{\theta}). \quad (2)$$

First order conditions with respect to C_1^N, C_2^N and C_2^H are standard

$$C_1^N : \tfrac{\partial u_1}{\partial C_1^N} = \lambda; \quad C_2^N : B(\boldsymbol{\theta}) \tfrac{\partial u_2}{\partial C_2^N} = \tfrac{\lambda}{1+r}; \quad C_2^H : B(\boldsymbol{\theta}) \tfrac{\partial u_2}{\partial C_2^H} = \tfrac{\lambda}{1+r} \cdot p^H,$$

and lead to standard results for a life cycle model with time-separable utility:

$$\frac{\partial u_1 / \partial C_1^N}{\partial u_2 / \partial C_2^N} = B(\boldsymbol{\theta}, D)(1+r); \quad \frac{\partial u_2 / \partial C_2^H}{\partial u_2 / \partial C_2^N} = p^H.$$

[18] With education level D, both forgone earnings and the price of education become increasingly higher: compare costs of high school, college, and professional school. Poor health is an obstacle for effective study. Among cognitive and personality skills, Cognition, Conscientiousness, and Openness are expected to lower the cost of education through lower tuition fees (e.g. higher probability of winning a scholarship), lower psychic costs, and greater time-efficiency in acquiring knowledge. Indeed, we can expect that Cognition helps to be effective at processing new information, Conscientiousness helps in staying organized and following rules, and Openness helps in creativity and by sustaining an interest in learning. We may also expect Extraversion to contribute to costs since studying hard implies forgone socializing. Neuroticism may increase psychic costs and reduce the efficiency in acquiring knowledge. It is theoretically unclear whether we should expect any effect of Agreeableness on college education.

[19] Clearly, greater health leads to greater productivity. Gensowski (2013) suggests that earnings are affected by Big Five skills, a result that we confirm in this paper

First order conditions with respect to health-related consumption, health investments, and education are more informative. With respect of health-related consumption we have:

$$\underbrace{\frac{\partial u_1}{\partial C_1^H}}_{\text{cons. benefit}} \underbrace{-B(\boldsymbol{\theta})S'(H_2)H_1\frac{\partial \delta}{\partial C_1^H}u_2}_{\text{longevity benefit}} \underbrace{-B(\boldsymbol{\theta})S(H_2)\frac{\partial u_2}{\partial H_2}H_1\frac{\partial \delta}{\partial C_1^H}}_{\text{morbidity benefit}} + \underbrace{B(\boldsymbol{\theta})S(H_2)\frac{\partial u_2}{\partial C_1^H}}_{\text{addiction benefit}} + \underbrace{\lambda\frac{S(H_2)}{1+r}\frac{\partial Y_2}{\partial H_2}H_1\frac{\partial \delta}{\partial C_1^H}}_{\text{health productivity}}$$
$$= \lambda\Big(\underbrace{p^H}_{\text{price}} + \underbrace{\frac{S'(H_2)H_1\partial\delta/\partial C_1^H}{1+r}(C_2^N + p^H C_2^H - Y_2(D, H_2, \boldsymbol{\theta}))}_{\text{budget deficit}}\Big). \tag{3}$$

We can see that multiple marginal costs and marginal benefits contribute to equilibrium health-related consumption. Generally, health-related consumption is a vector of multiple consumption types. Some of them such as heavy drinking, smoking, or taking hard drugs have adverse effects on health, while others such as consuming healthy food or gym services are beneficial. Consumption that is complementary with family stability (e.g. family trips) or with socialization (e.g. club or church memberships) are examples of both health-related consumption and beneficial addictions. For ease of presentation let us here treat health-related consumption as a composite consumption good that is both addictive ($\partial u_2/\partial C_1^H > 0$), and has positive effects on health (Becker, 2007). Generalizing to the multidimensional case is straightforward. From equation (4.1), benefits are produced from enjoying consumption ("consumption benefit"), from a higher probability to enjoy life in the second period ("longevity benefit"), from greater utility in the second period due to better health ("morbidity benefit"), from greater utility in the second period due to beneficial addictions ("addiction benefit"), and from greater wages in the second period due to better health ("health productivity"). The marginal cost is the price of health-related consumption ("price cost") and additional spending (or revenues) due to a higher expected positive (or negative) budget deficit in the second period due to a higher probability of survival ("Budget deficit cost (or benefit)"). Note that in this version of the model addictive consumption affects future utilities not only directly through health, but also indirectly, perhaps through social interactions, which is not explicitly modelled but implied. For instance, a person in-

volved in heavy drinking in the first period may lose his friends and spouse in the second period, which will make him less happy other things being equal.

The FOC with respect to health investment is the following:

$$\underbrace{-B(\boldsymbol{\theta})S'(H_2)H_1\frac{\partial\delta}{\partial I}u_2}_{\text{longevity benefit}}\underbrace{-B(\boldsymbol{\theta})S(H_2)\frac{\partial u_2}{\partial H_2}H_1\frac{\partial\delta}{\partial I}}_{\text{morbidity benefit}}+\underbrace{\lambda\frac{S(H_2)}{1+r}\frac{\partial Y_2}{\partial H_2}H_1\frac{\partial\delta}{\partial I}}_{\text{health productivity}}$$
$$=\lambda(\underbrace{p^I}_{\text{price}}+\underbrace{\frac{S'(H_2)H_1\partial\delta/\partial I}{1+r}(C_2^N+p^HC_2^H-Y_2(D,H_2,\boldsymbol{\theta}))}_{\text{budget deficit}}). \tag{4}$$

There are many terms in this expression that are similar in interpretation to terms in (4.1) but the difference is that there are no consumption and addiction benefits.

Finally, the FOC for education is the following:

$$\underbrace{-B(\boldsymbol{\theta})S'(H_2)H_1\frac{\partial\delta}{\partial D}u_2}_{\text{longevity benefit}}\underbrace{-B(\boldsymbol{\theta})S(H_2)\frac{\partial u_2}{\partial H_2}H_1\frac{\partial\delta}{\partial D}}_{\text{morbidity benefit}}+\underbrace{\lambda\frac{S(H_2)}{1+r}\frac{\partial Y_2}{\partial D}}_{\text{skill productivity}}+\underbrace{\lambda\frac{S(H_2)}{1+r}\frac{\partial Y_2}{\partial H_2}H_1\frac{\partial\delta}{\partial D}}_{\text{health productivity}}$$
$$=\lambda(\underbrace{\frac{\partial f(D,H_1,\boldsymbol{\theta})}{\partial D}}_{\text{direct cost}}+\underbrace{\frac{S'(H_2)H_1\partial\delta/\partial D}{1+r}(C_2^N+p^HC_2^H-Y_2(D,H_2,\boldsymbol{\theta}))}_{\text{budget deficit}}) \tag{5}$$

Here again there are terms that are similar in interpretation to terms in (4.1). There are also no consumption and addiction benefits, but there are costs and benefits specific to education: the benefit of higher wages due to more education ("skill productivity") and the direct marginal cost of education ("direct cost").

From this rudimentary model investigation we can already see multiple links between cognitive and personality skills, education, health-related consumption, education, health, and longevity.[20] For instance, in order to understand the multiple determinants of health-related consumption, it is productive to analyse major determinants of marginal costs and benefits shown in equation (4.1). Through $B(\boldsymbol{\theta})$, skills affect longevity, morbidity, and addiction benefits. In addition, personality skills and education directly boost earnings,

[20]This is a preliminary and incomplete version of model investigation.

which increases u_1 through the wealth effect thus contributing to the longevity benefit. Moreover, complementarities play a strong role (see also Becker (2007)). $\boldsymbol{\theta}$ boosts D and I (D may also increase exogenously), D and I boost $S(H_2)$ and u_2.

We therefore note that mechanisms linking $\boldsymbol{\theta}$, D and C^H are numerous. Leaving detailed investigation of these mechanisms for future research, we start with a reduced form approach to understanding relationships implied by this model. We regress outcomes on their primary developmental sources implied by the model: cognitive and personality skills and education choice conditional on background variables. This paper takes this approach to investigate multiple health behaviors and other health-related outcomes.

4.2 Econometric Model

We use simultaneous equation modelling to jointly estimate effects for education D and the five latent personality factors $\boldsymbol{\theta}$ (Openness (θ^O), Conscientiousness (θ^C), Extraversion (θ^E), Agreeableness (θ^A), and Neuroticism (θ^N)) on each health-related outcome.

4.2.1 Selection of Outcomes

We first identify all health-related outcomes available in the data for which we expect a relationship with longevity based on theoretical considerations and literature results. We calculate survival graphs using life-table calculations for a range of adult characteristics to document correlations between outcomes and longevity. We also group our health-related outcomes so as to account for family-wise error rates within each group of hypotheses via stepdown adjustment.

4.2.2 Model for Latent Factors

To build the factor model representing latent personality skills, we use a combination of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) briefly described

in the previous section. We omit further detailed description for brevity.[21] Instead, we will proceed directly with presenting the factor model generated by our EFA and CFA.

The factors, $i \in \mathcal{I} = \{O, C, E, A, N\}$, enter into a set of measurement equations, one for each psychological measure $M^j, j \in \mathcal{J} = \{1, \ldots, J\}$.[22] The factor model is thus defined by the following equations:

$$\begin{aligned} M^1 &= \alpha_1 + \boldsymbol{\beta}_1 \boldsymbol{\theta} + \gamma_1 A + \boldsymbol{\delta}_1 \boldsymbol{X} + \eta_1 \\ &\vdots \\ M^j &= \alpha_j + \boldsymbol{\beta}_j \boldsymbol{\theta} + \gamma_j A + \boldsymbol{\delta}_j \boldsymbol{X} + \eta_j \\ &\vdots \\ M^J &= \alpha_J + \boldsymbol{\beta}_J \boldsymbol{\theta} + \gamma_J A + \boldsymbol{\delta}_J \boldsymbol{X} + \eta_J, \end{aligned} \tag{6}$$

where A refers to age at 1922, and X represents background variables. $\theta^i \perp\!\!\!\perp \eta_j$, for all $i \in \mathcal{I}$, and all $j \in \mathcal{J}$. Likewise, $\eta_j \perp\!\!\!\perp \eta_{j'}$, except for the case when $j = j'$. We have no requirement of orthogonality between traits: $\theta^i \not\perp\!\!\!\perp \theta^{i'}$ for $i \neq i'$. In addition, for all $i \in \mathcal{I}$ and $j \in \mathcal{J}$, $\mathbb{E}(\eta^j) = 0$ and $\mathbb{E}(\theta^i) = 0$.

The factor model is identified by normalizing the variance of each latent factor ($Var\theta^i = 1, i \in \mathcal{I}$), and imposing a set of exclusion restrictions for each measurement equation ($\beta^i_j = 0$ for some j, i). The variance normalization is a standard technique that allows us to interpret factor loadings as the effect of changing the factor by one standard deviation. The exclusion restrictions are based on theoretical and empirical considerations which lead us to conclude that certain latent factors have no relationship with respect to certain measures. Some measures are therefore affected by only one latent factor, or a subset of latent factors. With sufficient exclusion restrictions and a sufficient number of measures, the factor model is identified.[23] The theoretical justification for exclusion restrictions stem from the interpretability of estimated factors, whereas the empirical motivations are grounded in our EFA

[21] The analyses are documented in a technical appendix available from the authors upon request.

[22] For example, "Prudence", "Leadership", and so on (see Table 5).

[23] For a more formal identification proof of a model with correlated factors, see, for instance, Web Appendices of Heckman, Pinto, and Savelyev (2013) or Conti, Heckman, and Urzúa (2010a).

and CFA.

Table 6 demonstrates the structure of the resultant factor model. The personality measures in bold indicate that the factor is a major explanatory variable for the associated measure. Unbolded measures indicate that we have allowed the factor to have a non-zero correlation with the associated measure, but the link is weak. To illustrate this, consider the measurement equation for the psychological measure "Prudence". Under a factor structure where we consider only the measures in bold, we have:

$$Prudence = \alpha + \beta^C \theta^C + \gamma A + \boldsymbol{\delta X} + \eta,$$

where $\beta^i = 0$ for $i \neq C$. Only Conscientiousness is allowed to enter into the measurement equation for "Prudence", and we consider "Prudence" to be a fully dedicated measure. Under the more flexible factor structure which includes measures not in bold, we have:

$$Prudence = \alpha + \beta^O \theta^O + \beta^C \theta^C + \gamma A + \boldsymbol{\delta X} + \eta,$$

where $\beta^E, \beta^A, \beta^N$ have been restricted to 0 so that Extraversion, Agreeableness, and Neuroticism do not enter into the measurement equation for "Prudence". We do, however, allow for a cross-loading so that Openness can have a non-zero effect on "Prudence". This model therefore imposes fewer exclusion restrictions and our CFA confirms that it improves model fit. Clearly, in interpreting the resulting latent factors, we need to rely on the strong links, while the weak links merely represent a cross-factor correlation.

4.2.3 Linear Model for Health-Related Outcomes

We use a linear model to examine the effect of education and personality skills on health related variables. Let h^k be the kth health-related outcome.

$$h^k = \gamma^k D + \boldsymbol{\rho}^k \boldsymbol{\theta} + \boldsymbol{\mu}^k \boldsymbol{X} + \delta^k, \tag{7}$$

where D represents the education indicator, $\boldsymbol{X}$ are the control variables, and δ is the i.i.d. error term. Each equation (7) is estimated simultaneously with measurement system (6), which allows us to identify the effect of latent factor $\boldsymbol{\theta}$ whilst controlling for measurement error that is explicitly modelled in (6).

We further estimate two simpler models to understand the relative importance of personality skills to other background controls and human capital measures traditionally employed by the literature. We estimate a model with only the personality skills:

$$h^k = \boldsymbol{\rho}^{p^k} \boldsymbol{\theta}^p + \delta^{p^k}, \tag{8}$$

where $\boldsymbol{\theta}^u$ are personality skills estimated from an *unconditional* measurement system similar to system (6) but without $\boldsymbol{X}$.

We also estimate a model omitting the personality skills:

$$h^k = \gamma^{r^k} \mathcal{D} + \boldsymbol{\mu}^{r^k} \boldsymbol{X} + \delta^{r^k}, \tag{9}$$

where the regressors consist only of education, IQ, and other background controls. We compare the coefficient of determination (R^2) of equations (7), (8), and (9) in Section 5.

4.2.4 Stepdown Procedure

We use a stepdown procedure as suggested by Romano and Wolf (2005) in order to account for multiple hypothesis testing on alcohol consumption, mental health, and general health over different stages of the life-cycle.

Given the large number of outcomes explored, it would be overoptimistic to accept calculated single-hypothesis p-values at face value. At the same time, jointly testing all possible combinations of single hypotheses using conventional joint tests is neither sensible nor practical. Therefore, following Heckman et al. (2010), we account for multiple hypotheses in each group of single hypotheses that are clustered apriori by type. For example, we wish to test

whether education has a statistically significant negative effect on heavy alcohol consumption at each stage of the life-cycle. Based on evidence from the literature, we have *apriori* beliefs that education should affect heavy drinking. We therefore group all single hypotheses on the effect of education on heavy drinking at different years and perform the stepdown adjustment.[24] If the effect of education, for example, survives the stepdown adjustment for one or more of these outcomes, we can conclude that education does indeed have a statistically significant effect on heavy drinking for these outcomes. Furthermore, the stepdown adjustment allows us to control for dependencies between outcomes in the set, increasing the power of the test, and providing information on the p-values for each specific outcome within the set, unlike a more traditional approach to joint hypothesis testing such as the F test.

We follow the algorithm outlined in Romano and Wolf (2005). Let there be K individual hypotheses in a family and B boostrap draws of t-statistics for each hypothesis, where t-statistics are absolutized since all tests are double-sided. Then:

1. For each individual hypothesis in the family obtain the true t-statistic and B bootstrap t-statistics.

2. Find the maximal t-statistic among K true t-statistics. Do the same for each pseudo sample to get a bootstrap distribution of maximal t-statistics.

3. Use the distribution of maximal bootstrap t-statistics to test the hypothesis associated with the maximal true t-statistic. The p-value of this test is the stepdown-adjusted individual hypothesis p-value.

3. If the test cannot be rejected at chosen significance level then stop the procedure and conclude that none of the remaining tests can be rejected.

4. If the test can be rejected then exclude the rejected hypothesis from the family. If only one hypothesis is left after the exclusion then test the hypothesis individually and stop

[24] The set of outcomes corresponding to the group of single hypotheses is: $h^{drink}_{1940}, h^{drink}_{1950}, h^{drink}_{1960}, h^{drink}_{all}$.

the procedure. If more than one hypotheses are left then repeat the procedure starting from (2).

Stepdown adjusted p-values are presented in Section 5.[25]

4.2.5 Assumptions for Claims of Causality

Similar to Heckman et al. (2006), we assume that conditional on detailed and theoretically relevant childhood and parental characteristics, the dependence across all measures, education choices, and health-related outcomes come from Cognition and the five personality skills.[26] The richness of the Terman data and the comprehensive nature of the personality controls (as argued in the Big Five theory) gives additional credibility to this assumption.

5 Empirical Results

5.1 Personality Skills Factor Model

Our EFA and CFA reveal that the psychological measures in the Terman data uncover five latent personality skills, as seen in Table 6. Further, the psychological measures for our personality skills are consistent with widely accepted definitions of the Big Five personality skills (see Table 4). This places our results within the personality psychology literature, and provides evidence for an externally valid interpretation of personality skills in this paper.

5.2 Longevity and Health-Related Outcomes

We perform a life-table analysis on a range of adult outcomes (see Figure 1 for health behaviors, Figure 2 for health measures, and Figures 3–4 for lifestyle choices and earnings).[27]

[25] A full description of the stepdown procedure we use is in a technical appendix, available from the authors on request.

[26] Selection is only on observables Heckman and Robb (1985).

[27] We summarize the multi-period observations of heavy drinking, mental difficulty, and general health into binary indicators which equal 1 when negative outcomes are observed in any point in time of the life-cycle, and 0 otherwise. We also present just a subset of marriage statuses and earnings measures in the interest of

This exercise confirms that most of the conventional adult characteristics thought to be important for predicting mortality are indeed associated with mortality in the Terman sample for males. In particular, measures of general health and later life earnings exhibit strong correlations with survival probabilities for males, while the other health-related outcomes show smaller but still distinct differences in survival probabilities. For females, differences in health behaviors, health measures, and lifestyle choices generally translate to a much smaller gradient in longevity as compared to males, with the exception of being divorced at least once.[28]

5.3 Personality, Education, and Health-Related Outcomes

We present the summary of our main results for health-related outcomes in Tables 7 and 8.[29] The p-values are adjusted for multiple hypotheses testing within a block, where a block refers, for example, to all available alcohol drinking-related outcomes across the life-cycle, or available all marriage-related outcomes.[30] Statistically significant coefficients are reported as well as borderline significant coefficients. The results are color-coded so that green (or light grey in print) refers to effects on the health-related outcome that are considered in the literature to be beneficial for longevity and red (or dark grey in print) refers to adverse effects.[31]

Our results are much more informative than simple F-tests. In the setting of using an F-statistic, the null hypothesis would be if education, for example, had an effect on *any* of the outcomes within the group. Our paper uses the stepdown method instead, which allows us to uncover statistical significance for education's effect on each outcome within the group while accounting for multiple hypothesis testing, and we can see which hypotheses within

brevity.

[28] Female survival curves and accompanying standard errors tend to be much closer together and the differences are not statistically significant for most outcomes.

[29] Detailed results with both adjusted and unadjusted p-values are in the Appendix, see Tables 12–18

[30] Physical exercise, BMI, and smoking are exceptions as they are single outcomes so that adjusting p-values for multiple hypothesis testing within a block of similar outcomes is unnecessary.

[31] See Figures 1–4 for suggestive evidence for our sample in support of our interpretation of the effects as beneficial or adverse.

the group are rejected.

5.3.1 Conscientiousness, Neuroticism, and Education

Our results show that for males, Conscientiousness and education act on health-related outcomes beneficially, while Neuroticism is disadvantageous.

For males, both Conscientiousness and education have strong effects on reducing heavy drinking and more modest effects on protecting against divorce.[32] Education also increases earnings, and Conscientiousness has strong effects on reducing mental difficulty. Finally, education and Neuroticism have effects on physical activity in opposite directions. Neuroticism has large and statistically significant negative effects on general and mental health, as well as modest effects on earnings.

For females, education encourages group membership, improves general health, and has modest effects on earnings and divorce. Both education and Neuroticism reduce the incidence of overweight BMI.

5.3.2 Other Personality Skills

For males, the effects of Extraversion are ambiguous with regard to health-related outcomes. Extraversion strongly encourages heavy drinking (probably through increased participation in social gatherings) but is beneficial to mental health and earnings (probably through better communication skills and networks). Agreeableness does not have statistically significant effects on most health-related outcomes with the exception of earnings, where it has a large negative effect for males, and number of organizations (small positive effect). A possible reason of this effect is that Agreeable persons are less likely to be promoted due to their avoidance of confrontation and their unwillingness to criticize others, both necessary activities for managerial occupations. Further, Agreeable persons may be less willing to change locations for career development due to placing a greater importance on existing location-

[32] Effects are "modest" in the sense that the effect is not statistically significant for some outcomes within the group.

specific social ties. Openness increases mental difficulty and divorce rates, and has some modest negative effects on general health. Further, Openness decreases male earnings. Note that since IQ correlates with Openness, Openness results should be interpreted with caution as this sample is selected on high IQ. For females, the other personality skills do not appear to play a large role in determining health-related outcomes.

5.4 Mid-life and Lifetime Outcomes

Our previous analysis makes clear which periods in the life-cycle are affected by IQ, personality skills, and education within each block of health-related outcomes. Another key question is whether IQ, personality skills, and education have effects across categories of health-related outcomes at particular points in time. Therefore, instead of blocks within a single health-related outcome across time, we form an alternative block consisting of variables (or proxies) that capture all health-related outcomes in 1960: drinking heavily, being overweight, frequency of physical activity, ever smoking, organization membership, ever divorced, age 50 earnings, and mental and general health. We then perform the stepdown procedure over this snapshot of 1960 outcomes to test for statistically significant effects.

We find that for males, the story remains much the same, with Conscientiousness playing an important protective role for drinking, smoking, divorce and mental difficulty. Neuroticism results in lower frequency of physical activity, lower earnings, more mental difficulty, and poorer general health. Education remains beneficial to organization membership and earnings, and lowers divorce rates. For females, Neuroticism predicts poorer mental and general health, while education promotes organization membership.

We further perform a similar analysis for lifetime health-related outcomes and find similar results.

5.5 Personality vs. Traditional Controls

The importance of personality skills is comparable, if not greater, than the combined role of education, IQ, and other background controls for many of our health-related outcomes, even though background controls include such important variables as early health, parental education, occupation, and social status, and early childhood investments. Figure 5 presents the R^2 statistic for three models: the full model, the model with only personality skills, and the model omitting personality skills.[33] The results suggest that omitting personality skills leads to a dramatic reduction in R^2 for all health-related outcomes, particularly mental health. This establishes personality skills as an important aspect of human capital that should receive more attention from economists.

6 Discussion

We contribute to the existing research by estimating the effects of education and all five personality skills conditional on education in a single model, as well as accounting for multiple hypothesis testing, which is uncommon in the literature. This is an improvement over a treatment of personality as a lower dimension object (often reduced to just a single-dimension variable), and adds interpretability and refinement to the large class of skills that are "non-cognitive" or "soft". Further, while outcomes such as earnings and self-reported health have been studied widely in the economic, sociological, and psychological literature, the role of personality skills in these outcomes in the economic literature is less prevalent and relatively new. Outcomes such as mental health, marriage status, and group membership are also relatively less well studied in economics. Our paper thus provide new evidence for education and personality skills as major determinants of health-related outcomes, and also raises awareness for a wider set of health-related outcomes than commonly considered.

[33] The sum of the R^2 statistic across model 2 and model 3 may fail to exactly coincide with the R^2 statistic of model 1 due to correlations between personality skills and traditional economic controls.

6.1 Education and Health

Our paper provides evidence that education has effects on heavy drinking, earnings, marriage, and physical activity. The literature documents education's effects on reducing heavy drinking (Conti and Hansman, 2013; Crum et al., 1993; Droomers et al., 1999), increasing earnings (Card, 1999), lowering divorce rates (Stevenson and Wolfers, 2007), and encouraging physical activity (Conti and Hansman, 2013; Conti et al., 2010c). Our results confirm that even after controlling for a major group of possible confounding factors (personality skills), education still has protective effects on these health-related outcomes.

Within the framework of the theoretical model in Section 4.1, we see that aside from the direct utility from health-related consumption, there are marginal effects through "longevity" (benefit of living longer), "morbidity" (benefit of better health), "health productivity" (increase in wages due to better health), and "budget deficit cost" (the financial cost of living longer). If we were to raise education exogenously, we expect to see an increase in $S(H_2)$[34] and Y_2 (see Table 18), therefore increasing the marginal benefit of health-related consumption through longevity and morbidity whilst lowering the marginal cost through "health productivity" and "budget deficit cost". A similar argument holds for health investments. Our empirical findings with regard to the effects of education on health-related consumption and earnings are thus in line with our theoretical model, although it is beyond the scope of this paper to break down precisely the relative importance of the various channels.

6.2 Personality and Health

Many of the effects of Conscientiousness and Neuroticism on health-related outcomes that we estimate are large and statistically significant. Estimated coefficients reflect a substantial percentage of prevailing sample means for most outcomes, and a few of the less precisely estimated coefficients were still sizeable. The size of the effects of personality skills are

[34] See Christenson and Johnson (1995); Deaton and Paxson (2001); Elo and Preston (1996); Lleras-Muney (2005); Savelyev (2013); van Kippersluis et al. (2011).

comparable or somewhat lower than education for outcomes on which they both act. Further, the R^2 analysis in Figure 5 show that personality skills are an important aspect of human capital that explains health-related outcomes.

Our results therefore confirm the positive effects of Conscientiousness on health, while for Neuroticism we add to a growing body of evidence that it is a major determinant of health-related outcomes (Lahey, 2009). Our results are also generally consistent with the literature with regard to the effect of personality skills (see Bogg and Roberts (2004); Droomers et al. (1999); Friedman (2000); Friedman et al. (1993); Lahey (2009)). For example, the negative effects of Agreeableness on earnings and the positive effects of Extraversion on drinking alcohol are widely recognized patterns (Cookson, 1994; Flory et al., 2002; Heineck and Anger, 2010; Judge and Livingston, 2011; Mueller and Plug, 2006). We confirm these patterns conditional on a substantial set of controls, IQ, education, and other personality skills.

Our results also have a number of implications for our theoretical model. First, the estimates with regard to mental and general health can be viewed as estimates of $\frac{\partial H_2}{\partial \boldsymbol{\theta}}$. We find that Conscientiousness and Extraversion affect health stock positively while Openness and Neuroticism have negative effects. Although our paper does not directly aim to estimate the health depreciation rate δ, our findings support the view that personality skills may affect the rate of health depreciation (Almlund et al., 2011; Turiano et al., 2013). Second, similar to the case of education discussed above, our findings suggest that skills change the marginal effects of health-related consumption through the four channels ("longevity", "morbidity", "health productivity", and "budget deficit"). The effect of skills on earnings speak directly to the channel "budget deficit" although we are unable to fully distinguish between the other channels.

In particular, the positive effect of Extraversion on earnings (Y) and mental health stock (H) is substantial, and should therefore reduce the marginal "budget deficit" and increase the marginal benefit of "morbidity" and "longevity" in the first order conditions of health-related consumption. However, we find that the effect of Extraversion on heavy drinking

is negative, implying that it must enter other marginal effects in a way that has not been explicitly modelled. One possibility could be the presence of social influences entering the "addiction" marginal effect, and that Extraversion would play a part in determining the nature and magnitude of such influences.

6.3 Life-cycle Patterns

Besides providing evidence for the effects of education and personality skills on health-related outcomes, our paper also breaks down these effects over the life-cycle and accounts for multiple-hypothesis testing to investigate the periods in life where outcomes are affected by early life human capital. We find that for some outcomes, the impact of early childhood personality skills and education occur only at specific periods over the life-cycle. For example, the effect of education on female earnings is statistically significant only in the earlier stage of the life-cycle (age 40) but the effect declines at later ages.[35]

Though this paper analyzes a wide range of health-related outcomes, further work is required to understand the precise links between the health-related outcomes, both across the life-cycle and between outcomes categories. For example, one would expect that heavy drinking in 1940 is related to heavy drinking in 1950, and that heavy drinking in 1950 affects mental health in 1950. While the linear models in this paper are easily interpretable and computationally tractable, they do not fully capture the interactions between health-related outcomes that may be necessary for a comprehensive understanding of the extent to which personality skills and education affect overall health. The key contribution for this paper is rather to draw attention to particular outcomes and sensitive periods in the life-cycle for further research on the linkages between education, personality skills, and health (see Hong, Savelyev, and Tan (2013) for an analysis of these links taking into account life-cycle patterns in health-related outcomes).

[35]Possible reasons include gender discrimination in the workplace that subject educated women to artificially lower earnings, which would allow less educated women to reduce the wage premium over the life-cycle.

6.4 Gender Differences

Our results agree with the general finding that Conscientiousness plays an important role in producing health for males but not for females, as documented in Savelyev (2013). We document the weaker association of health-related outcomes with longevity for females, as well as the smaller and less statistically significant effects of education and personality skills on health-related outcomes. The only exception is Neuroticism, which exhibits strong negative effects on mental and general health, and affects earnings.

However, we should be cautious about generalizing the results for females to contemporary cohorts, since the socioeconomic conditions for females have changed drastically over the course of the 20th century.

6.5 Data Limitations

The results in this paper are based on a historical sample with exceptional IQ. Attitudes and social norms toward many of these health-related outcomes have changed dramatically over time, which may affect the magnitude of the effects. For example, consider the historical attitudes toward divorce, where a more accepting society may reduce the social pressure to maintain a failing marriage. Then to the extent that Conscientiousness reflects a desire to conform to social norms, its protective effects against divorce may be weaker.

Another point of interest would be the proliferation of new technologies and the availability of health information. We can now do more good to our health through the choices we make. To the extent that Conscientiousness and education act as skills that motivate us to inform ourselves and adopt new technologies, this could potentially increase their importance in determining health-related outcomes.

7 Policy Implications

To the extent that we can generalize our results to modern general populations, our findings may be of interest to policy makers. Our findings with regard to mental health are of interest given the growing awareness of mental well-being as a key component of health. Neuroticism in both genders plays the largest role in determining later life mental health, while for males the other personality skills other than Agreeableness are also important. It is therefore the health outcome that would likely be most responsive to interventions on personality skills. Our results suggest that childhood personality skills can act as a direct and early life mechanism for improving mental health that may also benefit a broader class of health-related outcomes. This could be a viable and relevant alternative to relying on other forms of intervention such as universal health insurance (Baicker et al., 2013) or targeted programs based on exercise (Atlantis et al., 2004) and therapy (Creed et al., 1999).

This study therefore gives evidence for viewing childhood Conscientiousness and Neuroticism as possible policy variables for improving health-related outcomes.[36] While the malleability of personality skills is still controversial, there is a growing body of literature showing that there is scope for developing particular personality skills related to Conscientiousness (see Forgatch and DeGarmo (1999); Heckman et al. (2013); Milgram and Toubiana (1999); Piedmont (2001); Pychyl et al. (2002)).

8 Stepdown Adjustment

In all of our analyses, we employ the stepdown procedure suggested by Romano and Wolf (2005). This adjustment changes the number of statistically significant estimates in our results. We show an example of the difference for the analysis on life-cycle outcomes in Table 11, where items shaded in blue (light grey in print) refer to results that would have been statistically significant without the stepdown adjustment over the set of life-cycle outcomes.

[36] The other personality skills are more ambiguous in their effects on health-related outcomes.

The survival rate of unadjusted statistically significant estimates after the stepdown adjustment was $\tilde{4}3\%$ and 60% for males and females respectively. While most of the unadjusted effects are sensible, our empirical exercise suggests that controlling for family-wise error rates can play an important role in the conservative interpretation of estimates when analyzing multiple single hypotheses.

9 Conclusions

The importance of personality skills in the analysis of health is gaining recognition among economists. We contribute to this emerging literature by investigating the role of the Big Five personality skills on health-related outcomes and find that their effects are substantial. For males, we find that Conscientiousness benefits the health-related outcomes explored in this paper on a statistically significant level. We report the negative effects of Openness, Agreeableness and Neuroticism on health, and the ambiguous effects of Extraversion. For females, fewer results are statistically significant, as expected.

Controlling for personality and IQ, our estimates of the effect of education choice can be interpreted as causal effects. We find that education has a statistically significant effect on several important health-related outcomes including alcohol consumption and earnings. This adds new evidence from the Terman data to the literature regarding the causal effect of education on health. We also find that the role of personality skills in explaining health outcomes is comparable and sometimes greater, than that of education, and other background controls.

The findings with regard to personality skills open up a new dimension for economists to consider. If childhood personality skills are malleable and socially acceptable interventions are possible (through better schooling environments and good parenting, for example), then we can improve health outcomes by specifically encouraging Conscientiousness and Emotional Stability (the inverse of Neuroticism). The ambivalent effects of Openness,

Agreeableness and Extraversion on health make them less suitable as policy variables.

Table 1: List of Outcomes Observed

Health-related outcomes	Years of observations
Heavy drinking of alcohol	1940, 1950, 1960
Physical activity	1982
Mental well-being	1950, 1955, 1960
General health	1940, 1950, 1960
Body mass index (BMI)	1940
Marriage status	1922 to 1986
Number of organizations	1940, 1950, 1960
Life-cycle wages	Age 40, 50, 60, lifetime

Notes: Outcome variables are listed in this table along with the period of observation.

Table 2: Description of Main Variables, Outcomes

		Females				Males			
variable	year	mean	stand dev.	max	min	mean	stand dev.	max	min
Ever drank heavily	1940-1960	.205	.404	1	0	.394	.489	1	0
Physical activity, freq.	1982	.173	.379	1	0	.176	.382	1	0
Ever poor/fair mental well-being	1940-1960	.463	.499	1	0	.415	.493	1	0
Ever poor/fair general health	1940-1960	.127	.333	1	0	.074	.262	1	0
Abnormal BMI	1940	.160	.367	1	0	.225	.418	1	0
Ever divorced	1922-1986	.253	.435	1	0	.267	.443	1	0
# of organizations	1950	1.565	1.662	10	0	2.714	2.173	10	0
Wages at age 50	1955-1967	16.083	20.708	104.176	0	71.503	52.959	294.096	0
Estimation Sample			527				680		

Notes: [(a)]Calculations are based on the Terman data. Multi-period observations of heavy drinking, mental difficulty, and general health are summarized into binary indicators which equal 1 when negative outcomes are observed in any point in time of the life-cycle, and 0 otherwise. A subset of marriage statuses, group membership measurements, and earnings measures are presented.

Table 3: Description of Main Variables[a], Background Controls

		Females				Males			
variable	year	mean	stand dev.	max	min	mean	stand dev.	max	min
Subject's Background									
IQ	1922	148.573	10.197	201	135	149.238	10.572	200	126
Bachelor's degree or above	1922-1968	.676	.468	1	0	.728	.445	1	0
Extraordinary birth	1922	.629	.483	1	0	.565	.496	1	0
No breastfeeding	1922	.084	.277	1	0	.096	.295	1	0
Childhood health	1922	9.013	1.907	13	4.5	8.545	1.982	13	3
Childhood energy	1922	8.817	1.813	13	4	8.220	1.917	13	3
Age at 1922	1922	11.258	2.816	17.959	6.058	11.848	2.922	17.984	6.008
Cohort 1915-1918	1922	.171	.377	1	0	.240	.427	1	0
Cohort 1907-1910	1922	.369	.483	1	0	.296	.457	1	0
Participation in World War II	1945	-	-	-	-	.406	.491	1	0
Combatant in World War II	1945	-	-	-	-	.091	.288	1	0
Parental Background									
Mother dead	1922	.031	.173	1	0	.027	.162	1	0
Father dead	1922	.073	.260	1	0	.079	.271	1	0
Parents divorced	1922	.047	.212	1	0	.050	.217	1	0
Father's education	1922	.245	.431	1	0	.288	.453	1	0
Parental finances	1922	.371	.483	1	0	.366	.482	1	0
Parental social standing	1922	.162	.369	1	0	.265	.442	1	0
Mother working	1922	.135	.342	1	0	.125	.331	1	0
Father high skilled	1922	.271	.445	1	0	.241	.428	1	0
Parent born abroad	1922	.275	.447	1	0	.308	.462	1	0
Parent born in Europe	1922	.209	.407	1	0	.216	.412	1	0
Duration of private tutoring (weeks)[b]	1922	.343	.594	5.743	0	.105	.375	4.247	0
Home investment (hours)[b]	1922	.407	.359	1.839	0	.441	.369	1.771	0
Estimation Sample			527				680		

Notes: [a]Calculations are based on the Terman data. [b]Durations are transformed using natural logarithm: $\ln(1 + duration)$.

Table 4: Description of Big–Five Personality Skills[(a)]

Trait	Definition
1. Openness to Experience (Intellect)	The breadth, depth, originality, and complexity of individual's mental and experimental life
2. Conscientiousness	A propensity to follow socially prescribed norms for impulse control, to be task- and goal- directed, to be planfull, to delay gratification, and to follow norms and rules
3. Extraversion	An energetic approach to the social and material world, which includes traits such as sociability, activity, assertiveness, and positive emotionality
4. Agreeableness	A prosocial and communal orientation towards others (as opposed to antagonism), which includs traits such altruism, tender-mindedness, trust, and modesty
5. Neuroticism (Emotional Stability)	An emotional stability and even-temperedness as opposed to negative emotionality, such as feeling anxious, nervous, sad, and tense

Notes: [(a)]Description taken from John and Srivastava (1999).

Table 5: Description of Main Variables[(a)], Personality Measures

		Females				Males			
variable	year	mean	stand dev.	max	min	mean	stand dev.	max	min
Openness									
Knowledge	1922	10.077	2.105	13	1	10.404	1.902	13	3
Originality	1922	9.286	2.198	13	1	9.584	2.192	13	2
Intelligence	1922	10.697	1.693	13	6	10.808	1.711	13	1
Conscientiousness									
Prudence	1922	9.160	2.281	13	1	8.540	2.331	13	1
Conscientiousness	1922	10.216	2.245	13	2	9.396	2.519	13	1
Trustworthiness	1922	9.946	2.319	13	2	9.737	2.429	13	1
Extraversion									
Friendliness	1922	8.181	2.414	13	1	7.565	2.452	13	1
Leadership	1922	8.069	2.143	13	2	7.479	2.145	13	2
Popularity	1922	8.160	2.185	13	2	7.498	2.149	13	2
Agreeableness									
Easy to get along with	1940	7.140	1.647	11	2	7.271	1.647	11	2
Avoids arguments	1940	.691	.462	1	0	.522	.500	1	0
Critical	1940	.452	.498	1	0	.591	.492	1	0
Tactful	1940	.696	.460	1	0	.559	.497	1	0
Unfeeling	1940	.276	.447	1	0	.447	.498	1	0
Domineering	1940	.288	.453	1	0	.413	.493	1	0
Inflated opinion of self	1940	.248	.432	1	0	.360	.481	1	0
Neuroticism									
Miserable	1940	.258	.438	1	0	.215	.411	1	0
Touchy	1940	.358	.480	1	0	.376	.485	1	0
Periods of loneliness	1940	.276	.448	1	0	.251	.434	1	0
Lonely when with others	1940	.230	.421	1	0	.229	.420	1	0
Remorseful and regretful	1940	.232	.423	1	0	.195	.396	1	0
Lack self confidence	1940	.471	.500	1	0	.241	.428	1	0
Worry about humiliating experiences	1940	.403	.491	1	0	.354	.479	1	0
Emotionally unstable	1940	.288	.453	1	0	.204	.403	1	0
Easily hurt	1940	.451	.498	1	0	.402	.491	1	0
Hard to be serene	1940	.102	.302	1	0	.093	.290	1	0
Moody	1940	6.239	1.984	11	1	5.869	1.932	10	1
Sensitive	1940	6.912	1.618	11	3	6.605	1.805	10	1
Estimation Sample			527				680		

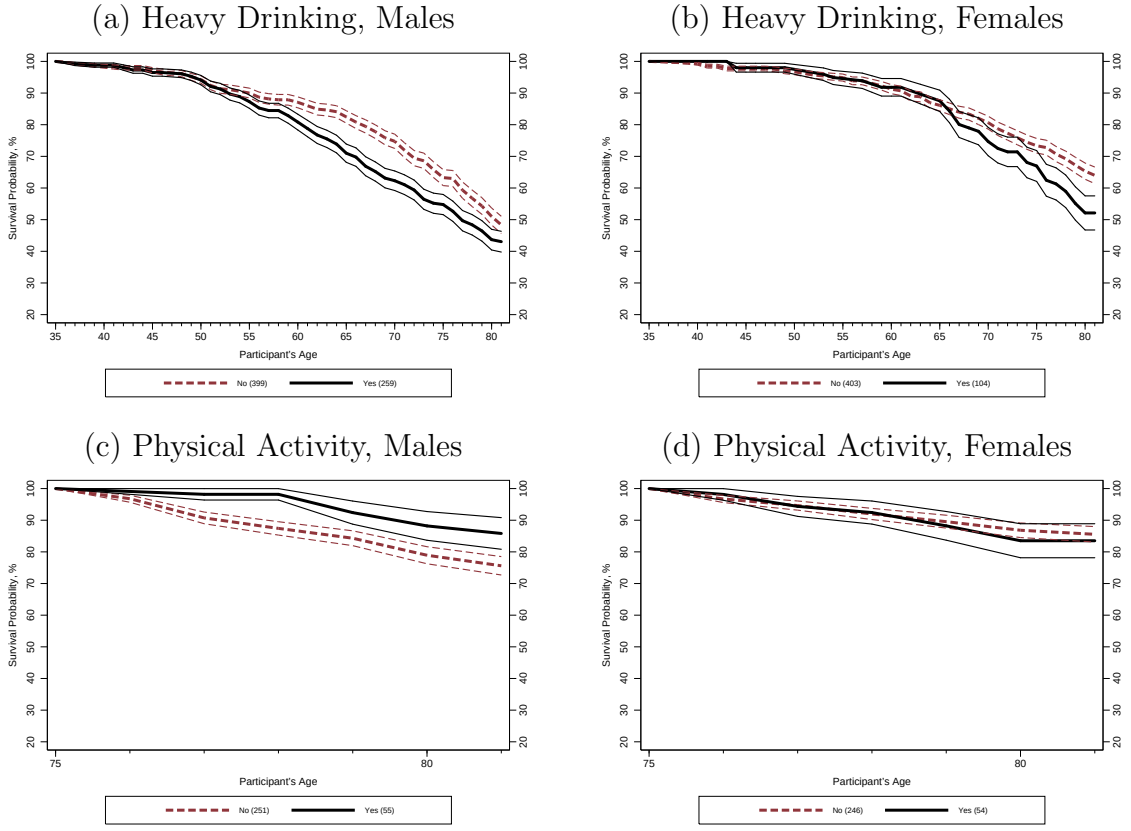
Notes: [(a)]Calculations are based on the Terman data. The items represent psychological measures used to extract the five latent personality skills. Each psychological measure is driven by a subset of the five personality skills as shown in our factor model. The psychological measures correspond well with the taxonomical definitions used widely in the psychology literature (see Table 4).

Table 6: Personality Skills Factor Structure

Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Desire to know	**Prudence**	**Fondness for large groups**	**Easy to get along**	**Miserable**
Originality	**Conscientiousness**	**Leadership**	**Avoid arguments**	**Touchy**
Intelligence	**Truthfulness**	**Popularity**	**Critical**	**Periods of Loneliness**
Prudence	Desire to know	Truthfulness	**Tactful**	**Lonely when with others**
Leadership	Popularity	Desire to Know	**Unfeeling**	**Remorseful**
Popularity	Fondness for large groups		**Domineering**	**Lack self confidence**
			Inflated self-opinion	**Worry about humiliation**
			Lack self confidence	**Emotionally unstable**
			Worry about humiliation	**Easily hurt**
			Easily hurt	**Hard to be serene**
			Hard to be serene	**Moody**
			Sensitive	**Sensitive**
			Conscientiousness	Easy to get along
				Critical

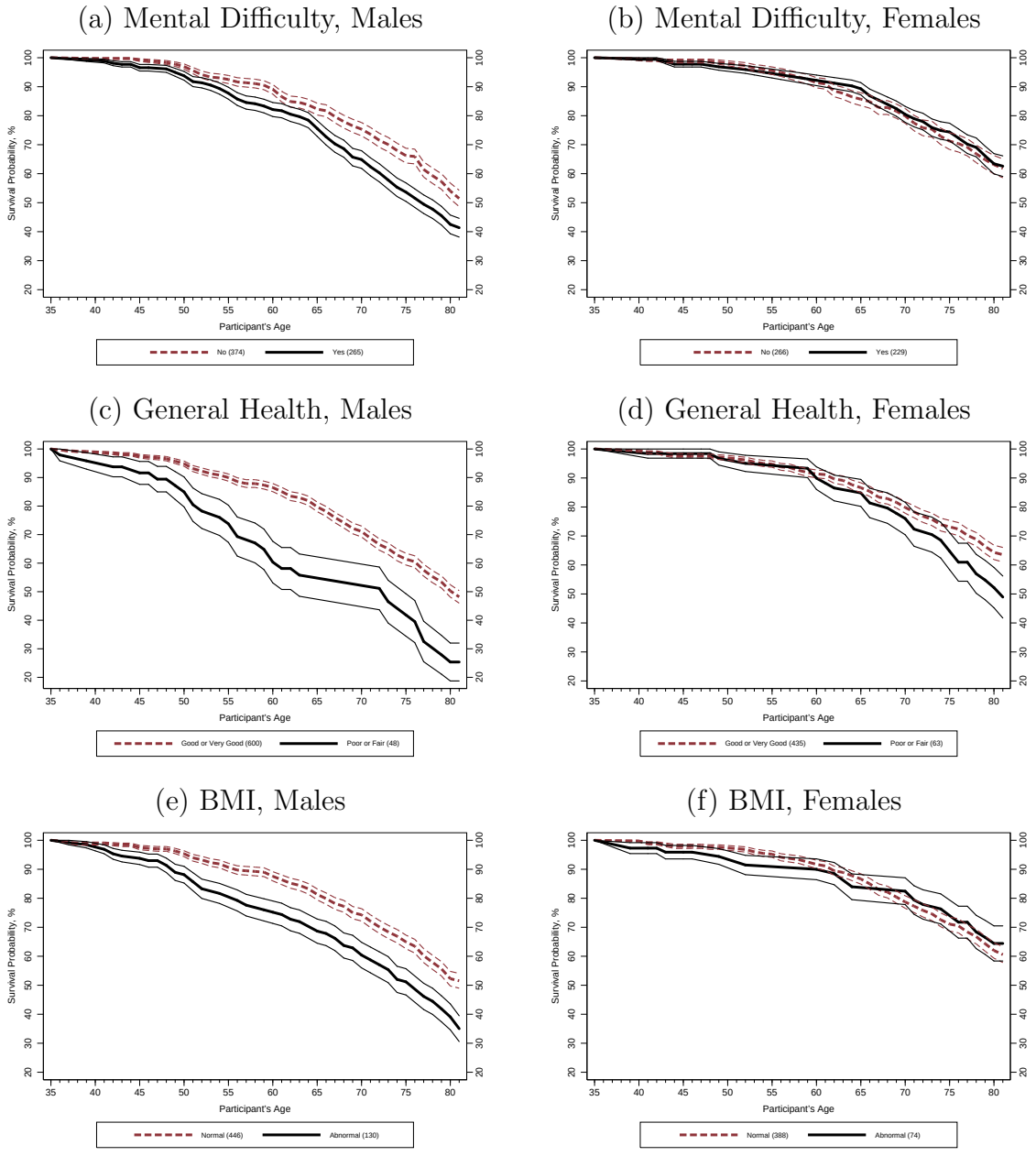
Notes: Personality measures in bold are strongly associated with the corresponding personality skill, and measures not in bold weakly relate to the corresponding personality skill. Factor structure is determined by theoretical considerations and empirical EFA.

Figure 1: Survival by Health Behaviors[(a)]



Notes: [(a)]Health behaviors refer to heavy drinking and physical activity. Heavy drinking in this graph is an indicator variable which is 1 if subject ever reported drinking heavily over the period of 1940–1960 and 0 otherwise. Physical activity indicates whether or not the subject engaged in physical activity frequently in 1982. Survival graphs are based on lifetable calculations, standard errors above and below are represented by the thinner lines.

Figure 2: Survival by Health Measures[(a)]

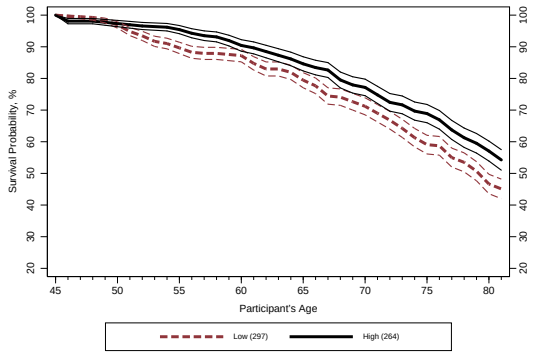


Notes: [(a)]Health measures refer to mental health, general health, and body mass index (BMI). Mental difficulty indicates whether or not the subject experienced any mental difficulty over the years 1950–1960. General health is an index constructed from various self-reported health measures including "energy level", "vitality", and "physical health". It indicates whether the subject experienced poor or fair health over the years 1940–1960. Lastly, BMI indicates whether or not the subject had abnormal BMI in 1940, where abnormal means underweight or overweight. Overweight refers to subjects who had a BMI above 25. Underweight subjects had a BMI below 18.5.

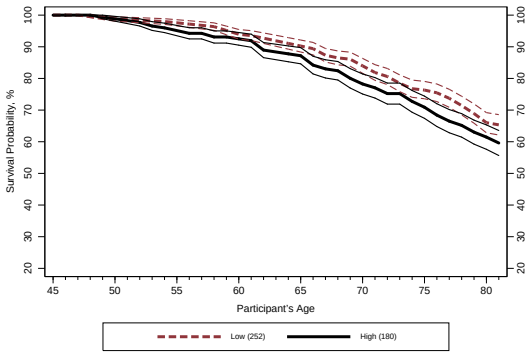
Survival graphs are based on lifetable calculations, standard errors above and below are represented by the thinner lines.

Figure 3: Survival by Lifestyle Choices - Social and Family

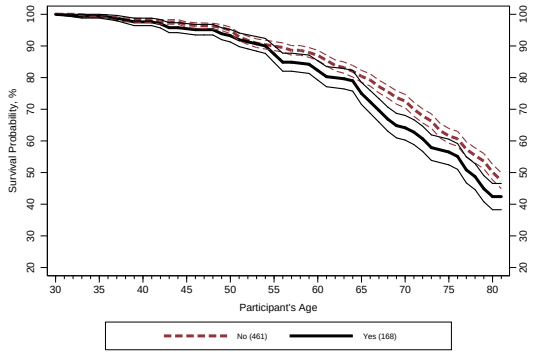
(a) Group Membership, Males



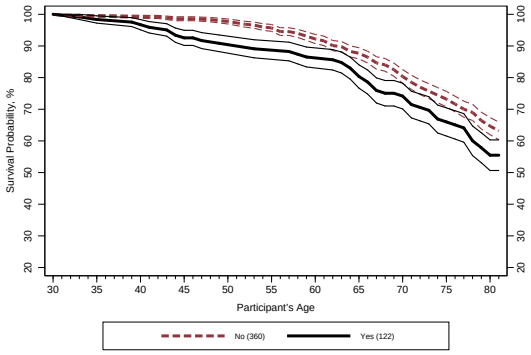
(b) Group Membership, Females



(c) Ever Divorced, Males



(d) Ever Divorced, Females

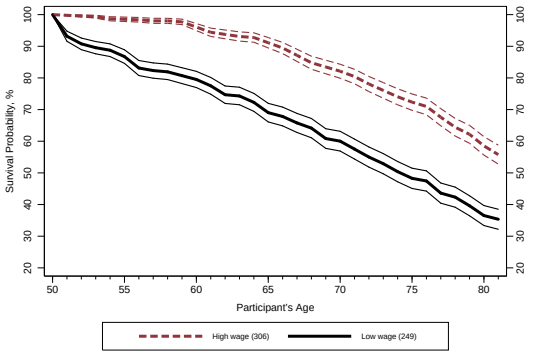


Notes: [(a)]Lifestyle choices refer to group membership in 1950 and marriage status. 'High' membership refers to subjects having a greater number of organization memberships than the median. 'Low' membership refers to subjects at or below the median number of organization memberships. "Ever divorced" indicates whether the subject was divorced at least once.

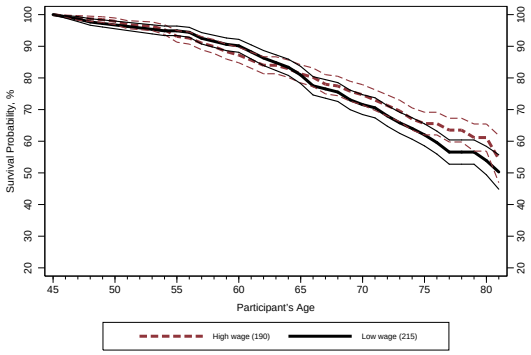
Survival graphs are based on lifetable calculations, standard errors above and below are represented by the thinner lines.

Figure 4: Survival by Age 50 Earnings, Non-discounted

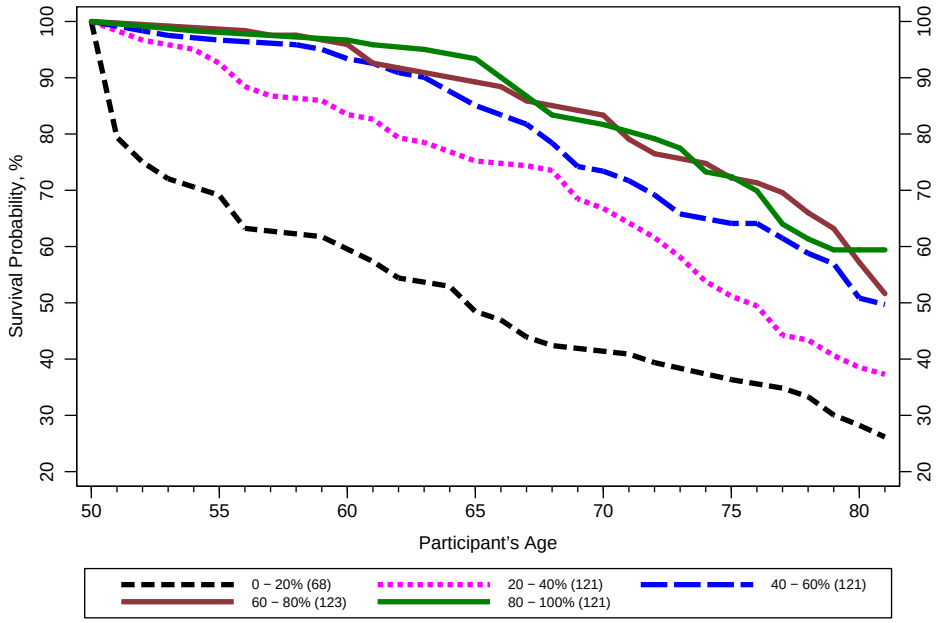
(a) Above Median, Males



(b) Above Median, Females



(c) Quintiles, Males



Notes: "High wage" refers to earnings above the median, "low wage" refers to earnings at or below the median. For females, the median wage is zero. Survival by earnings quintiles are also presented. Survival graphs are based on lifetable calculations, standard errors above and below are represented by the thinner lines.

Table 7: Summary of Effects on Health-Related Outcomes, Males

	Males						
	C	O	E	A	N	IQ	Edu
Health behaviors and their proxies							
1940 - 1960 Ever Drank Heavily	-.055 **		.061 **				-.109 **
1940 Heavy Drinking	-.046 *		.044			.057 **	-.086
1950 Heavy Drinking			.040 **		.039 *		-.090 **
1960 Heavy Drinking	-.072 **	.056	.044 *				-.077
1940 Overweight				-.034		-.023	
1982 Physical Activity, Freq.		-.044 *			-.066 **		.108 *
1991 Ever Smoked	-.107 **						
1940 - 1960 Any Organization							
1940 Number of Organizations						-.175 *	-.175
1950 Number of Organizations				.258 *			
1960 Number of Organizations						.327 **	.327 ***
Never Married	.023				.024		
Married Once and Still Married	.056 *						.120 **
Ended up Divorced	-.023 *	.050 ***			.024		
Ever Divorced	-.055 *						-.137 **
Divorced at least Twice	-.044 **	.031 *			.025		
Earnings							
Lifetime earnings, 3%			79.908 **	-94.713 **		44.431	44.431 ***
Earnings at age 40				-6.556 ***		3.280	3.280 ***
Earnings at age 50			4.122	-6.787 **	-6.553 **	4.758 *	4.758 ***
Earnings at age 60			5.814 *		-7.466 **		
Mental Health (MH)							
Ever Poor/Fair MH	-.071 ***	.085 ***	-.051 *		.134 ***		
1940 Mental Difficulty	-.078 ***	.086 ***	-.077 ***		.120 ***		
1950 Mental Difficulty	-.040 *				.111 ***		
1960 Menatl Difficulty	-.080 ***	.091 ***	-.101 ***		.120 ***		
General Health (GH)							
Never Poor/Fair GH		-.032 *			-.021		
1940 General Health					-.279 ***		
1950 General Health	.135 **	-.152 **	.096		-.242 ***		
1960 General Health					-.211 ***		

Notes: Calculations are based on the Terman data. Letters denote: C, Conscientiousness; O, Openness; E, Extraversion; A, Agreeableness; N, Neuroticism. Coefficients are reported with accompanying statistical significance represented by stars, where $***, **, *$ indicates $p < 0.01, 0.05, 0.10$ respectively. Coefficient with no star refers to $p < 0.15$, while a blank cell refers to coefficient with p-value above 0.15. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005). Coefficients shaded green (light grey in print) and red (dark grey in print) denote beneficial and adverse implications for health. See Tables 12–18 for a full set of results used for the summary.

Table 8: Health-Related Outcomes, Females

	Females						
	C	O	E	A	N	IQ	Edu
Health behaviors and their proxies							
1940 - 1960 Ever Drank Heavily		-.073 **	.054 *				
1940 Heavy Drinking				-.041 *			
1950 Heavy Drinking							
1960 Heavy Drinking		-.060 *	.049				
1940 Overweight					-.037 *		-.074 *
1982 Physical Activity, Freq.							
1991 Ever Smoked							
1940 - 1960 Any Organization							.066 **
1940 Number of Organizations							.789 ***
1950 Number of Organizations							.877 ***
1960 Number of Organizations						-.352 **	1.213 ***
Never Married							.074 ***
Married Once and Still Married							.129 *
Ended up Divorced							
Ever Divorced							-.111 **
Divorced at least Twice							-.054 *
Earnings							
Lifetime earnings, 3%							
Earnings at age 40							3.946 *
Earnings at age 50							
Earnings at age 60					-4.650		
Mental Health (MH)							
Ever Poor/Fair MH					.152 ***		
1940 Mental Difficulty					.137 ***		
1950 Mental Difficulty					.134 ***		
1960 Menatl Difficulty					.123 ***		
General Health (GH)							
Never Poor/Fair GH					-.044 ***		.116 ***
1940 General Health				-.133 *	-.318 ***		.283 **
1950 General Health				-.094	-.267 ***		.172
1960 General Health					-.241 ***		

Notes: Calculations are based on the Terman data. Letters denote: C, Conscientiousness; O, Openness; E, Extraversion; A, Agreeableness; N, Neuroticism. Coefficients are reported with accompanying statistical significance represented by stars, where $***, **, *$ indicates $p < 0.01, 0.05, 0.10$ respectively. Coefficient with no star refers to $p < 0.15$, while a blank cell refers to coefficient with p-value above 0.15. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005). Coefficients shaded green (light grey in print) and red (dark grey in print) denote beneficial and adverse implications for health. See Tables 12–18 for a full set of results used for the summary.

Table 9: Lifetime and 1960 Outcomes and Proxies, Males

	Males						
	C	O	E	A	N	IQ	Edu
Lifecycle Outcomes and Proxies							
1940 - 1960 Ever Drank Heavily	-.055						-.109 *
1940 Overweight							
1982 Physical Activity, Freq.					-.066 *		
1991 Ever Smoked	-.107 **						
1940 - 1960 Any Organization							.084 ***
Ever Divorced	-.055						-.137 ***
Lifetime earnings, 3%			79.908 *	-94.713 *			209.191 ***
Ever Poor/Fair MH	-.071 *	.085 ***			.134 ***		
Never Poor/Fair GH							
1960 Outcomes and Proxies							
Drank Heavily	-.072 **						
1940 Overweight							
1982 Physical Activity, Freq.					-.066 *		
1991 Ever Smoked	-.107 *						
# of Organization						.327 *	1.501 ***
Ever Divorced	-.055 *						-.137 **
Age 50 earnings				-6.787 *	-6.553 *		19.788 ***
Mental Difficulty	-.080 **	.091 ***	-.101 ***		.120 ***		
General Health					-.211 ***		

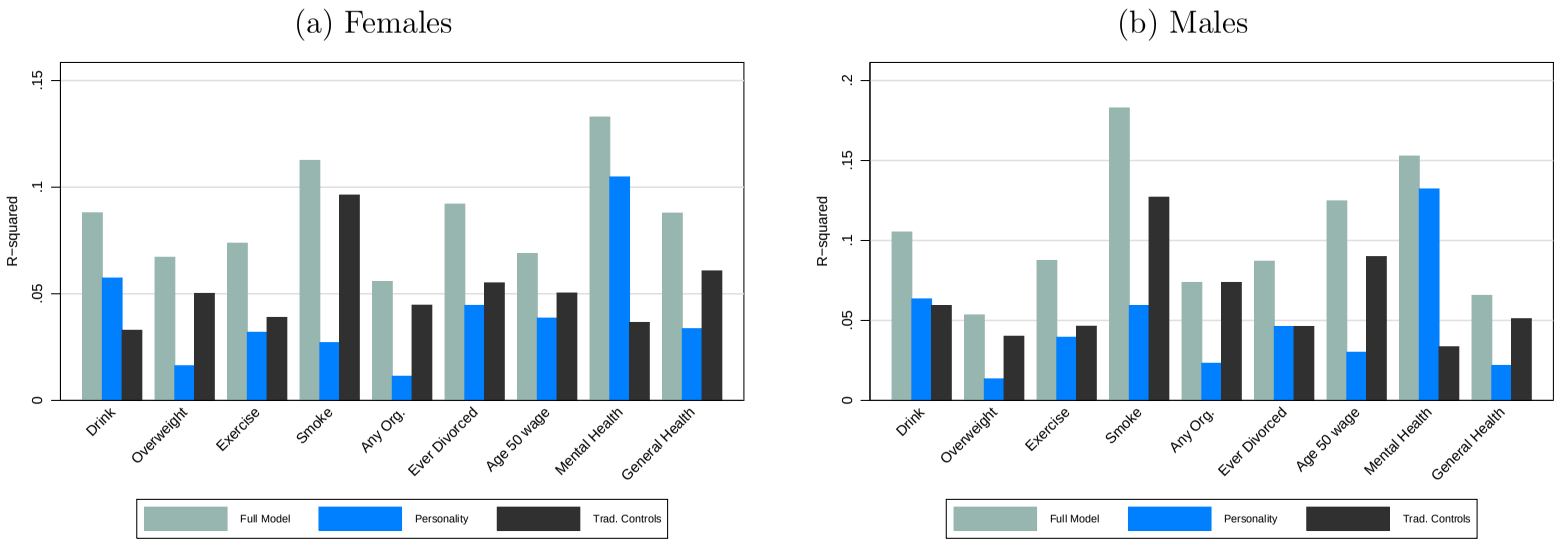
Notes: Calculations are based on the Terman data. Letters denote: C, Conscientiousness; O, Openness; E, Extraversion; A, Agreeableness; N, Neuroticism. Coefficients are reported with accompanying statistical significance represented by stars, where $***, **, *$ indicates $p < 0.01, 0.05, 0.10$ respectively. Coefficient with no star refers to $p < 0.15$, while a blank cell refers to coefficient with p-value above 0.15. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005). Coefficients shaded green (light grey in print) and red (dark grey in print) denote beneficial and adverse implications for health.

Table 10: Lifetime and 1960 Outcomes and Proxies, Females

	Females						
	C	O	E	A	N	IQ	Edu
Lifecycle Outcomes and Proxies							
1940 - 1960 Ever Drank Heavily							
1940 Overweight							
1982 Physical Activity, Freq.							
1991 Ever Smoked							
1940 - 1960 Any Organization							
Ever Divorced							-.111
Lifetime earnings, 3%							
Ever Poor/Fair MH					.152 ***		
Never Poor/Fair GH					-.044		.116 **
1960 Outcomes and Proxies							
Drank Heavily							
1940 Overweight							
1982 Physical Activity, Freq.							
1991 Ever Smoked							
# of Organization						-.352 *	1.213 ***
Ever Divorced							-.111
Age 50 earnings							
Mental Health					.123 ***		
General Health					-.241 ***		

Notes: Calculations are based on the Terman data. Letters denote: C, Conscientiousness; O, Openness; E, Extraversion; A, Agreeableness; N, Neuroticism. Coefficients are reported with accompanying statistical significance represented by stars, where $***, **, *$ indicates $p < 0.01, 0.05, 0.10$ respectively. Coefficient with no star refers to $p < 0.15$, while a blank cell refers to coefficient with p-value above 0.15. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005). Coefficients shaded green (light grey in print) and red (dark grey in print) denote beneficial and adverse implications for health.

Figure 5: Coefficient of Determination (R^2) Comparison



Notes: Calculations are based on the Terman data. For each helath-related outcome, R^2 is reported for the full model, the model based on only personality skills, and the model omitting personality skills. Due to correlations between latent personality skills and observable regressors the R^2 for the full model can be somewhat smaller that the sum of R^2 for the partial models.

Table 11: Lifetime Outcomes and Proxies, Stepdown Comparison

	Lifecycle Outcomes and Proxies						
	C	O	E	A	N	IQ	Edu
Males							
1940 - 1960 Ever Drank Heavily	-.055 **		.061 ***	-.045 *			-.109 **
1940 Overweight							
1982 Physical Activity, Freq.		-.044 *			-.066 **		.108 *
1991 Ever Smoked	-.107 **						
1940 - 1960 Any Organization							.084 ***
Ever Divorced	-.055 **			-.045 *			-.137 ***
Lifetime earnings, 3%		-75.290 *	79.908 **	-94.713 ***		44.431 *	209.191 ***
Ever Poor/Fair MH	-.071 ***	.085 ***	-.051 **		.134 ***		
Never Poor/Fair GH		-.032 **					.046 *
Females							
1940 - 1960 Ever Drank Heavily		-.073 ***	.054 **				
1940 Overweight							
1982 Physical Activity, Freq.							
1991 Ever Smoked							
1940 - 1960 Any Organization							.066 **
Ever Divorced					.045 *		-.111 **
Lifetime earnings, 3%		31.623 *					44.451 *
Ever Poor/Fair MH					.152 ***		
Never Poor/Fair GH					-.044 **		.116 ***

Notes: Calculations are based on the Terman data. Letters denote: C, Conscientiousness; O, Openness; E, Extraversion; A, Agreeableness; N, Neuroticism. Coefficients are reported with accompanying statistical significance represented by stars, where $***, **, *$ indicates $p < 0.01, 0.05, 0.10$ respectively. Coefficient with no star refers to $p < 0.15$, while a blank cell refers to coefficient with p-value above 0.15. p-values are calculated using bootstrap techniques and are *unadjusted*. Coefficients shaded in blue (light grey in print) did not survive the stepdown adjustment whereas coefficients shaded in lilac (dark grey in print) survived.

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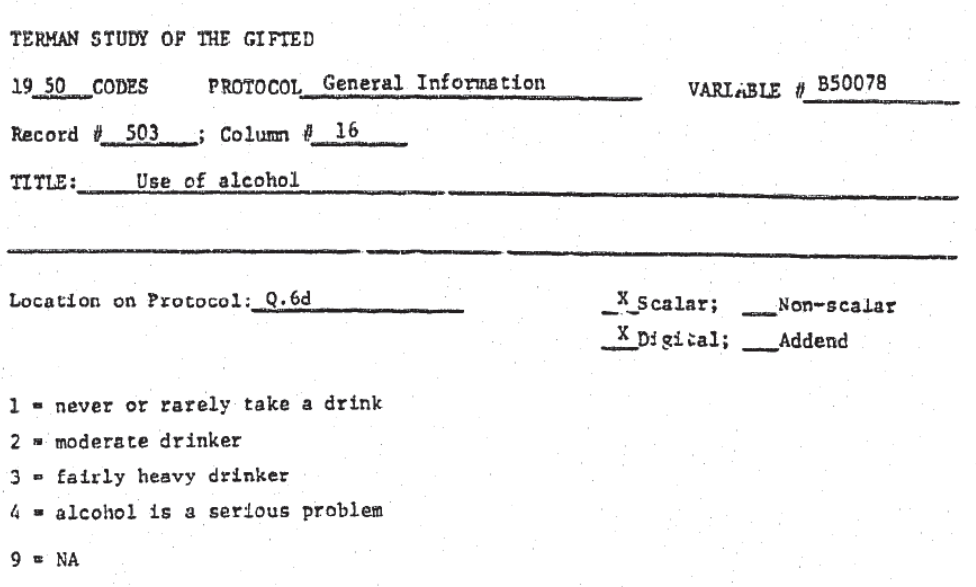
A Appendix

Figure 6: Survey Questions for Heavy Drinking



TERMAN STUDY OF THE GIFTED

19_50__CODES PROTOCOL_General Information_____ VARIABLE # B50078

Record #_503__; Column #_16__

TITLE:____Use of alcohol_____

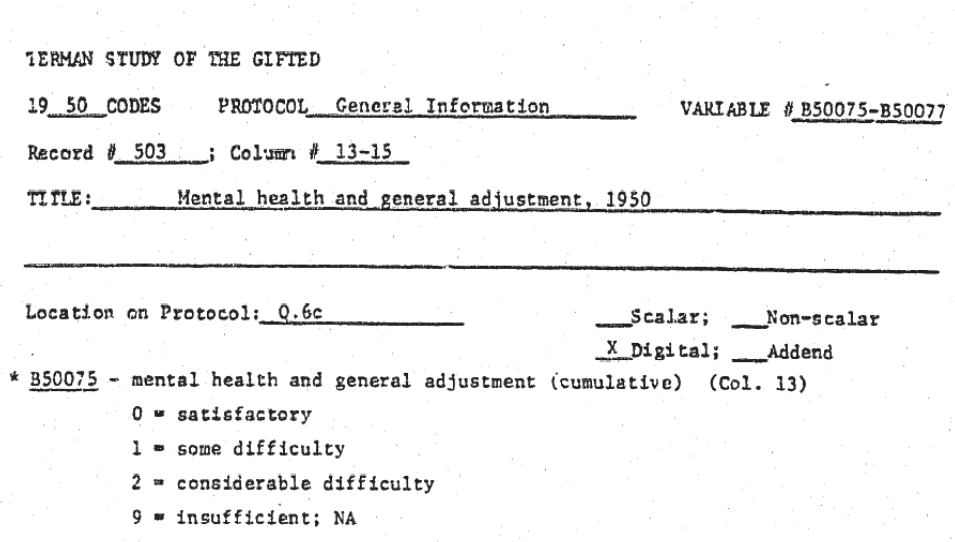
Location on Protocol:_Q.6d_____ _X_Scalar; ___Non-scalar
___X_Digital; ___Addend

1 = never or rarely take a drink
2 = moderate drinker
3 = fairly heavy drinker
4 = alcohol is a serious problem

9 = NA

Notes: Taken from Terman (1986). Ratings 3 and 4 were considered to be indicative of heavy drinking.

Figure 7: Survey Questions for Mental Health



TERMAN STUDY OF THE GIFTED

19 50 CODES PROTOCOL General Information VARIABLE # B50075-B50077

Record # 503 ; Column # 13-15

TITLE: Mental health and general adjustment, 1950

Location on Protocol: Q.6c ___Scalar; ___Non-scalar

X Digital; ___Addend

* B50075 - mental health and general adjustment (cumulative) (Col. 13)

0 = satisfactory

1 = some difficulty

2 = considerable difficulty

9 = insufficient; NA

Source: Taken from Terman (1986).

Table 12: Heavy Drinking

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Ever Drank Heavily in 1940-1960	Conscientiousness	.205	-.011	(.028)	.695	.886	.394	-.055	(.023)	***.018***	***.036***
	Openness		-.073	(.028)	***.011***	***.036***		.035	(.025)	.167	.362
	Extraversion		.054	(.024)	***.028***	***.091***		.061	(.024)	***.009***	***.031***
	Agreableness		-.017	(.024)	.470	.597		-.045	(.027)	.103	.158
	Neuroticism		.020	(.023)	.403	.403		.036	(.023)	.118	.248
	Cognition		.033	(.021)	.106	.246		.024	(.021)	.234	.411
	Bachelor's degree or above		-.019	(.039)	.627	.627		-.109	(.046)	***.013***	***.038***
	Joint				***.002***	***.008***				***.000***	***.001***
Drank Heavily in 1940	Conscientiousness	.102	.005	(.022)	.822	.822	.267	-.046	(.022)	***.033***	***.065***
	Openness		-.040	(.025)	.112	.201		.008	(.024)	.728	.926
	Extraversion		.008	(.018)	.678	.678		.044	(.024)	***.071***	.127
	Agreableness		-.041	(.019)	***.040***	***.072***		-.048	(.025)	***.063***	.170
	Neuroticism		.020	(.017)	.239	.331		.033	(.022)	.132	.252
	Cognition		.029	(.016)	***.059***	.222		.057	(.022)	***.011***	***.031***
	Bachelor's degree or above		-.042	(.031)	.172	.426		-.086	(.046)	***.063***	.118
	Joint				***.027***	***.053***				***.001***	***.002***
Drank Heavily in 1950	Conscientiousness	.038	-.009	(.014)	.523	.892	.118	-.012	(.017)	.518	.518
	Openness		.008	(.014)	.559	.559		.003	(.019)	.893	.893
	Extraversion		.014	(.011)	.206	.320		.040	(.016)	***.011***	***.040***
	Agreableness		-.016	(.010)	***.055***	.180		-.031	(.017)	***.083***	.172
	Neuroticism		.018	(.011)	***.057***	.244		.039	(.017)	***.016***	***.067***
	Cognition		.013	(.010)	.206	.352		.009	(.015)	.554	.554
	Bachelor's degree or above		-.014	(.021)	.540	.746		-.090	(.034)	***.013***	***.029***
	Joint				.176	.176				***.002***	***.004***
Drank Heavily in 1960	Conscientiousness	.167	-.012	(.027)	.659	.919	.347	-.072	(.026)	***.004***	***.018***
	Openness		-.060	(.028)	***.030***	***.089***		.056	(.028)	***.038***	.147
	Extraversion		.049	(.024)	***.038***	.119		.044	(.026)	***.080***	***.080***
	Agreableness		.013	(.023)	.523	.523		-.020	(.029)	.475	.475
	Neuroticism		.028	(.023)	.161	.383		.024	(.025)	.317	.317
	Cognition		.019	(.020)	.358	.358		.030	(.024)	.205	.435
	Bachelor's degree or above		-.036	(.040)	.373	.663		-.077	(.051)	.138	.138
	Joint				***.023***	***.068***				***.007***	***.007***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 13: Mental Health

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Ever Had Mental Difficulty in 1940-1960	Conscientiousness	.463	.026	(.029)	.345	.619	.415	-.071	(.025)	***.002***	***.004***
	Openness		-.007	(.034)	.833	.959		.085	(.027)	***.000***	***.004***
	Extraversion		.018	(.029)	.525	.846		-.051	(.024)	***.034***	***.066***
	Agreableness		-.022	(.030)	.478	.698		-.010	(.028)	.704	.882
	Neuroticism		.152	(.026)	***.000***	***.000***		.134	(.022)	***.000***	***.000***
	Cognition		.000	(.023)	.987	.987		.007	(.022)	.774	.936
	Bachelor's degree or above		-.009	(.049)	.876	.961		-.026	(.044)	.526	.740
	Joint				***.000***	***.000***				***.000***	***.000***
Mental Difficulty in 1940	Conscientiousness	.328	.015	(.029)	.619	.619	.278	-.078	(.024)	***.002***	***.006***
	Openness		-.006	(.032)	.863	.863		.086	(.024)	***.000***	***.002***
	Extraversion		.022	(.027)	.381	.756		-.077	(.023)	***.004***	***.006***
	Agreableness		-.028	(.028)	.298	.559		.002	(.025)	.918	.918
	Neuroticism		.137	(.025)	***.000***	***.000***		.120	(.020)	***.000***	***.000***
	Cognition		.000	(.023)	.989	1.000		-.013	(.020)	.536	.870
	Bachelor's degree or above		-.040	(.048)	.400	.683		-.052	(.042)	.204	.474
	Joint				***.000***	***.000***				***.000***	***.000***
Mental Difficulty in 1950	Conscientiousness	.333	.042	(.031)	.167	.409	.272	-.040	(.024)	***.088***	***.088***
	Openness		.015	(.033)	.612	.944		.034	(.026)	.190	.190
	Extraversion		.015	(.029)	.610	.839		.008	(.025)	.762	.762
	Agreableness		.003	(.029)	.895	.895		-.030	(.028)	.280	.536
	Neuroticism		.134	(.027)	***.000***	***.000***		.111	(.021)	***.000***	***.000***
	Cognition		.010	(.024)	.655	.916		.001	(.019)	.946	.946
	Bachelor's degree or above		.001	(.049)	.970	.970		.033	(.043)	.460	.768
	Joint				***.000***	***.000***				***.000***	***.000***
Mental Difficulty in 1960	Conscientiousness	.344	.024	(.030)	.422	.619	.294	-.080	(.027)	***.006***	***.008***
	Openness		-.009	(.034)	.777	.976		.091	(.027)	***.004***	***.008***
	Extraversion		.012	(.028)	.681	.681		-.101	(.024)	***.000***	***.000***
	Agreableness		-.044	(.031)	.141	.355		.030	(.028)	.288	.598
	Neuroticism		.123	(.027)	***.000***	***.000***		.120	(.022)	***.000***	***.000***
	Cognition		-.017	(.024)	.490	.829		.009	(.022)	.640	.942
	Bachelor's degree or above		-.042	(.050)	.403	.734		.003	(.044)	.948	.948
	Joint				***.000***	***.000***				***.000***	***.000***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 14: General Health

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Never Poor or Fair Health in 1940-1960	Conscientiousness	.873	.024	(.023)	.287	.679	.926	.012	(.015)	.428	.659
	Openness		-.012	(.023)	.621	.925		-.032	(.014)	***.028***	***.070***
	Extraversion		.009	(.020)	.640	.934		.019	(.014)	.169	.283
	Agreableness		-.016	(.015)	.259	.259		.005	(.013)	.659	.880
	Neuroticism		-.044	(.018)	***.009***	***.009***		-.021	(.015)	.157	.157
	Cognition		-.017	(.019)	.394	.754		.003	(.011)	.745	.992
	Bachelor's degree or above		.116	(.035)	***.000***	***.002***		.046	(.026)	***.078***	.237
	Joint				***.002***	***.003***				***.096***	***.096***
General Health in 1940	Conscientiousness	-.016	-.029	(.066)	.657	.880	.029	.043	(.057)	.446	.446
	Openness		-.021	(.074)	.805	.946		-.081	(.058)	.161	.277
	Extraversion		-.096	(.064)	.124	.360		.103	(.051)	***.058***	.155
	Agreableness		-.133	(.056)	***.019***	***.071***		-.029	(.059)	.671	.944
	Neuroticism		-.318	(.051)	***.000***	***.000***		-.279	(.056)	***.000***	***.000***
	Cognition		.009	(.052)	.880	.880		-.007	(.044)	.890	.890
	Bachelor's degree or above		.283	(.106)	***.004***	***.019***		.164	(.108)	.114	.223
	Joint				***.000***	***.000***				***.000***	***.000***
General Health in 1950	Conscientiousness	-.005	-.011	(.067)	.872	.872	-.004	.135	(.052)	***.008***	***.036***
	Openness		.018	(.072)	.769	.769		-.152	(.056)	***.014***	***.032***
	Extraversion		.029	(.065)	.668	.863		.096	(.052)	***.060***	.147
	Agreableness		-.094	(.052)	***.056***	.148		.003	(.055)	.956	.956
	Neuroticism		-.267	(.055)	***.000***	***.000***		-.242	(.056)	***.000***	***.000***
	Cognition		-.025	(.055)	.610	.944		-.020	(.043)	.671	.972
	Bachelor's degree or above		.172	(.100)	***.094***	.154		.143	(.105)	.173	.173
	Joint				***.000***	***.000***				***.000***	***.000***
General Health in 1960	Conscientiousness	.006	.048	(.081)	.522	.880	-.012	.056	(.058)	.351	.697
	Openness		-.070	(.080)	.405	.805		-.040	(.065)	.560	.560
	Extraversion		.017	(.071)	.835	.835		.068	(.071)	.329	.329
	Agreableness		-.087	(.060)	.148	.244		.094	(.062)	***.090***	.355
	Neuroticism		-.241	(.060)	***.002***	***.002***		-.211	(.058)	***.000***	***.000***
	Cognition		.021	(.054)	.704	.895		-.011	(.044)	.841	.978
	Bachelor's degree or above		.060	(.109)	.582	.582		.197	(.120)	***.096***	.243
	Joint				***.003***	***.003***				***.001***	***.002***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 15: Physical Activity and BMI

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Exercise	Conscientiousness	.173	.027	(.027)	.316	-	.176	.002	(.024)	.926	-
	Openness		-.048	(.031)	.118	-		-.044	(.026)	***.089***	-
	Extraversion		-.039	(.029)	.185	-		.000	(.027)	.988	-
	Agreableness		-.016	(.028)	.583	-		.011	(.030)	.709	-
	Neuroticism		-.025	(.028)	.364	-		-.066	(.026)	***.012***	-
	Cognition		.026	(.023)	.252	-		-.007	(.020)	.720	-
	Bachelor's degree or above		.010	(.046)	.829	-		.108	(.058)	***.062***	-
	Joint				.402					***.059***	
BMI	Conscientiousness	.160	.009	(.024)	.718	-	.225	-.007	(.022)	.807	-
	Openness		.010	(.025)	.699	-		-.014	(.023)	.456	-
	Extraversion		-.012	(.023)	.595	-		-.001	(.022)	.783	-
	Agreableness		-.010	(.025)	.688	-		-.037	(.023)	.120	-
	Neuroticism		-.037	(.021)	***.071***	-		.021	(.021)	.842	-
	Cognition		-.006	(.017)	.730	-		-.019	(.018)	.159	-
	Bachelor's degree or above		-.074	(.042)	***.075***	-		.012	(.044)	.661	-
	Joint				.486					.571	
Ever Smoked	Conscientiousness	.425	-.052	(.050)	.294	-	.521	-.107	(.045)	***.017***	-
	Openness		-.019	(.054)	.731	-		.016	(.055)	.773	-
	Extraversion		.013	(.045)	.770	-		.067	(.046)	.145	-
	Agreableness		-.003	(.050)	.951	-		.057	(.048)	.228	-
	Neuroticism		.023	(.045)	.606	-		.029	(.048)	.549	-
	Cognition		.002	(.033)	.940	-		.017	(.039)	.672	-
	Bachelor's degree or above		.089	(.081)	.273	-		.165	(.119)	.163	-
	Joint				.772					.162	

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 16: Group Membership

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Any Organization in 1940-1960	Conscientiousness	.900	.027	(.018)	.123	.319	.937	.000	(.013)	.969	.969
	Openness		.000	(.019)	.978	.978		.004	(.014)	.732	.924
	Extraversion		.024	(.020)	.225	.511		.020	(.012)	***.096***	.340
	Agreableness		.003	(.023)	.901	.985		.009	(.015)	.534	.808
	Neuroticism		.003	(.017)	.852	.852		-.011	(.013)	.377	.621
	Cognition		.006	(.013)	.581	.581		-.017	(.011)	***.002***	***.004***
	Bachelor's degree or above		.066	(.033)	***.044***	***.044***		.084	(.027)	.107	.203
	Joint				.400	.400				***.007***	***.022***
# of Organizations in 1940	Conscientiousness	2.506	.162	(.115)	.156	.273	2.435	.086	(.092)	.349	.786
	Openness		-.138	(.124)	.244	.526		-.107	(.102)	.281	.721
	Extraversion		.132	(.111)	.233	.407		.073	(.085)	.399	.619
	Agreableness		.056	(.096)	.559	.916		.034	(.095)	.728	.728
	Neuroticism		.101	(.085)	.238	.604		-.072	(.078)	.355	.732
	Cognition		-.093	(.085)	.278	.458		-.175	(.078)	.111	.111
	Bachelor's degree or above		.789	(.175)	***.000***	***.000***		.245	(.154)	***.028***	***.081***
	Joint				***.001***	***.003***				.114	.114
# of Organizations in 1950	Conscientiousness	1.565	.186	(.098)	***.062***	.198	2.714	.007	(.120)	.972	1.000
	Openness		.046	(.124)	.707	.919		-.034	(.132)	.765	.765
	Extraversion		.169	(.104)	***.084***	.333		-.001	(.132)	.993	.993
	Agreableness		.007	(.112)	.958	.958		.258	(.114)	***.015***	***.087***
	Neuroticism		-.104	(.092)	.244	.535		-.008	(.107)	.926	.926
	Cognition		-.120	(.079)	.143	.352		.012	(.104)	***.000***	***.000***
	Bachelor's degree or above		.877	(.153)	***.000***	***.000***		1.172	(.198)	.919	.919
	Joint				***.000***	***.000***				***.000***	***.000***
# of Organizations in 1960	Conscientiousness	2.567	.072	(.154)	.676	.676	3.423	-.033	(.149)	.810	.993
	Openness		.248	(.162)	.117	.394		.142	(.164)	.373	.741
	Extraversion		-.139	(.157)	.346	.346		-.182	(.142)	.203	.505
	Agreableness		-.135	(.170)	.383	.877		.255	(.144)	***.076***	.190
	Neuroticism		.105	(.137)	.454	.685		-.214	(.122)	***.085***	.257
	Cognition		-.352	(.128)	***.007***	***.022***		.327	(.121)	***.000***	***.000***
	Bachelor's degree or above		1.213	(.256)	***.000***	***.000***		1.501	(.244)	***.002***	***.031***
	Joint				***.000***	***.000***				***.000***	***.000***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 17: Marriage Status

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Never Married	Conscientiousness	.085	.017	(.016)	.281	.492	.061	.023	(.012)	***.048***	.106
	Openness		.012	(.021)	.559	.559		.012	(.011)	.263	.263
	Extraversion		-.001	(.017)	.937	.937		-.028	(.014)	***.036***	.158
	Agreableness		.004	(.019)	.805	.805		-.017	(.013)	.189	.556
	Neuroticism		.005	(.017)	.784	.940		.024	(.011)	***.024***	.120
	Cognition		-.023	(.012)	***.044***	.209		-.014	(.009)	.120	.341
	Bachelor's degree or above		.074	(.022)	***.002***	***.007***		-.006	(.022)	.797	.797
	Joint				***.006***	***.024***				***.006***	***.019***
Married Once and Still Married	Conscientiousness	.456	-.003	(.029)	.912	.912	.614	.056	(.025)	***.022***	***.072***
	Openness		-.024	(.035)	.494	.717		-.048	(.028)	***.091***	.192
	Extraversion		-.008	(.031)	.770	.963		.011	(.026)	.687	.871
	Agreableness		.029	(.032)	.297	.691		.031	(.029)	.301	.621
	Neuroticism		-.006	(.030)	.833	.833		-.010	(.023)	.694	.694
	Cognition		-.007	(.026)	.775	.775		.012	(.021)	.627	.866
	Bachelor's degree or above		.129	(.051)	***.012***	***.053***		.120	(.048)	***.010***	***.050***
	Joint				.235	.235				***.014***	***.027***
Ended up Divorced	Conscientiousness	.133	-.041	(.022)	***.063***	.251	.068	-.023	(.014)	***.084***	***.084***
	Openness		.039	(.027)	.146	.466		.050	(.015)	***.002***	***.007***
	Extraversion		.023	(.019)	.244	.596		-.027	(.014)	***.045***	.158
	Agreableness		-.013	(.020)	.506	.726		.000	(.015)	.971	.971
	Neuroticism		.011	(.021)	.617	.933		.024	(.012)	***.053***	.127
	Cognition		.008	(.016)	.594	.937		-.018	(.010)	***.074***	.264
	Bachelor's degree or above		-.039	(.035)	.262	.262		-.007	(.025)	.773	.969
	Joint				***.089***	.178				***.006***	***.022***
Ever Divorced	Conscientiousness	.253	-.032	(.027)	.227	.524	.267	-.055	(.022)	***.012***	***.055***
	Openness		.036	(.032)	.248	.575		.039	(.024)	.105	.189
	Extraversion		.027	(.026)	.278	.629		-.020	(.023)	.392	.698
	Agreableness		-.038	(.026)	***.077***	.323		-.045	(.026)	***.072***	.307
	Neuroticism		.045	(.027)	***.079***	.237		.026	(.021)	.230	.331
	Cognition		.022	(.022)	.318	.705		-.012	(.019)	.510	.878
	Bachelor's degree or above		-.111	(.046)	***.019***	***.046***		-.137	(.044)	***.002***	***.012***
	Joint				***.000***	***.001***				***.000***	***.001***
Divorced at least Twice	Conscientiousness	.064	-.034	(.019)	***.070***	.253	.067	-.044	(.015)	***.002***	***.022***
	Openness		.022	(.019)	.213	.619		.031	(.014)	***.026***	***.094***
	Extraversion		.026	(.015)	***.077***	.295		-.004	(.012)	.773	.773
	Agreableness		.034	(.016)	***.035***	.107		.002	(.013)	.854	.978
	Neuroticism		.028	(.016)	***.086***	.244		.025	(.012)	***.043***	.129
	Cognition		.005	(.011)	.640	.870		-.002	(.010)	.785	.785
	Bachelor's degree or above		-.054	(.026)	***.056***	***.086***		-.042	(.027)	.117	.331
	Joint				***.008***	***.023***				***.024***	***.024***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005).

Table 18: Life-cycle Earnings

		Females					Males				
		mean	effect	std. error	p-value	stepdown adjusted p-value	mean	effect	std. error	p-value	stepdown adjusted p-value
Lifetime Wages	Conscientiousness	271.997	-7.761	(16.370)	.824	.937	1115.885	34.003	(34.462)	.299	.393
Discounted 3%	Openness		31.623	(18.171)	.433	.500		-75.290	(43.168)	***.090***	.192
	Extraversion		-16.679	(16.495)	.622	.805		79.908	(32.102)	***.014***	***.026***
	Agreableness		-23.526	(16.693)	.120	.397		-94.713	(36.553)	***.004***	***.018***
	Neuroticism		-24.824	(15.653)	***.084***	.263		-48.963	(32.901)	.130	.178
	Cognition		-1.203	(11.061)	.889	.889		44.431	(24.693)	***.074***	.120
	Bachelor's degree or above		44.451	(26.910)	.164	.300		209.191	(63.163)	***.000***	***.000***
	Joint				.230	.230				***.000***	***.000***
Wages at age 40	Conscientiousness	11.541	-.677	(1.090)	.538	.941	62.231	.801	(2.489)	.725	.725
	Openness		.533	(1.178)	.637	.637		-3.908	(3.389)	.253	.429
	Extraversion		-.967	(1.013)	.347	.504		3.843	(2.326)	.102	.176
	Agreableness		-.842	(1.148)	.475	.475		-6.556	(2.346)	***.004***	***.008***
	Neuroticism		.104	(.961)	.912	.912		-1.940	(2.187)	.325	.325
	Cognition		3.946	(1.686)	.210	.576		3.280	(1.723)	***.056***	.118
	Bachelor's degree or above		-.887	(.707)	***.008***	***.084***		14.585	(4.875)	***.000***	***.000***
	Joint				.390	.390				***.000***	***.000***
Wages at age 50	Conscientiousness	16.083	.391	(1.368)	.767	.767	71.503	4.606	(2.739)	***.088***	.198
	Openness		1.904	(1.468)	.183	.305		-5.601	(3.124)	***.072***	.210
	Extraversion		-.687	(1.539)	.628	.628		4.122	(2.564)	.120	.120
	Agreableness		-1.716	(1.330)	.176	.380		-6.787	(2.725)	***.012***	***.018***
	Neuroticism		-1.549	(1.307)	.221	.357		-6.553	(2.622)	***.012***	***.032***
	Cognition		3.303	(2.278)	.786	.952		4.758	(2.228)	***.030***	***.094***
	Bachelor's degree or above		.298	(1.119)	.130	.231		19.788	(4.990)	***.000***	***.000***
	Joint				.296	.296				***.000***	***.000***
Wages at age 60	Conscientiousness	15.327	-1.028	(1.440)	.464	.947	62.001	4.404	(3.250)	.182	.305
	Openness		3.903	(1.696)	***.021***	.279		-3.562	(3.365)	.291	.291
	Extraversion		-1.533	(1.509)	.328	.845		5.814	(2.805)	***.040***	***.090***
	Agreableness		-1.652	(1.571)	.288	.456		-4.637	(3.375)	.182	.182
	Neuroticism		-4.650	(1.453)	***.002***	***.004***		-7.466	(3.173)	***.012***	***.042***
	Cognition		2.551	(2.469)	.511	.880		.637	(2.483)	.802	.802
	Bachelor's degree or above		.654	(1.078)	.311	.311		30.530	(5.399)	***.000***	***.000***
	Joint				***.029***	.116				***.000***	***.000***

Notes: Calculations are based on the Terman data. Statistically significant p-values at the 10% level are bolded. p-values are calculated using bootstrap techniques, and further adjusted using the stepdown procedure in Romano and Wolf (2005). Earnings measures are net of tuition paid for schooling and taxes, in 2010 dollars.