



Who are the low educational achievers? An analysis in relation to gender, emotional stability and conscientiousness

Caroline Wehner & Trudie Schils

To cite this article: Caroline Wehner & Trudie Schils (2021) Who are the low educational achievers? An analysis in relation to gender, emotional stability and conscientiousness, *Applied Economics*, 53:46, 5354-5368, DOI: [10.1080/00036846.2021.1922592](https://doi.org/10.1080/00036846.2021.1922592)

To link to this article: <https://doi.org/10.1080/00036846.2021.1922592>



© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.



Published online: 30 May 2021.



[Submit your article to this journal](#)



Article views: 1903



[View related articles](#)



[View Crossmark data](#)



Citing articles: 2 [View citing articles](#)

ARTICLE

 OPEN ACCESS Check for updates

Who are the low educational achievers? An analysis in relation to gender, emotional stability and conscientiousness

Caroline Wehner ^{a,b,c,d} and Trudie Schils ^e

^aFederal Institute for Vocational Education and Training (BIBB), Economics of VET, Bonn, Germany; ^bInstitute of Labor Economics (IZA), Bonn, Germany; ^cResearch Centre for Education and the Labour Market (ROA), Maastricht University, Maastricht, The Netherlands; ^dUnited Nations University – Maastricht Economic and Social Research Institute on Innovation and Technology (UNU-MERIT), Maastricht, The Netherlands; ^eDepartment of Macro International and Labour Economics, School of Business and Economics, Maastricht University, Maastricht, The Netherlands

ABSTRACT

Low educational qualification, i.e. reaching no or only a very basic educational degree, substantially decreases an individual's prospects on today's labour market. Emotional stability and conscientiousness are known to be predictive of educational achievement. Nevertheless, the moderating role of these two personality traits on the outcome of low educational qualification, and the interaction with gender are far less explored. In this paper, we use rich data from the British Cohort Study 1970 to analyse the relationship between personality measured in adolescence and educational achievement in adulthood. Our results show that less emotionally stable and less conscientious females have the highest risk of reaching only a low educational qualification. In contrast, more emotionally stable and less conscientious males face an above average risk of reaching a low educational qualification. Our results suggest that neglecting gender differences in the moderating relation of these two personality traits on low educational achievement is likely misleading.

KEYWORDS

Low educational achievement; adolescence and adult age; personality differences; gender heterogeneity

JEL CLASSIFICATION

I20; I24; J16

1. Introduction

Low achievement in education is related to negative outcomes in later life, e.g. low wages, but also health problems, and therefore it is high on the policy agenda (OECD 2017). Remedying interventions are developed targeting social emotional aspects, such as personality, that limit optimal student performance (e.g. Damgaard and Nielsen 2018). Less emotional stability and less conscientiousness are generally considered to be associated with low educational achievement (e.g. Almlund et al. 2011; Poropat 2014). Moreover, important gender heterogeneity in educational achievement has been documented, which is in part related to gender differences in personality traits (e.g. Cornwell, Mustard, and Van Parys 2013; Fischer, Schult, and Hell 2013). However, little is known about the interaction effect between emotional stability and conscientiousness in the relationship with low educational achievement and gender differences therein. It is important to obtain

additional insights into these interrelations to avoid misleading results. These may jeopardize the success of related (school) interventions targeting low educational achievers.

This article discusses the interaction effect between emotional stability and conscientiousness among individuals aged 16 in relation to low educational achievement, i.e. reaching no or only a very basic educational degree, at the age of 30. Thereby, we explicitly analyse gender heterogeneity. Data are used from the rich British Cohort Study 1970 (BCS70), which allows us to trace individual history from birth to adulthood and include measurements for personality traits,¹ cognitive ability, socioeconomic background in childhood, and educational achievement.

Our results show that less emotionally stable and less conscientious females have the highest risk of reaching only a low educational qualification. For females, more emotional stability and more conscientiousness are positively related to educational

CONTACT Caroline Wehner  wehner@bibb.de  Federal Institute for Vocational Education and Training (BIBB), Robert-Schuman-Platz 3, Bonn 53175, Germany

¹We assess personality using the Big-5 personality inventory (Goldberg 1993; McCrae and John 1992), which contains the five following personality traits (OCEAN): Openness (O), conscientiousness (C), extraversion (E), agreeableness (A) and neuroticism (N). Emotional stability is defined as the reverse of neuroticism.

© 2021 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

achievement and interact positively in their relation with educational outcomes. This means that more conscientiousness is able to mitigate some of the negative effects associated with less emotional stability in reaching a low educational qualification. Interestingly, among males, more emotional stability and less conscientiousness increases the risk of reaching a low educational qualification, while less emotionally stable and less conscientious males have a lower risk for low educational achievement. This indicates that less emotional stability does not seem to be a penalty, but may actually be an advantage for males at the lower part of the educational distribution. Furthermore, for males no interaction between emotional stability and conscientiousness is observed in relation to a low educational qualification. In contrast, an additional analysis shows that more emotional stability and more conscientiousness correlates positively with obtaining an academic degree for both genders. This also holds when the two personality traits are interacted.

This study's contribution to the economic literature is threefold. First, we specifically address the interaction effect between emotional stability and conscientiousness in relation to low educational achievement. To our knowledge, this has not been studied within the current literature. Second, we explore gender differences in regard to this relationship. Third, we show that it is important to analyse the relation between emotional stability and conscientiousness with educational achievement by distinguishing between different parts of the educational distribution.

These insights furthered our understanding of heterogeneity in low educational achievement. As females and males exhibit different relationships between emotional stability and educational achievement throughout the ability distribution, our results also provide important input for policymakers. It stresses the importance of diversity in policy making.

In the next section, we discuss the relevant economic and psychological literature. We then introduce the data and present our results. Finally, we discuss our findings and provide a conclusion.

II. Literature

Personality and educational achievement

It is well documented that students' cognitive ability is not the sole predictor of educational success or future outcomes of children. This includes labour market success, risky behaviour, and health (e.g. Campbell et al. 2014; Heckman, Pinto, and Savelyev 2013; Lundborg, Nystedt, and Rooth 2014; Spengler, Damian, and Roberts 2018).

The educational and psychological literature yields more information on the exact aspects of the non-cognitive factors that contribute to educational achievement. Among such factors are the ability to plan and organize tasks, self-discipline, future goal orientation, self-concept, daily learning routines, coping with stress, test anxiety, and control expectations (Corker and Donnellan 2012; Hodis et al. 2011; Lee et al. 2010; McClure et al. 2011). In recent years, a range of learning programmes have been implemented in schools, targeted at the development of non-cognitive skills among students, in particular the low educational achievers. These programmes are grounded in psychological theories.

Some theories point to varied coping styles (i.e. problemsolving thoughts and actions). Ursin and Eriksen's Cognitive Activation Theory of Stress, for example, contemplates that individuals react with arousal when they are confronted with a stimulus that is defined as the discrepancy between what the individual expects and what actually happens. The extent of stress and the way it affects student learning behaviours in school depends on individual stimuli and response outcome expectancies, which are based on previous experiences and learning; these are expected to differ between students with different personalities, including the elements of emotional stability and conscientiousness (Cervone and Pervin 2014; Connor-Smith and Flachsbart 2007; Ursin and Eriksen 2004).

Less emotional stability relates to the degree to which a person experiences the world as threatening. It includes several important facets, such as anxiety, anger, hostility, depression, self-consciousness, impulsiveness, and vulnerability (Hogan and Hogan 2007; Matthews, Deary, and

Whiteman 2009). Persons with less emotional stability are more likely to report low self-esteem, worrying, insecurity, and nervousness (Cervone and Pervin 2014). They may also have heightened stress-reactivity and use emotion-focused coping strategies such as procrastination or avoidance (Campbell-Sills, Cohan, and Stein 2006; Connor-Smith and Flachsbart 2007). These coping strategies may reduce negative emotions and produce relief, which can be considered short-term gains. These short-term gains are likely to be outweighed by long-term costs (i.e. lower grades due to less effective schoolwork preparation), creating a self-fulfilling prophecy. Individuals with less emotional stability may be trapped in destructive patterns regarding expectations, feelings, and behaviours that are related to ineffective learning strategies and worsened educational outcomes (Wehner 2018). Empirical studies have shown that less emotional stability is negatively related to student grades and participation (Almlund et al. 2011; Fouarge, Schils, and De Grip 2013; Golsteyn and Schils 2014; Mendolia and Walker 2014; Migali and Zucchelli 2017; Poropat 2014; Ryan, Delaney, and Harmon 2013). Recently, Iterbeke and De Witte (2020) have shown that students with less emotional stability experienced the school closure and remote learning due to the covid-pandemic as more negative.

Conscientious students, by contrast, are more likely to apply problem-focused and engaged coping strategies (Connor-Smith and Flachsbart 2007). These students are also considered organized, persistent, and ambitious (Cervone and Pervin 2014). Here, conscientiousness refers to the degree to which a person is willing to comply with conventional rules. The most important facets include competence, order, dutifulness, achievement, striving, self-discipline, and deliberation (Hogan and Hogan 2007; Matthews, Deary, and Whiteman 2009). Conscientious students are more likely to establish and refine an appropriate work organization and engage in proper time management. They also have the self-discipline to realize their plans. Conscientiousness seems more related to behaviour rather than emotion and contributes to both effective learning strategies and higher school performance (Almlund et al. 2011; Golsteyn and Schils 2014; Iterbeke and De Witte 2020; MacCann

et al. 2012; Mendolia and Walker 2014; Migali and Zucchelli 2017; Poropat 2014; Ryan, Delaney, and Harmon 2013; Saklofske et al. 2012).

While these studies demonstrate a great deal of knowledge on the relationship between single personality traits and educational achievement, less is known about the interaction between the personality traits and low educational achievement. For example, increased levels of conscientiousness may mitigate the negative relationship between less emotional stability and low educational achievement, due to the higher probability of engagement and problem-focused coping.

In the health literature, for example, a debate emerged about whether such a trait interaction is a better predictor for physical health than emotional stability alone (Friedman, Kern, and Reynolds 2010). Some studies show evidence for 'healthy neuroticism', i.e. being less emotionally stable and more conscientious people show more healthy behaviour in certain domains (Graham et al. 2020; Naragon-Gainey and Simms 2017; Weston and Jackson 2015). Other studies show no such interaction, e.g. for serious diseases that are likely to be genetic (Weston et al. 2020; Turiano et al. 2020), but also on precautionary behaviour in relation to COVID-19 (Aschwanden et al. 2020).

A few studies looked into this interaction in a work-related environment. Some studies find no effects for 'beneficial neuroticism' on helping behaviour at work or being counterproductive at work (e.g. Jensen and Patel 2011; King, George, and Hebl 2005). In a recent paper, Kreil et al. (2021) observed 'beneficial neuroticism' in highly investigative job environments, i.e. workers that are less emotionally stable and more conscientiousness are more in control and report higher job satisfaction. To our knowledge, in the education economic literature this issue of trait interactions and the possible existence of 'beneficial neuroticism' is not targeted yet.

Emotional stability, conscientiousness, and gender

Gender differences are apparent when addressing educational outcomes. Many studies report that gender differences in educational achievement are related to specific subjects (e.g. maths or reading) (Bedard and Cho 2010; Cornwell, Mustard, and

Van Parys 2013; Ellison and Swanson 2010; Fryer and Levitt 2010; Lai 2010). Other studies report the existence of gender differences in test scores in relation to the importance of the test, with boys showing a larger difference in performance between low and high stakes tests than girls (Attali, Neeman, and Schlosser 2011).

Not only are gender differences observable in educational achievement, research also indicates important gender differences in emotional stability and conscientiousness (Else-Quest et al. 2006; Fischer, Schult, and Hell 2013; Schmitt et al. 2008). In general, conscientiousness levels are higher among females than males, especially for facets that relate to increased organization and diligence. Furthermore, females generally show lower levels of emotional stability than males. This includes lower levels of self-confidence and higher levels of anxiety. The extent of the observed gender differences changes with the age of the observed population. Moreover, some non-cognitive skills (e.g. self-discipline or self-control) have been found to partially mediate gender differences in educational achievement (Cornwell, Mustard, and Van Parys 2013; Duckworth et al. 2015; Spinath, Eckert, and Steinmayr 2014; Spinath, Freudenthaler, and Neubauer 2010). There might also be gender differences in the relation between emotional stability, conscientiousness and low educational achievement, but this issue has to our knowledge not been studied so far.

A few studies investigated gender differences in the trait interaction between emotional stability and conscientiousness in relation to health outcomes. Both Roberts et al. (2009) and Turiano et al. (2013) found that males in particular showed 'healthy neuroticism' related to physical health. Males exhibiting these behaviours are more likely to seriously consider the risk factors for physical health and initiate proper actions to prevent problems. Aschwanden et al. (2019) find something similar for females for certain types of cancer, i.e. less emotionally stable and more conscientious

females were more likely to undertake a cervical screening test. The interaction was not observed for breast or colorectal screenings. This raises the question as to whether similar gender differences are observed in the interaction between emotional stability and conscientiousness with respect to low educational achievement.

III. Data

This study is based on the British Cohort Study 1970 (BCS70).² Our analysis relies on a working sample restricted to cases with available information on cognitive ability among individuals aged 10, personality among those aged 16, educational achievement among those aged 30, gender, socioeconomic background, the region in which individuals lived at birth, and the age of the mother. Only individuals with no missing values are considered for the analysis, thereby resulting in 4,203 observations.

We addressed the issue of possible sample selection by comparing the working sample with the unrestricted sample, as seen in Table 1. The procedure shows that the working sample is selective. On average, people in the working sample are more emotionally stable and more conscientious, have higher cognitive ability, are from advantaged socioeconomic backgrounds, and have slightly older mothers. We thus likely estimate lower bound results so that these associations may have been even larger in the unrestricted sample.³

Educational achievement

We focus on educational achievement at the age of 30 because most individuals have achieved their highest educational degree by that time. Two dependent variables are used in the analysis. To investigate the relation between personality, gender and educational achievement in general, the highest National Vocational Qualification (NVQ) at the age of 30 was analysed. The NVQ considers both vocational and academic qualifications. A NVQ score of 0 indicates

²The following BCS70 waves were used: Chamberlain, Chamberlain, and University of London (2013) (birth), Butler and Bynner (2014) (age, 10), Butler and Bynner (2013) (age, 16), University of London, Institute of Education, Centre for Longitudinal Studies (2013) (age, 30).

³A multiple imputation of missing values with regard to the personality trait variables was performed to test the robustness of the results. Personality items were imputed if there were five or fewer missing values out of the 22 total items. The imputation of missing values resulted in an increase of the sample size to 4,908 observations. These results were consistent with the main results and are available upon request.

Table 1. Descriptive statistics.

Variable Names	Working Sample					Unrestricted Sample				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
Highest NVQ Level (Age 30)	4203	2.69	1.38	0.00	5.00	7704	2.56	1.42	0.00	5.00
Low Edu. Qualification (Age 30)	4203	0.17	0.38	0.00	1.00	7704	0.20	0.40	0.00	1.00
Emotional Stability (ES, Age 16)	4203	0.06	0.95	-4.60	0.85	6768	0.00	1.00	-4.60	0.85
Conscientiousness (C, Age 16)	4203	0.06	0.94	-4.76	0.71	6768	0.00	1.00	-4.76	0.71
Agreeableness (A, Age 16)	4203	0.07	0.90	-7.69	0.52	6768	0.00	1.00	-8.29	0.52
Extraversion (E, Age 16)	4203	0.03	0.96	-5.49	0.98	6768	0.00	1.00	-5.49	0.98
Male	4203	0.46	0.50	0.00	1.00	10,046	0.50	0.50	0.00	1.00
Cognitive Ability (Age 10)	4203	0.15	0.93	-3.51	2.18	8586	0.00	1.00	-4.10	2.18
Higher SES Parents (Birth)	4203	0.20	0.40	0.00	1.00	10,033	0.19	0.39	0.00	1.00
Region (Birth)	4203	5.66	2.71	1.00	10.00	10,046	5.69	2.64	1.00	11.00
Age Mother (Birth)	4203	22.64	3.94	14.00	46.00	9989	22.33	3.96	13.00	47.00

Source: BCS70, own calculations.

SES refers to the term socioeconomic status and NVQ to National Vocational Qualification.

that no qualification level is reached, while a NVQ score of 1 equals a low Ordinary Level (O level) or a Certificate of Secondary Education (CSE) between grades 2 through 5. A NVQ score of 2 includes a good O level, two or more AS (Advanced Subsidiary) levels, or one A (Advanced) level, and a NVQ score of 3 equals more than one A level. A NVQ score of 4 refers to a bachelor's or master's degree or Postgraduate Certificate in Education (PGCE), and a NVQ score

of 5 indicates higher degrees (e.g. doctorates) (Dodgeon et al. 2011).

To specifically zoom in on the low educational achievers, we use a binary variable 'low educational qualification'. The variable equals 1 if respondents have only reached an NVQ score of 0 or 1, while it equals 0 if respondents have reached an NVQ score of 2 or higher by the age of 30.

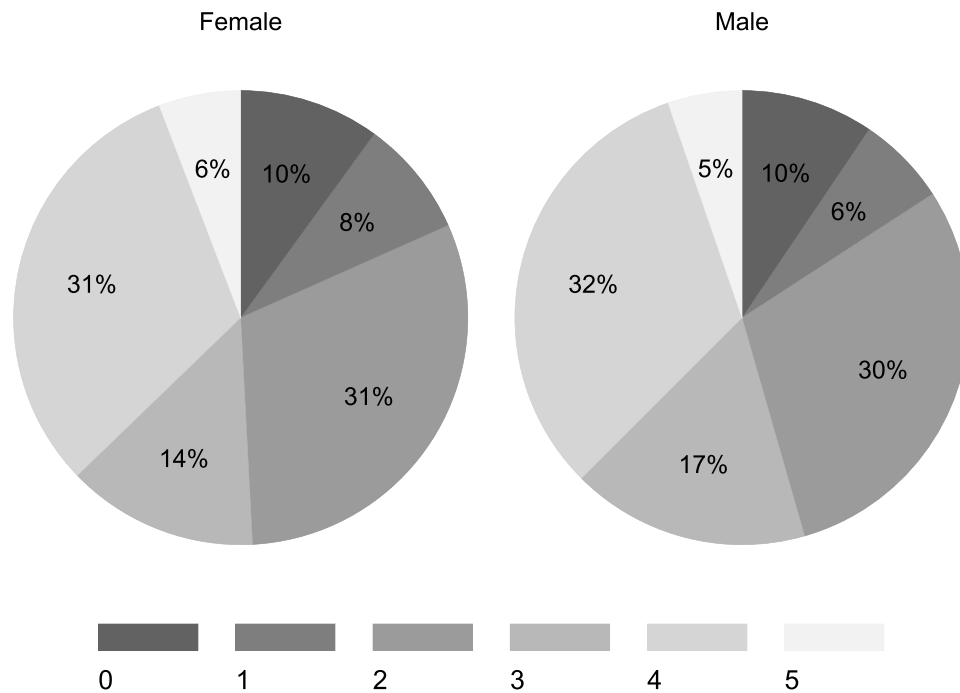


Figure 1. National Vocational Qualification (NVQ) scores by the age of 30. Source: BCS70. Own calculations, $n = 4203$ (females = 2279; males = 1924).

Figure 1 provides descriptive information about the distribution of educational achievement at the age of 30. On average 17% of the working sample respondents have a low educational qualification (NVQ scores of 0–1).⁴ The percentage of females reaching low educational qualification is slightly higher than that for males.

Emotional stability and conscientiousness

The BCS70 does not directly provide information about the personality traits of emotional stability, conscientiousness, agreeableness, or extraversion. In order to assess the personality of the individuals in the analysis, this study follows Prevoo and Ter Weel (2015), who use BCS70 mother-rated behavioural items at the age of 16 and extract emotional stability, conscientiousness, extraversion, and agreeableness from an initial set of 38 behavioural items. The latter two traits are included as controls.

A principle component factor analysis is performed using the proposed 22 standardized items to test the validity of the personality trait structure. The first four factors have eigenvalues larger than one and most items load highly on their respective factors. Each trait is assessed by extracting the first principle component from the set of items belonging to it. An overview of the reliability measures that correspond to the four personality traits is provided in Table 2. The results are comparable to those reported by Prevoo and Ter Weel (2015).

Figure 2 presents the distribution by gender of the personality traits at the age of 16. The figure shows that females score higher in conscientiousness, but lower in emotional stability when compared to males; this is well-established in the literature (Schmitt et al. 2008).

Additional controls

Controls are included for the mother's age, mother's age squared, parental socioeconomic status, region of living at birth, and cognitive ability.

Table 2. Personality traits at age 16.

Personality	Explained	Cronbach's	
		Alpha	Items
Emotional Stability	55.40%	0.84	R9. Miserable and tearful. C8. Requests must be met. C12. Sullen or sulky. C16. Changes mood quickly. C17. Temper unpredictable.
Conscientiousness	63.85%	0.81	C3. Easily distracted. C13. Fails to finish things. C19. Difficulty concentrating.
Agreeableness	42.32%	0.77	R4. Frequently fights. R10. Takes others' belongings. R14. Often disobedient. R18. Often tells lies. R19. Bullies other children. C11. Interferes with others.
Extraversion	36.28%	0.57	R6. Often worried. R7. Rather solitary. R16. Afraid of new things. R17. Fussy or over-particular.

Source: BCS70, own calculations based on working sample $n = 4203$. Items are stated in original terms, but were reversely used in the analysis.

Parental socioeconomic status is a binary variable (a value of 1 or 0). It equals 1 if the highest parental occupational status is nonmanual, managerial, technical, or professional, and equals 0 if the child has a non-working single parent, parents are unskilled or partly-skilled, or when the highest occupational status of the parents involves manual work. All variables are presented in Table 1.

Following Prevoo and Ter Weel (2015), cognitive ability is measured by using test scores at the age of 10 because it can be considered rank-order stable at that time (Lebel and Beaulieu 2011). Table 3 provides all test scores available at the age of 10. Results are analysed based on the Shortened Edinburgh Reading Test (ERT), the Friendly Maths Test (FMT), the Pictorial Language Comprehension Test (PLCT), and the diagnostic spelling test. This is because these tests contain the lowest numbers of missing values and measure a broad range of cognitive skills. The measure of cognitive ability is assessed according to a calculation of the share of correct answers per test. A standardized score (i.e. a mean of 0 and standard deviation of 1) is achieved out of these four shares per person.

⁴The working sample was compared with data from Eurostat (2021) to check the plausibility of the results. Eurostat data from 2010 indicate that 22% of those aged 35 to 45 years had reached less than primary, primary or lower secondary education, while 37% had finished tertiary education. Differences with regard to low achievers may be explained by the positive selection of respondents in the working sample.

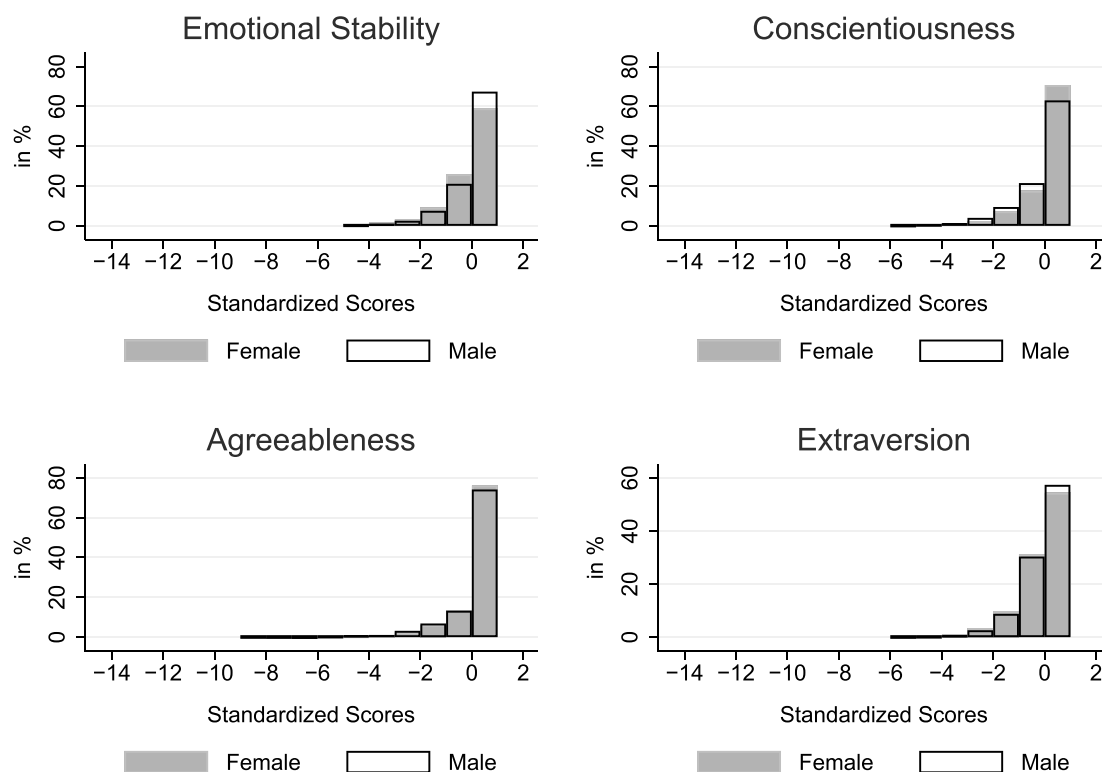


Figure 2. Personality traits at age 16. Source: BCS70. Own calculations, $n = 4203$ (females = 2279; males = 1924).

Table 3. Cognitive ability measures at age 10.

Educational Test	Components
British Abilities Scale (BAS)	Self-completion; Non-verbal: Recall of digits (34 items), matrices (28 items); Verbal: Word definitions (37 items), word similarities (42 items).
Shortened Edinburgh Reading Test (ERT)	Self-completion (64 items).
Friendly Maths Test (FMT)	72 multiple choice questions.
Pictorial Language Comprehension Test (PLCT)	Vocabulary items, sequencing items, sentence comprehension items (100 items).
Diagnostic Test	Reading (108 items) and spelling test (50 items).

Source: BCS70, SN3723; Butler and Bynner (2014).

IV. Results

First, we present our results about the interaction effects between emotional stability and conscientiousness at the age of 16 regarding education outcomes at the age of 30, with a particular focus on low educational achievers. Second, we extend our analyses to obtaining an academic degree to see whether similar relations are observed at the upper end of the ability distribution.

This analysis uses ordinary least square (OLS) regression models for the continuous dependent

variable National Vocational Qualification (NVQ) and linear probability regression methods for the binary dependent variables of reaching low educational qualification and academic degree. All regressions include the controls described in the data section. Robust standard errors are calculated to account for the possible problem of heteroscedasticity.

Personality and educational achievement

Figure 3 (based on Appendix Table A1, columns 2 and 3) presents the interaction effect between emotional stability and conscientiousness at the age of 16 with respect to educational achievement at the age of 30. Figure 3(a) focuses on educational achievement throughout the full distribution, measured in NVQ, while Figure 3(b) targets the risk of a low educational qualification.

These figures consistently show that conscientiousness in adolescence is positively associated with educational achievement in adulthood for both genders. Students who score 1 standard deviation higher in conscientiousness at the age of 16 reach a 0.20 higher NVQ level and have

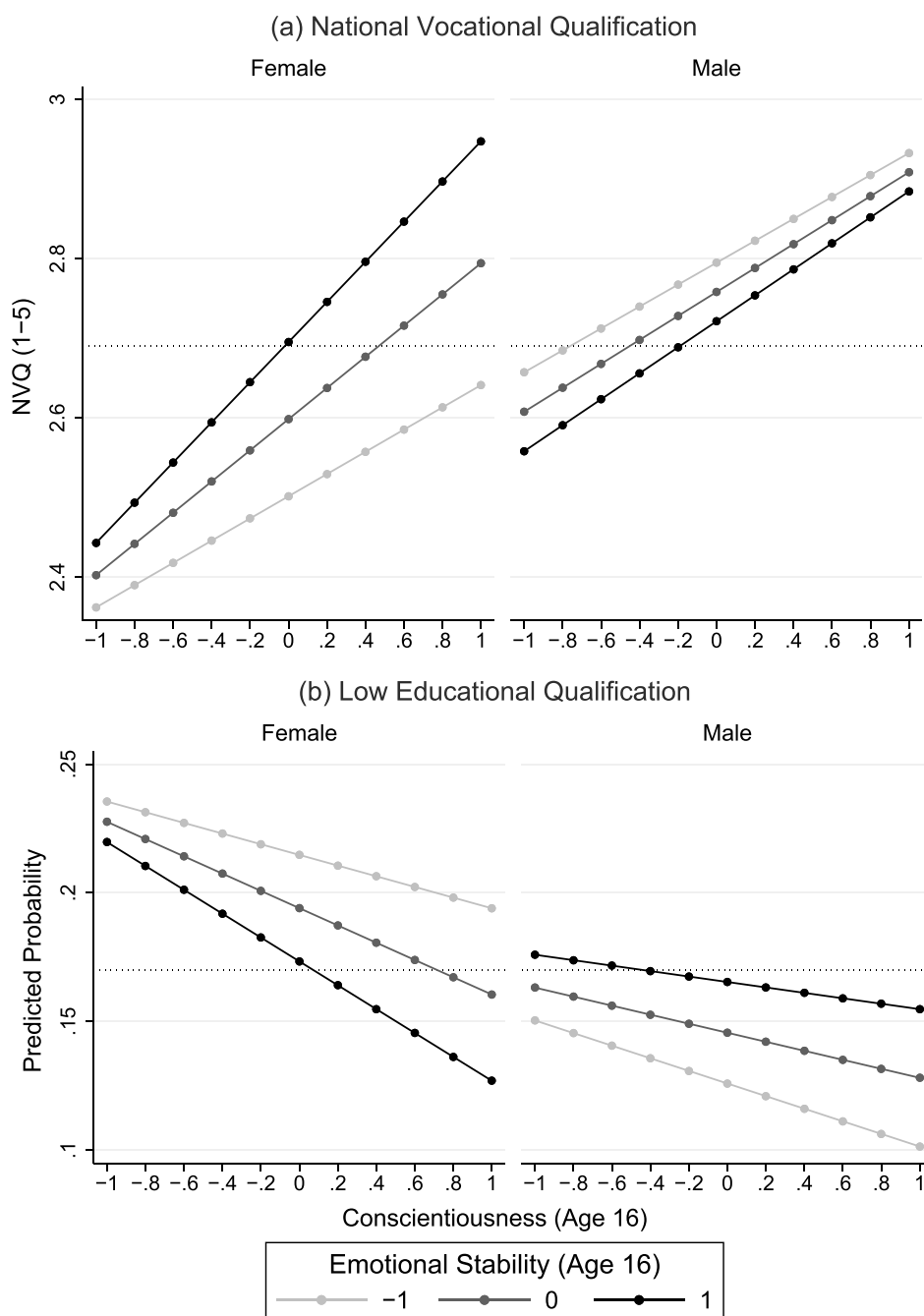


Figure 3. Educational achievement at age 30. Source: BCS70. Own calculations, $n = 4203$ (females = 2279; males = 1924). The horizontal line denotes the mean NVQ or the mean predicted probability at the age of 30.

a 3.4 percentage-point lower probability of reaching a low educational qualification.

Importantly, for emotional stability, we observe relevant gender differences in the relation with educational achievement in later life. Among females, emotional stability in adolescence is particularly important for educational achievement in adulthood. Females who score 1 standard deviation higher in emotional stability at the age of 16 reach

a 0.1 higher NVQ level and have a 2.1 percentage-point lower probability of reaching a low educational qualification. In contrast, the emotional stability male interaction terms show that emotional stability is significantly less related to educational achievement for males when compared to females. Additional analysis reveals that males who score 1 standard deviation higher in emotional stability at the age of 16 have a 2 percentage-point higher

probability of reaching a lower educational qualification.⁵ In other words, less emotionally stable males have a lower risk of a low educational achievement in adulthood compared to more emotionally stable males. This is opposite to what is observed for females, where more emotionally stable females have a lower risk of a low educational achievement compared to less emotionally stable females.

Figure 3 also shows a significant interaction effect between emotional stability and conscientiousness on educational achievement among females. This means that the positive association between emotional stability and educational achievement is stronger with increasing conscientiousness. Alternatively, conscientiousness is able to compensate for low emotional stability, and vice versa. For males, no significant interaction effect between emotional stability and conscientiousness is observed in relation to low educational achievement.

Extension: Academic degree

Our analysis gives rise to the question whether these results also hold for obtaining an academic degree. To address this issue, a binary measure for having an 'academic degree' is constructed. The variable equals 1 if respondents have reached an NVQ score of 4 or 5, and it equals 0 if respondents have reached an NVQ score of 0, 1, 2, or 3 by the age of 30. On average 37% hold an academic degree by the age of 30 and both genders are equally likely to obtain academic degrees (NVQ scores of 4–5). Figure 4 presents the probability of obtaining an academic degree in adult age (based on Table A1, column 4).

For conscientiousness, our results show that students who score 1 standard deviation higher in conscientiousness at the age of 16 have a 6.3 percentage-point higher probability of holding an academic degree at the age of 30. In line with the results for NVQ and obtaining a low educational achievement, no gender differences are observed. When looking at emotional stability, we observe that females who score

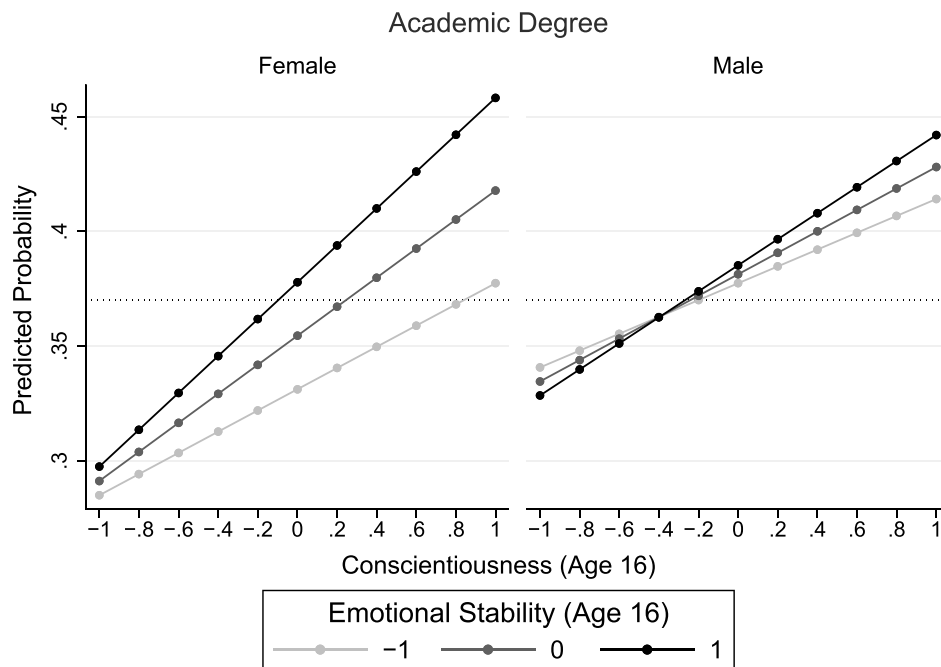


Figure 4. Academic degree at age 30. Source: BCS70. Own calculations, $n = 4203$ (females = 2279; males = 1924). The horizontal line denotes the mean predicted probability at the age of 30.

⁵The coefficient involves a p-value of 0.074 and is thus significant at a 10% confidence level.

1 standard deviation higher in emotional stability at the age of 16 have a 2.3 percentage-point higher probability of holding an academic degree at the age of 30. Interestingly, we observe no significant difference between males and females for the relation between emotional stability and holding an academic degree. This suggests that at higher levels of the educational distribution, emotional stability is equally important for males and females. Finally, in the upper part of the educational distribution, we found a significant interaction effect between emotional stability and conscientiousness for both males and females.

V. Discussion and conclusion

Previous research has shown that low educational achievement can be related to gender and personality traits such as emotional stability and conscientiousness. These previous studies indicate that the observed gender differences among low achievers largely depend on the specific circumstances under analysis, including the subject tested, importance of the test, and age at which the tests are taken. These studies further show that less emotional stability is predominantly negatively related to educational achievement, while conscientiousness is almost a guarantee for desirable results. However, less is known about the moderating effect of emotional stability and conscientiousness in relation to low educational achievement and the gender differences therein. This study directly addresses this knowledge gap.

First, our results are largely consistent with those in the educational literature, with both emotional stability and conscientiousness being positively related to educational achievement (e.g. Almlund et al. 2011; Egan et al. 2017; Prevoe and Ter Weel 2015; Roberts, Walton, and Bogg 2005). In other words, students that are more emotionally stable or more conscientious at the age of 16 have a significantly lower probability of reaching only a low educational qualification. A similar relation is observed at the upper part of the achievement distribution, i.e. for obtaining an academic degree.

Interestingly, our analysis shows that the bivariate relationship between emotional stability and

low achievement is stronger for females than for males. For males, we observe that more emotional stability is positively related to low achievement, rather than negatively. In other words, it seems that for males some degree of emotional instability may help them move into the middle performance group instead of the bottom group of the educational distribution. By contrast, we observe no gender differences in the observed bivariate positive association between conscientiousness and educational outcomes.

Second, our results reveal a significant interaction effect between emotional stability and conscientiousness and low educational achievement among females. That is, the positive association between emotional stability and educational achievement is stronger with increased conscientiousness. For males, this interaction effect is only observed at the upper end of the educational distribution.

In this respect, one could derive two hypotheses from previous studies. First, persons with less emotional stability are more likely to report low self-esteem, worrying, insecurity, and nervousness (Cervone and Pervin 2014). They may also have heightened stress-reactivity and use emotion-focused coping strategies such as procrastination or avoidance (Campbell-Sills, Cohan, and Stein 2006; Connor-Smith and Flachsbart 2007). Therefore, we hypothesized that less emotional stability is related to lower educational achievement for both females and males, because less emotionally stable females and males are more likely to react with procrastination or even avoidance in challenging educational situations, which is likely to decrease educational results.

Second, the result can be linked to the literature about the so-called 'healthy or beneficial neuroticism'. It suggests that emotional stability or reversely neuroticism might have also the contrasting effect via varying behaviour. Accordingly, less emotional stability might be related to better educational achievement by initiating proper actions to prevent the potential risk of educational failure.

It seems that for females, our results are in line with the first hypothesis. School life is full of challenging situations and different stakes. In this context, less emotional stability is likely to be related to

higher arousal, procrastination, and even avoidance. This likely forms an important channel for negative school experiences and early school dropout (De Paola and Scoppa 2015; Johnson and Bloom 1995) and might serve as an explanatory approach why less emotionally stable and less conscientious females have the lowest educational achievement, while more emotionally stable and more conscientious females belong to the group with the highest educational outcomes in adulthood in our study.

The second hypothesis fits more for less emotionally stable males at the bottom part of the educational distribution (cf. Friedman, Kern, and Reynolds 2010; Roberts et al. 2009; Turiano et al. 2013). They seem to be more productive and have a lower risk of low educational achievement than their more emotionally stable classmates. An explanatory approach particularly linked to the previous health literature might be that the less emotionally stable males in our study may be particularly anxious and attentive about their educational achievements, are more likely to take the risk factors for educational failure seriously, and tend to initiate proper action to prevent low educational achievement, i.e. the so-called ‘beneficial neuroticism’.

Our study yields some important insights for educational research and related policies. First, our findings maintain the focus on the important role of conscientiousness for educational achievement of both females and males. For instance, training students to become more organized can potentially reduce the number of low achievers. Our results also indicate an underestimated importance of improving skills related to conscientiousness if analysed in isolation. This is due to a neglect of the benefits that accrue through an interaction with emotional stability. For females, conscientiousness can mitigate the negative aspects of emotional instability in relation to educational achievement.

Second, our analysis reveals heterogeneity in the relationship between emotional stability and educational achievement according to gender and the educational distribution. On the one hand, our findings suggest that increased emotional stability is likely beneficial in terms of educational outcomes among females. This is especially interesting given

the fact that, on average, females reported lower levels of emotional stability when compared to males at the age of 16. However, interventions aimed at improving emotional stability should only carefully target males at the lower end of the educational distribution.

As females and males seem to show different relationships between personality and low educational achievement, tailored gender-based interventions should consider individual levels of emotional stability and conscientiousness in adolescence. Findings from neuroscientific studies demonstrate that this life phase is important in terms of brain plasticity. This is especially true for elements related to cognitive development such as planning and reasoning, thereby suggesting that school interventions may raise educational achievements in both adolescence and adulthood (Reyna et al. 2012; Steinberg 2014). Tailor-made interventions may boost educational outcomes better than gender and personality interventions that are more general. However, an experimental study is needed to support this claim.

Finally, it has to be discussed that a major shift in the percentage of females and males with low educational achievement, but also with academic degrees took place. In 2010, 23% of females and 22% of males had only reached less than primary, primary or lower secondary education. In 2019, these percentages decreased to 13% for females and 16% for males. In contrast, 38% of females and 37% of males had finished tertiary education in 2010, while 54% of females and 48% of males had reached an academic degree (Eurostat 2021; females and males aged 35 to 45). On the one hand, these patterns in the educational development suggest that females have been able to turn their relative disadvantage into an advantage. Future research about differences in the educational behaviour related to gender and personality might help to understand this phenomenon. On the other hand, this development shows that the percentage of low educational achievers is still relatively high among both females and males. Measures to support people at risk of low educational achievement are especially important in today’s labour market that is characterized by an increasing demand of analytical and interactive non-routine tasks and a decreasing amount of

manual and cognitive routine tasks (Autor, Levy, and Murnane 2003).

Declaration

The analysis in this article is based on the British Cohort Study (BCS70). For detail on the ethics approval and the consent to participate, see the notes of the data provider BCS70.

Disclosure statement

There are no financial or non-financial competing interests to declare.

ORCID

Caroline Wehner  <http://orcid.org/0000-0003-3527-7985>
 Trudie Schils  <http://orcid.org/0000-0003-3533-9031>

References

- Almlund, M., A. L. Duckworth, J. Heckman, and T. Kautz. 2011. "Personality Psychology and Economics." In *Handbook of the Economics of Education*, edited by E. A. Hanushek, S. Machin, and L. Woessman, 1–181. Vol. 4. Amsterdam: Elsevier. doi:10.1016/B978-0-444-53444-6.00001-8.
- Aschwanden, D., M. A. Gerend, M. Luchetti, Y. Stephan, A. R. Sutin, and A. Terracciano. 2019. "Personality Traits and Preventive Cancer Screenings in the Health Retirement Study." *Preventive Medicine* 126: 105763. doi:10.1016/j.ypmed.2019.105763.
- Aschwanden, D., J. E. Strickhouser, A. A. Sesker, J. H. Lee, M. Luchetti, Y. Stephan, A. R. Sutin, A. Terracciano, and M. Back. 2020. "Psychological and Behavioural Responses to Coronavirus Disease 2019: The Role of Personality." *European Journal of Personality* 35 (1): 51–66. doi:10.1002/per.2281.
- Attali, Y., Z. Neeman, and A. Schlosser. 2011. "Rise to the Challenge or Not Give a Damn: Differential Performance in High Vs. Low Stakes Tests." *IZA Discussion Paper*. 5693.
- Autor, D. H., F. Levy, and R. J. Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *The Quarterly Journal of Economics* 118 (4): 1279–1333. doi:10.1162/003355503322552801.
- Bedard, K., and I. Cho. 2010. "Early Gender Test Score Gaps Across OECD Countries." *Economics of Education Review* 29 (3): 348–363. doi:10.1016/j.econedurev.2009.10.015.
- Butler, N., and J. Bynner, University of London, Institute of Education, Centre for Longitudinal Studies. 2013. *1970 British Cohort Study: Sixteen-Year Follow-Up, 1986*. 5th ed, SN: 3535. Colchester, Essex: UK Data Archive. doi:10.5255/UKDA-SN-3535-2.
- Butler, N., and J. Bynner, University of London, Institute of Education, Centre for Longitudinal Studies. 2014. *1970 British Cohort Study: Ten-Year Follow-Up, 1980*. 5th ed, SN: 3723. Colchester, Essex: UK Data Archive. doi:10.5255/UKDA-SN-3723-3.
- Campbell, F., G. Conti, J. J. Heckman, S. Moon, R. Pinto, E. Pungello, and Y. Pan. 2014. "Early Childhood Investments Substantially Boost Adult Health." *Science* 343 (6178): 1478–1485. doi:10.1126/science.1248429.
- Campbell-Sills, L., S. L. Cohan, and M. B. Stein. 2006. "Relationship of Resilience to Personality, Coping, and Psychiatric Symptoms in Young Adults." *Behaviour Research and Therapy* 44 (4): 585–599. doi:10.1016/j.brat.2005.05.001.
- Cervone, D., and L. Pervin. 2014. *Personality Psychology*. 12th ed. New York, NY: Wiley.
- Chamberlain, R., and G. Chamberlain, University of London, Institute of Education, Centre for Longitudinal Studies. 2013. *1970 British Cohort Study: Birth and 22-Month Subsample, 1970-1972*. 3rd ed, SN: 2666. Colchester, Essex: UK Data Service. doi:10.5255/UKDA-SN-2666-2.
- Connor-Smith, J. K., and C. Flachsbart. 2007. "Relations between Personality and Coping: A Meta-Analysis." *Journal of Personality and Social Psychology* 93 (6): 1080–1107. doi:10.1037/0022-3514.93.6.1080.
- Corker, K. S., and M. B. Donnellan. 2012. "Setting Lower Limits High: The Role of Boundary Goals in Achievement Motivation." *Journal of Educational Psychology* 104 (1): 138–149. doi:10.1037/a0026228.
- Cornwell, C., D. Mustard, and J. Van Parys. 2013. "Noncognitive Skills and the Gender Disparities in Test Scores and Teacher Assessments: Evidence from Primary School." *Journal of Human Resources* 48 (1): 236–264. doi:10.3368/jhr.48.1.236.
- Damgaard, M. T., and H. S. Nielsen. 2018. "Nudging in Education." *Economics of Education Review* 64: 313–342. doi:10.1016/j.econedurev.2018.03.008.
- De Paola, M., and V. Scoppa. 2015. "Procrastination, Academic Success and the Effectiveness of Remedial Program." *Journal of Economic Behavior & Organization* 115: 217–236. doi:10.1016/j.jebo.2014.12.007.
- Dodgeon, B., M. Hancock, J. Johnson, and S. Parsons. 2011. *Deriving Highest Qualification in NCDS and BCS70 (Vol. 2011; Data Note No. 2011/1)*. London: Centre for Longitudinal Studies.
- Duckworth, A. L., E. Shulman, A. J. Mastronarde, S. D. Patrick, J. Zhang, and J. Druckman. 2015. "Will Not Want: Self-control Rather than Motivation Explains Female Advantage in Report Card Grades." *Learning and Individual Differences* 39: 13–23. doi:10.1016/j.lindif.2015.02.006.
- Egan, M., M. Daly, L. Delaney, C. Boyce, and A. M. Wood. 2017. "Adolescent Conscientiousness Predicts Lower Lifetime Unemployment." *Journal of Applied Psychology* 102 (4): 700–709. doi:10.1037/apl0000167.
- Ellison, G., and A. Swanson. 2010. "The Gender Gap in Secondary School Mathematics at High Achievement

- Levels: Evidence from the American Mathematics Competitions." *The Journal of Economic Perspectives* 24 (2): 109–128. doi:10.1257/jep.24.2.109.
- Else-Quest, N., J. Hyde, H. Goldsmith, and C. Van Hulle. 2006. "Gender Differences in Temperament: A Meta-Analysis." *Psychological Bulletin* 132 (1): 33–72. doi:10.1037/0033-2909.132.1.33.
- Eurostat. 2021. "Population by Educational Attainment Level, Sex and Age (In Percent): Edat_lfse_03." Accessed March 2021.
- Fischer, F., J. Schult, and B. Hell. 2013. "Sex Differences in Secondary School Success: Why Female Students Perform Better." *European Journal of Psychology of Education* 28 (2): 529–543. doi:10.1007/s10212-012-0127-4.
- Fouarge, D., T. Schils, and A. De Grip. 2013. "Why Do Low-Educated Workers Invest Less in Further Training?" *Applied Economics* 45 (18): 2587–2601. doi:10.1080/00036846.2012.671926.
- Friedman, H. S., M. L. Kern, and C. Reynolds. 2010. "Personality and Health, Subjective Well-Being, and Longevity." *Journal of Personality* 78 (1): 179–216. doi:10.1111/j.1467-6494.2009.00613.x.
- Fryer, R. G., and S. D. Levitt. 2010. "An Empirical Analysis of the Gender Gap in Mathematics." *American Economic Journal. Applied Economics* 2 (2): 210–240. doi:10.1257/app.2.2.210.
- Goldberg, L. R. 1993. "The Structure of Phenotypic Personality Traits." *American Psychologist* 48 (1): 26–34. doi:10.1037/0003-066X.48.1.26.
- Golsteyn, B., and T. Schils. 2014. "Gender Gaps in Primary School Achievement: A Decomposition into Endowments and Returns to IQ and Non-cognitive Factors." *Economics of Education Review* 41: 176–187. doi:10.1016/j.econedurev.2014.04.001.
- Graham, E. K., S. J. Weston, N. A. Turiano, D. Aschwanden, T. Booth, F. Harrison, B. D. James, et al. 2020. "Is Healthy Neuroticism Associated with Health Behaviors? A Coordinated Integrative Data Analysis." *Collabra Psychology* 6 (1): 32. doi:10.1525/collabra.266.
- Heckman, J. J., R. Pinto, and P. Savelyev. 2013. "Understanding the Mechanisms through Which an Influential Early Childhood Program Boosted Adult Outcomes." *American Economic Review* 103 (6): 2052–2086. doi:10.1257/aer.103.6.2052.
- Hodis, F., L. H. Meyer, J. McClure, K. F. Weir, and F. H. Walkey. 2011. "A Longitudinal Investigation of Secondary School Achievement Using Growth Mixture Modeling." *Journal of Educational Psychology* 103 (2): 312–323. doi:10.1037/a0022547.
- Hogan, R., and J. Hogan. 2007. *Hogan Personality Inventory Manual*. 3rd ed. Tulsa, OK: Hogan Assessment Systems.
- Iterbeke, K., and K. De Witte. 2020. "Helpful or Harmful? The Role of Personality Traits in Student Experiences of the COVID-19 Crisis and School Closure." *Department of Economics KU Leuven Working Paper* 20.19.
- Jensen, J. M., and P. C. Patel. 2011. "Predicting Counterproductive Work Behavior from the Interaction of Personality Traits." *Personality and Individual Differences* 51 (4): 466–471. doi:10.1016/j.paid.2011.04.016.
- Johnson, J. L., and A. M. Bloom. 1995. "An Analysis of the Contribution of the Five Factors of Personality to Variance in Academic Performance." *Personality and Individual Differences* 18 (1): 127–133. doi:10.1016/0191-8869(94)00109-6.
- King, E. B., J. M. George, and M. R. Hebl. 2005. "Linking Personality to Helping Behaviors at Work: An Interactional Perspective." *Journal of Personality* 73 (3): 585–607. doi:10.1111/j.1467-6494.2005.00322.x.
- Kreil, A., A. Tumasjan, T. Yasseri, and I. Welp. 2021. "What Drives Passion? An Empirical Examination on the Impact of Personality Trait Interactions and Job Environments on Work Passion." *Preprint Arxiv* 2101.01270: 1–29.
- Lai, F. 2010. "Are Boys Left Behind? The Evolution of the Gender Achievement Gap in Beijing's Middle Schools." *Economics of Education Review* 29 (3): 383–399. doi:10.1016/j.econedurev.2009.07.009.
- Lebel, C., and C. Beaulieu. 2011. "Longitudinal Development of Human Brain Wiring Continues from Childhood into Adulthood." *The Journal of Neuroscience* 31 (30): 10937–10947. doi:10.1523/JNEUROSCI.5302-10.2011.
- Lee, J. Q., D. M. McInerney, G. A. D. Liem, and Y. P. Ortega. 2010. "The Relationship between Future Goals and Achievement Goal Orientations: An Intrinsic-extrinsic Motivation Perspective." *Contemporary Educational Psychology* 35 (4): 264–279. doi:10.1016/j.cedpsych.2010.04.004.
- Lundborg, P., P. Nystedt, and D. Rooth. 2014. "Height and Earnings: The Role of Cognitive and Non-cognitive Skills." *Journal of Human Resources* 49 (1): 141–166. doi:10.3368/jhr.49.1.141.
- MacCann, C., A. A. Lipnevich, J. Burrus, and R. D. Roberts. 2012. "The Best Years of Our Lives? Coping with Stress Predicts School Grades, Life Satisfaction, and Feelings about High School." *Learning and Individual Differences* 22 (2): 235–241. doi:10.1016/j.lindif.2011.08.004.
- Matthews, G., I. J. Deary, and M. C. Whiteman. 2009. *Personality Traits*. Cambridge: Cambridge University Press.
- McClure, J., L. H. Meyer, J. Garisch, R. Fischer, K. F. Weir, and F. H. Walkey. 2011. "Students' Attributions for Their Best and Worst Marks: Do They Relate to Achievement?" *Contemporary Educational Psychology* 36 (2): 71–81. doi:10.1016/j.cedpsych.2010.11.001.
- McCrae, R. R., and O. P. John. 1992. "An Introduction to the Five-Factor Model and Its Applications." *Journal of Personality* 60 (2): 175–215. doi:10.1111/j.1467-6494.1992.tb00970.x.
- Mendolia, S., and I. Walker. 2014. "The Effect of Personality Traits on Subject Choice and Performance in High School: Evidence from an English Cohort." *Economics of Education Review* 43: 47–65. doi:10.1016/j.econedurev.2014.09.004.
- Migali, G., and E. Zucchelli. 2017. "Personality Traits, Forgone Health Care and High School Dropout: Evidence

- from US Adolescents.” *Journal of Economic Psychology* 62: 98–119. doi:10.1016/j.joep.2017.06.007.
- Naragon-Gainey, K., and L. J. Simms. 2017. “Three-way Interaction of Neuroticism, Extraversion, and Conscientiousness in the Internalizing Disorders: Evidence of Disorder Specificity in a Psychiatric Sample.” *Journal of Research in Personality* 70: 16–26. doi:10.1016/j.jrp.2017.05.003.
- OECD. 2017. *Educational Opportunity for All: Overcoming Inequality Throughout the Life Course*. Educational Research and Innovation. Paris: OECD Publishing. doi:10.1787/9789264287457-en.
- Poropat, A. 2014. “Other-rated Personality and Academic Performance: Evidence and Implications.” *Learning and Individual Differences* 34: 24–32. doi:10.1016/j.lindif.2014.05.013.
- Previo, T., and B. Ter Weel. 2015. “The Importance of Early Conscientiousness for Socio-Economic Outcomes: Evidence from the British Cohort Study.” *Oxford Economic Papers* 67 (4): 918–948. doi:10.1093/oep/gpv022.
- Reyna, V. F., S. B. Chapman, M. R. Dougherty, and J. Confrey. 2012. *The Adolescent Brain: Learning, Reasoning, and Decision Making*. Washington, DC: American Psychological Association. doi:10.1037/13493-000.
- Roberts, B. W., J. Smith, J. Jackson, and G. Edmonds. 2009. “Compensatory Conscientiousness and Health in Older Couples.” *Psychological Science* 20 (5): 553–559. doi:10.1111/j.1467-9280.2009.02339.x.
- Roberts, B. W., K. Walton, and T. Bogg. 2005. “Conscientiousness and Health across the Life Course.” *Review of General Psychology* 9 (2): 156–168. doi:10.1037/1089-2680.9.2.156.
- Ryan, M., L. Delaney, and C. P. Harmon. 2013. “The Role of Noncognitive Traits in Undergraduate Study Behaviours.” *Economics of Education Review* 32: 181–195. doi:10.1016/j.econedurev.2012.07.009.
- Saklofske, D., E. Austin, S. Mastoras, L. Beaton, and S. Osborne. 2012. “Relationships of Personality, Affect, Emotional Intelligence and Coping with Student Stress and Academic Success: Different Patterns of Association for Stress and Success.” *Learning and Individual Differences* 22 (2): 251–257. doi:10.1016/j.lindif.2011.02.010.
- Schmitt, D. P., A. Realo, M. Voracek, and J. Allik. 2008. “Why Can’t a Man Be More like a Woman? Sex Differences in Big Five Personality Traits across 55 Cultures.” *Journal of Personality and Social Psychology* 94 (1): 168–182. doi:10.1037/0022-3514.94.1.168.
- Spengler, M., R. I. Damian, and B. Roberts. 2018. “How You Behave in School Predicts Life Success above and beyond Family Background, Broad Traits, and Cognitive Ability.” *Journal of Personality and Social Psychology* 114 (4): 620–636. doi:10.1037/pspp0000185.
- Spinath, B., C. Eckert, and R. Steinmayr. 2014. “Gender Differences in School Success: What are the Roles of Students’ Intelligence, Personality and Motivation?” *Educational Research* 56 (2): 230–243. doi:10.1080/00131881.2014.898917.
- Spinath, B., H. H. Freudenthaler, and A. C. Neubauer. 2010. “Domain-specific School Achievement in Boys and Girls as Predicted by Intelligence, Personality and Motivation.” *Personality and Individual Differences* 48 (4): 481–486. doi:10.1016/j.paid.2009.11.028.
- Steinberg, L. 2014. *Age of Opportunity: Lessons from the New Science of Adolescence*. New York, NY: Houghton Mifflin Harcourt.
- Turiano, N. A., E. K. Graham, S. J. Weston, T. Booth, F. Harrison, B. D. James, N. A. Lewis, et al. 2020. “Is Healthy Neuroticism Associated with Longevity? A Coordinated Integrative Data Analysis.” *Collabra Psychology* 6 (1): 33. doi:10.1525/collabra.268.
- Turiano, N. A., D. K. Mroczek, J. Moynihan, and B. P. Chapman. 2013. “Big 5 Personality Traits and Interleukin-6: Evidence for “Healthy Neuroticism” in a US Population Sample.” *Brain, Behavior, and Immunity* 28: 83–89. doi:10.1016/j.bbi.2012.10.020.
- University of London, Institute of Education, Centre for Longitudinal Studies. 2013. *1970 British Cohort Study: Twenty-Nine-Year Follow-Up, 1999-2000*. 3rd ed, SN: 5558. Colchester, Essex: UK Data Archive. doi:10.5255/UKDA-SN-5558-2.
- Ursin, H., and H. R. Eriksen. 2004. “The Cognitive Activation Theory of Stress.” *Psychoneuroendocrinology* 29 (5): 567–592. doi:10.1016/S0306-4530(03)00091-X.
- Wehner, C. 2018. “Too Scared to Achieve: The Relation between Neuroticism, Conscientiousness and Socioeconomic Outcomes.” *Maastricht: Boekenplan*. doi:10.26481/dis.20180525cw.
- Weston, S. J., E. K. Graham, N. A. Turiano, D. Aschwanden, T. Booth, F. Harrison, B. D. James, et al. 2020. “Is Healthy Neuroticism Associated with Chronic Conditions? A Coordinated Integrative Data Analysis.” *Collabra Psychology* 6 (1): 42. doi:10.1525/collabra.267.
- Weston, S. J., and J. J. Jackson. 2015. “Identification of the Healthy Neurotic: Personality Traits Predict Smoking after Disease Onset.” *Journal of Research in Personality* 54: 61–69. doi:10.1016/j.jrp.2014.04.008.

Appendix

Table A1 Interaction effect between emotional stability and conscientiousness.

Education Level (Age 30)	National Vocational Qualification Scale: 0–5	Low Educational Qualification Binary: 1 = 0, 1	Academic Degree Binary: 1 = 4, 5
Emotional Stability (Age 16)	0.097** (0.003)	–0.021* (0.046)	0.023* (0.030)
Conscientiousness (Age 16)	0.196*** (0.000)	–0.034** (0.007)	0.063*** (0.000)
Emotional Stability × Male (Age 16)	–0.134** (0.004)	0.040** (0.004)	–0.019 (0.235)
Conscientiousness × Male (Age 16)	–0.045 (0.322)	0.016 (0.304)	–0.017 (0.279)
Emotional Stability × Conscientiousness (Age 16)	0.056** (0.003)	–0.013* (0.046)	0.017** (0.004)
Emotional Stability × Conscientiousness × Male (Age 16)	–0.044 (0.137)	0.020* (0.047)	–0.007 (0.425)
Male	0.160*** (0.000)	–0.048*** (0.000)	0.027 (0.067)
<i>N</i>	4203	4203	4203
<i>R</i> ²	0.247	0.124	0.183

Source: British Cohort Study (BCS70), own calculations.

p-values in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. OLS (NVQ) and linear probability (Low Educational Qualification, Academic Degree) regression methods used robust standard errors. The regressions included controls for mother's age, mother's age squared, region of living, and parental socioeconomic background at birth, the personality traits of agreeableness and extraversion as measured at the age of 16, and cognitive ability as measured at the age of 10.