Immigrant-Native Wage Gap in Sweden: Do Personality Traits Matter?

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Abstract

Sweden has an immigrant-native wage gap. Although the impact of educational attainment and other variables have been studied, the impact of specific personality traits analyzed separately on the wage gap remains poorly understood. In this study, we used a unique dataset that usually contains unobserved personality traits evaluated by psychologists during the Swedish military conscription, as well as post-conscription labor market data to examine whether and to what extent heterogeneity in four different personality traits contributes to disparities in wages among men born in Sweden (both Swedish-born parents) and naturalized men born outside EU-15. The sample consisted of 278,660 males (6% with a foreign background) and was based on the 1975–1990 birth cohorts. The findings show that two of the four personality traits, i.e., intensity and emotional stability, significantly contribute to the immigrant-native wage gap. Men born outside the EU-15 received lower returns (2–3%) from these traits compared to men born in Sweden. The difference in returns from these traits was robust across the sensitivity analyses. Our overall conclusion is that specific personality traits play a role in the immigrant-native wage gap.

Keywords Immigrant-native wage gap · Oaxaca–Blinder decomposition · Personality traits

Introduction

In many Western European countries, the wages of immigrants are lower than those of the native population (see Table 2.1 OECD, 2020), i.e., there is evidence of an immigrant-native wage gap. Various explanations have been suggested to lie

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behind this wage gap, such as differences in socioeconomic characteristics (e.g., educational attainment) and non-transformability of human capital (i.e., knowledge, skills, and experience) into the host country as well as lack of language proficiency, access to information and networks, and work experience. Likewise, in Sweden, people born outside Europe earn 20–30% less than natives, defined as those born in Sweden to Swedish-born parents (Statistics Sweden, 2021). In Sweden, Ekberg and Rooth (2003) found that parental socioeconomic characteristics explained 9–40% of the immigrant-native wage gap. Nordin and Rooth (2009) also added cognitive test scores from the Swedish Military Enlistment (SME) register that explained 47–64% of the immigrant-native wage gap. Hanes and Norlin (2011) introduced psychological strength, a summary index of personality traits, and showed that this measure explained 30–40% of the wage gap. Although some previously examined factors have explained parts of the wage gap, more than half of the wage gap remains unexplained. These wage gaps are problematic from a broader societal perspective because immigrants' socioeconomic opportunities in the host country are an indication of integration, and a lack thereof may result in persistent discrimination and economic inequalities, which in turn are associated with poorer physical and psychological health on a long-term basis.

Recent theoretical contributions suggest that other individual traits, beyond educational attainment and human capital, affect wages. Bowles et al. (2001a, b) showed that there is an impact of individual personality traits on wages (see also Heckman et al., 2006; Borghans et al., 2008; Cunha et al., 2006a, b). Hanes and Norlin (2011) showed that the overall personality profile explained parts of the Swedish immigrant-native wage gap; however, it could also be argued that studies on the personality profile's impact on various outcomes should be supplemented by the inclusion of more narrow personality traits (Roberts, 2006). In this context, little is known from previous studies to what extent each individual personality trait may explain the immigrant-native wage gap. A German study conducted by Ingwersen and Thomsen (2021) did not find any impact of personality traits on the immigrant wage gap. In contrast, a study by Laible and Brenzel (2022) reported a potential impact of different personality traits on the immigrant wage gap in Germany. The inconclusive German results call for further studies in different settings.

The overall purpose of this study was to further examine the potential impact of four different personality traits on the immigrant-native wage gap in Sweden. The present study has several advantages compared to previous Swedish research. For example, we analyzed four personality traits separately, which has not been done before in previous Swedish studies on the immigrant-native wage gap. The assessments of personality traits were made by trained psychologists during the SME at the typical age of 18–19 years. The evaluated personality traits included four different traits: social maturity, psychological energy, intensity, and emotional stability. Although traits measured during the SME are mainly used for military enlistment, they are also useful in the prediction of non-military labor outcomes (see, e.g., Edin et al., 2022; Grönqvist & Lindqvist, 2016; Fredriksson et al., 2018). The German studies are relatively similar to ours, although they used somewhat different personality measures based on self-reported questionnaires. Our measures of personality traits avoided self-reporting bias, which is a common problem when using

questionnaires (Chen et al., 2020). Personality traits were evaluated prior to post-secondary education and labor market entry, as conscripts take the SME test when they are 18–19 years old. The literature suggests that personality traits develop during childhood and early adolescence and are relatively constant over time but might change in a life-course perspective due to specific life events (see McCrae & Costa 1999; Caspi & Roberts 1999). Another advantage is that we examine 11 annual birth cohorts from 1978 to 1988 based on compulsory nationwide conscriptions (Ludvigsson et al., 2022). This means that our total sample size is considerably larger than in most other previous studies. The many strengths of our dataset represent a major contribution to the relatively scarce previous literature on how different individual personality traits may explain the existing immigrant-native wage gap.

This study addresses three interrelated research questions: (1) Are there differences in any of the four different personality traits between men born in Sweden (both Swedish-born parents) and naturalized (defined as having Swedish citizenship) men born outside the EU-15 countries (see below for definition)? (2) Do the potential differences in these four personality traits explain the immigrant-native wage gap? (3) Are the four personality traits rewarded differently between natives and immigrants in the Swedish labor market? The manuscript is structured as follows: First, we outline key observations regarding personality traits and earnings along with an overview of existing literature on personality traits and the immigrant-native wage gap. Second, we provide details on the methods and data employed in the analyses. Then, the econometric models utilized are introduced. Finally, we discuss the findings and offer concluding remarks.

Background

Personality Traits and Earnings

Earlier studies have identified a link between personality traits and labor market outcomes (see, e.g., Barrick and Mount 1991; Salgado 1997). Recent theoretical contributions have developed theoretical models to integrate personality traits into economic models. Bowles et al. (2001a, b) showed that personality traits may influence wages through productivity-enchasing capacities and workers' incentive structure. Borghans et al. (2008) showed how personality traits impact wages through a channel of choices such as preferences toward leisure, work, and job-search behavior for the unemployed (Browning et al., 1999). Personality traits may also affect wages through mechanisms other than productivity, such as wage bargaining (Mueller & Plug, 2006) or risk preferences (Croson & Gneezy, 2009; Bertrand, 2011). Growing empirical contributions support the relationship between personality traits and wages (Almlund et al., 2011; Alderotti et al., 2021). Empirical studies have adopted the Big Five Theory, which describes personality traits or their facets, to examine how personality traits affect earnings. These five traits are openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (Heckman et al., 2021). Openness to experience describes intellectual curiosity and is usually positively associated with wages (Barrick & Mount 1991). However, openness may

reduce wages if intellectuality deters success (Heineck 2011). Conscientiousness is a trait of diligence that is positively associated with wages (Judge et al., 1999). However, extreme levels of conscientiousness may negatively impact wages (Heineck, 2011). Extroverted individuals may be suited to leadership roles or occupations with high levels of social interaction. However, the impact of extroversion on wages also depends on the occupation (Nyhus & Pons, 2005). Agreeableness has a positive impact on wages in occupations with high degrees of social interaction (Nyhus & Pons 2005). However, individuals with high agreeableness may be at a disadvantage in wage negotiations (Mueller & Plug, 2006). Individuals high in neuroticism may not perform well in stressful situations, while the opposite, i.e., emotionally stable individuals, may have better job performance (Heineck, 2011). The importance of personality traits has also been described in gender wage gap studies (Nyhus & Pons, 2005; Mueller & Plug, 2006; Blau & Kahn, 2017). The personality traits that were used in the present study are social maturity, psychological energy, intensity, and emotional stability.

Immigrant-Native Wage Gap and Personality Traits

Empirical studies have found that personality impacts wages, and differences in overall personality may explain parts, but far from the whole, immigrant-native wage gap (see Hanes and Norlin, 2011). However, there is no clear picture of the potential importance of single personality traits in this gap. Recently, Laible and Brenzel (2022) examined the impact of single personality traits on the immigrant-native wage gap in Germany using survey data from the German Linked Personnel Panel (LPP) and "Betriebspanel" (BP). The findings showed that native Germans and immigrants differed in their average personality traits. Furthermore, the decomposition results showed that personality traits significantly affected the wage gap in Germany. However, when using data from the German Socio-Economic Panel (SOEP), Ingwersen and Thomsen (2021) could not replicate the impact of personality traits on the wage gap, as recognized by Laible and Brenzel (2022). The inconclusive German results may be due to a self-report bias in the survey questionnaires, and the literature suggests the importance of addressing this bias using measures of personality traits derived from observations rather than questionnaires (Chen et al., 2020). The inconclusive results may also be due to the relatively small sample size, where the findings from Laible and Brenzel (2022) were based on a sample of only 326 male migrants and 2673 male natives. The corresponding numbers for the study by Ingwersen and Thomsen (2021) were 1812 and 51,959, respectively. Nevertheless, the recent findings from the study by Laible and Brenzel (2022) call for further studies on whether single personality traits may impact the immigrant-native wage gap. The development of an individual's personality may be a complex issue. Bisin and Verdier (2000) posited a model of cultural transmission as a shaping mechanism for personality traits (see also Triandis 2001; Triandis & Suh 2002). Furthermore, according to Berry & Sam (1997) acculturation model, culture may shape personality formation through learning and imitation. For example, ethnic minorities may maintain their distinctive culture due to fear of rejection by their compatriots, and

thus, they may differentiate themselves from the native majority in a process called "forming of oppositional identities" (see Akerlof & Kranton, 2000). Oppositional identities have been shown to be associated with poorer educational performance (Austen-Smith & Fryer, 2005) and wage penalties on the labor market (Battu & Zenou 2007; Sáez-Martí & Zenou, 2005). A cultural distance between the country of origin and the host country often exists, and Matsumoto and Juang (2016) examined personality traits across countries and found average differences. Such differences in personality traits between immigrants and natives have also been shown in other studies (McCrae & Terracciano 2008; Jokela, 2009; Jaeger et al. 2010; Schmitt et al., 2007). However, these country differences may be eliminated by self-selection, in which migrants display personality traits that differ from those who stay in their home countries (Borjas, 1985; Chiswick, 1978), where the migrants, to a larger extent, may resemble the people in the host country.

Migration to Sweden

In 2023, Sweden was home to over 2 million foreign-born residents, comprising 20% of its total population. Over the past five decades, Sweden has witnessed several waves of immigration, each characterized by unique features of migrants. The initial wave, commencing in the mid-1970s, attracted labor migrants predominantly from Finland, Greece, Italy, and Yugoslavia. Swedish migration policies shifted from the mid-1980s to the early 1990s, resulting in the arrival of refugees from conflict-affected regions such as Chile, the Middle East, the Balkans, Eastern Europe, and Africa. These migration waves have contributed to the current heterogeneous migrant population in Sweden (see Hammarstedt and Palme, (2012) Table 1 p.7 Lundh and Ohlsson (1999) and Nilsson (2004)).

The individuals included in this study were born outside of Sweden, with some potentially having refugee backgrounds. There are several reasons why these individuals might display differences in personality traits compared to those born in Sweden. The framework for understanding skill development, as outlined by Cunha et al. (2006a, b) and Heckman (2011), is central in studies of skills development and socioeconomic success. This framework suggests that family plays a significant role in shaping abilities through genetics, parental investments, and choice of child environments. It may also be applicable to the development of personality traits and the economic assimilation of migrants. Early experiences can also shape preferences and cultural identity (Erikson 1968), processes likely influenced by parental upbringing (Bisin and Verdier, 2000), and potentially gendered factors (Fernández et al., 2004). Moreover, critical life events like migration may expose these individuals to conditions affecting their psychological and physical well-being (Fazel et al., 2012), potentially influencing the development of personality traits and their economic integration. Additional stressors and cultural transitions can profoundly impact personality development.

While previous research has examined how education impacts the wage gap, the effects of personality traits remain unclear. Despite suggestions that personality traits significantly influence economic decisions, they are often omitted from

economic models. This oversight is significant because an existing immigrant-native wage gap can negatively impact individuals and society, leading to perceptions of unfairness and a departure from meritocratic principles. We will test three hypotheses in the present study: (1) There are group differences in average personality traits between men born in Sweden (both Swedish-born parents) and naturalized men born outside the EU-15 countries. (2) Personality traits affect individual wages and the immigrant-native wage gap. (3) Similar traits are rewarded differently between men born in Sweden (both Swedish-born parents) and naturalized men born outside the EU-15 countries on the Swedish labor market.

Methods

Data

This study used a dataset from The Swedish National Service Administration (Pliktverket), containing test scores evaluated during the Swedish Military Enlistment (SME) (see Lindqvist and Vestman, 2011, and Mood et al., 2012a, b, for a thorough description of the entire SME process). We used a unique dataset containing four different personality traits that have not been separately studied previously in Swedish wage gap studies. These four personality traits were included as part of the conscription assessment procedure for the entire population of men from 1997 to 2010. Conscription occurs among Swedish citizens at a typical age of 18-19 years. Because foreign-born men could avoid conscription by the Swedish Armed Forces (SAF), either by postponing or opting out of Swedish citizenship, the sample of foreign-born men in our study may be positively selected into enlistment conditional on citizenship. Following previous Swedish immigrant-native gap studies (e.g., Nordin and Rooth, 2009; Hanes and Norlin, 2011), we distinguished between men born in Sweden with both Swedish-born parents (henceforth: "Both Swe") and naturalized men born outside EU-15 (henceforth: "non-EU-15"), i.e., immigrants that are *not* born in the countries Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom. Overall, personality traits were evaluated in Swedish citizens born between 1975 and 1990 and conscripted from 1995 to 2010. Our study population contains 278,660 men. Females were not included because they were too few for meaningful analysis. Overall, "Both Swe" had a total of 261,090 men, corresponding to 93.70% of the sample, and "non-EU-15" comprised 17,570 men – 6.30% of the sample (see Table 1). The variables of interest in our study were the four unique personality traits evaluated in a 20–40-minute semi-structured interview by a trained, randomly assigned psychologist during the SME. Prior to the interview, conscripts answered a questionnaire that included 70–80 questions related to childhood, family, living conditions, school experiences, and spare-time activities. Moreover, psychologists have information about the conscripts' high school grades, cognitive skill tests, and results from the medical and physical evaluations. Conscripts' motivation to serve in SAF is not considered during the evaluation, and SAF does not explicitly reveal the evaluation procedure during the interviews. The evaluation process

and content of the SME measures have been extensively discussed by Lindqvist and Vestman (2011) and Mood et al. (2012a). Although the specific details of the evaluation process are confidential, Carlstedt & Andersson 2003; Carlstedt 2006) has outlined the generic structure of the evaluation. The topics discussed during the interview followed the "SAFHE" manual: Skolan (in English: school), Arbetet (in English: work experience), Fritiden (in English: spare-time activities), Hemmet (in English: family and living conditions), and Emotionell anpassning (in English: emotional adaptability). Conscripts' personality traits were evaluated along four separate sub-dimensions: (i) social maturity (measures extroversion, having friends, taking responsibility, and independence); (ii) psychological energy (measures perseverance, ability to fulfill plans, and ability to remain focused); (iii) intensity (measures capacity to activate oneself without external pressure, ability to take initiatives, and frequency of spare-time activities); and (iv) emotional stability (measures ability to control and channel nervousness, tolerance to stress, and disposition to anxiety) (see Hensvik and Nordström-Skans, 2023). For each dimension, conscripts were assigned a test score ranging from 1 (lowest) to 5 (highest). In Hensvik and Nordström-Skans (2023; Table 1.1), a comparison is made between the traits assessed during the SME and the Big Five personality traits. They associated the four traits as follows: (i) Social Maturity is linked to extraversion; (ii) psychological energy is linked to conscientiousness; (iii) intensity encompasses aspects of conscientiousness and openness; and (iv) emotional stability is linked to neuroticism. Although the four traits used by the SAF do not perfectly align with the Big Five traits, their mapping may help in the interpretation of the results.

We linked the SME dataset to post-enlistment information on income and employment using the Swedish 10-digit personal ID number. ID numbers were replaced with pseudonymized serial numbers to ensure confidentiality. The following data sources from Statistics Sweden were used: LISA (Longitudinal Integration Database for Health Insurance and Labor Market Studies), containing information about education and income from 1990 to 2018, and the Multi-generation Register, containing information on parents, birth year, country of birth, and age at migration. Our dependent variable was individual pre-tax standardized annual gross income that included taxable benefits and transfers from the social security system, such as sick and parental leave pay, but not income from self-employment or capital earnings. Gross incomes were assessed at the ages of 30 and 35, spanning 19 years, from 2000 to 2018. These age groups were used because, in this age span, education is mostly completed, and income is relevant for future income levels (Gensowski, 2018). Incomes corresponded to the year in which they were earned. We, therefore, deflated incomes to 2018 levels according to the Consumer Price Index. Antelius and Björklund (2000) argue that by using Swedish data and excluding individuals with low earnings, it is possible to interpret earnings as hourly wages. For this study, we included all male individuals with an annual gross income exceeding 100,000 SEK (approximately 10,000 €), which is equivalent to three months' average wages in Sweden. This threshold is in line with previous research (Dackehag et al., 2015).

The applied income restrictions exclude individuals with shorter employment spells and jobs with low pay. However, the income restriction reduced the sample size and may have resulted in a positive selection of individuals: 42,817 (16.39 %)

among "Both Swe" did not fulfill the set criteria; the corresponding numbers for "non-EU-15" was 2544 (14.47 %). The corresponding *t*-test comparing differences in each of the four personality traits between those who did and did not fulfill the set criteria revealed small differences in average personality traits. These differences in personality traits related to labor force participation suggested potential selection effects that may influence our estimates. Therefore, we performed sensitivity analyses with different income cutoffs.

Statistical Analyses

The following analysis examines how personality traits impact the immigrant-native wage gap in Sweden. We first set up the following linear model for the log of wages:

$$\ln w_i = a + \beta \mathbf{X}'_i + \varepsilon_i \tag{3.1}$$

where the subscript i indicates the individual. Consequently, $\ln w_i$ denotes the natural logarithm of the annual wage for individual i, and α is the intercept and indicates initial earning levels. $\mathbf{X}'_i$ is a vector of individual variables, including personality traits, immigration status, and adjusting factors, $\hat{\beta}$ measures the estimated return to the different characteristics, and ε_i is the residual term. We were mainly interested in the impact of the four unique personality traits on wages. To enhance a potential causal interpretation of our results, our methodological approach is determined by a "pre-labor market" approach that emphasizes the inclusion of explanatory variables measured prior to labor market entry (Neal & Johnson, 1996). Our empirical strategy was to first present an estimate of the wage differences between "Both Swe" and "non-EU-15". Second, we included the vector of covariates, starting from a model that contained only parental education level, which is then subsequently augmented by the four personality traits. Next, we included an interaction term between each of the four personality traits and immigration status into Eq. (3.1) to examine whether personality traits affect wages differently for "Both Swe" and "non-EU-15". Following this analysis, we conducted a series of tests to ensure the robustness of our results. For example, personality traits may indirectly affect wages through educational attainment (Heckman et al. 2006; Lundberg 2013), and educational attainment may be endogenous to personality traits, for example, due to educational sorting (Case & Paxson, 2008). We addressed this possibility by performing a mediation analysis to examine the impact of personality traits on wages mediated by educational attainment.

In the second step, to better understand the contribution of personality traits to the wage gap, we applied the threefold (OB) decomposition (1973) as follows:

$$\overline{\ln w_A} - \overline{\ln w_B} = \underbrace{(\overline{X}_A - \overline{X}_B)'\beta_B}_{endowments} + \underbrace{\overline{X}'_B(\hat{\beta}_A - \hat{\beta}_B)}_{coefficients} + \underbrace{(\overline{X}_A - \overline{X}_B)'(\hat{\beta}_A - \hat{\beta}_B)}_{interaction} \tag{3.2}$$

where the mean wage gap between A = "Both Swe" and B = "non-EU-15." $\overline{X}_A$ and $\overline{X}_B$ are the mean values of the independent variables, and $\hat{\beta}$ is a vector with the

corresponding estimated regression coefficients. Equation (3.2) decomposes the mean wage gap into three terms.

The *endowments* represent differences in log wages due to actual differences in personality traits and thereby capture the contribution to the log wage difference that is explained by average group differences in the independent variables. The *coefficients* represent differences in log wages due to differences in returns of the independent variables. It also captures differences due to unobserved characteristics. Finally, the *interaction* represents the differences in log wages due to the combined effects of the differences in endowments and coefficients (Brunow & Jost 2022; Jann, 2008). To calculate these components, we chose a set of coefficients as the standard of comparison. "Both Swe" is the reference group in the main analysis, and **"**non-EU-15" was used in the sensitivity analysis.

Sensitivity and Robustness Analysis

As noted in the "Background" section, we restricted the main analytical sample to wages exceeding 100,000 SEK. These restrictions may result in a positive selection of individuals. We conducted a series of sensitivity analyses related to our sample restriction by estimating Eqs. (3.1) and (3.2) using different income thresholds. We estimated our regression models as follows: (i) an unconditional regression, that is, with no income threshold; (ii) an income threshold of 50,000 SEK (e.g., Nordin & Rooth, 2009; Hanes & Norlin, 2011); and (iii) an income threshold of 150,000 SEK. Furthermore, we employed an unconditional quantile regression (UQR) proposed by Firpo et al. (2009) and Fortin et al., (2010) to examine the impact of personality traits along the wage distribution. It is worth noting that Eqs. (3.1) and (3.2) provide evidence about mean wage differences. Focusing on mean wage differences could hide important disparities that occur in other parts of the wage distribution than the mean. For example, Collischon (2020) showed that returns on personality traits varied across income distributions. We also performed several heterogeneity analyses. Edin et al. (2022) showed that the economic return to non-cognitive skills doubled between 1992 and 2013 due to technological shifts in the Swedish labor market. Furthermore, baby-boom cohorts and/or macroeconomic shocks may also exert up- or downward pressure on the return from traits on wages. These changes may lead to attenuation, which could make our main analysis less generalizable to the lower-income range when examining the impact of certain traits on wages. We, therefore, performed cohort-specific regressions to mitigate these concerns. We also considered potential selectivity at conscription. Conscription in the SAF was mandatory for a long time in Sweden (see Ludvigsson et al., 2022). However, after 2006, owing to the downsizing and closure of military bases, the number of conscripts was reduced. Almén (2020) showed that, while the number of conscripts was reduced, the average cognitive and non-cognitive abilities among conscripts increased. We controlled for the potential positive selection of conscripts by including birth cohort and year of conscription fixed effects estimated in our main models and estimating the main analysis by conscription period. To investigate the potential country differences, we conducted a country-specific analysis, as highlighted by Brunow and Jost

(2021), for the five largest immigrant groups in our sample: Iran (12.05%), Yugoslavia (11.32%), Bosnia (11.15%), Iraq (6.53%), and Lebanon (5.07%). This analysis examined whether the four personality traits were rewarded differently between natives and the five largest immigrant groups in the Swedish labor market.

Ethical Permission

The use of secondary, registered data in this study was permitted by the Swedish Ethical Authorities in Lund.

Results

Descriptive Statistics – Personality Traits and Wages

Table 1 presents the descriptive statistics and *p*-values for the differences in key variables in the study population.

In Table 1, the variables are divided into three categories: (1) labor market outcomes, (2) personality traits, and (3) socio-demographic variables. The first category includes income and unemployment. We observed significantly lower incomes for "non-EU-15" compared to "Both Swe"; likewise, "non-EU15" had, on average, twice the number of unemployment days. For all four personality traits, the *t*-test revealed small, but significant differences in mean values between "Both Swe" and "non-EU-15." We further calculated $Cohen's d$: $\frac{Group\ A\ mean\ -\ Group\ B\ mean}{Pooled\ Standard\ Deviation}$ because this method is often used in the psychological literature to report group differences in personality traits. The assessed Cohen's *d* revealed scores between 0.22 and 0.35, which indicates rather small effect sizes between the groups. Furthermore, the standard deviations indicated that personality traits were similarly distributed across groups and that the variation between groups was smaller than that within the groups.

Educational attainment is reported in categories: low education (<9 years), primary education (9 years), medium education (10–12 years), pre-university education (13 years), and higher education (14–16 years). However, for decomposition purposes, we converted the categorical variables into continuous variables. We found that "Both Swe" had a couple of more months of schooling (14.07), although the difference between the groups was minor. The other socio-demographic variables were added as wage-determinant characteristics in the empirical analysis for explanatory purposes.

We extended the descriptive statistics from Table 1 to examine variability in personality trait categories and wages. The boxplot in Fig. 1 depicts the personality test scores in categories among "Both Swe" and "non-EU-15" evaluated during the SME at a typical age of 18–19 years and the corresponding wages (log income) at age 30. For each personality trait test score category (1–5), the boxplot depicts the mean wage (the horizontal line) and the interquartile ranges; that is, the range goes from the 25th percentile to the 75th percentile (box). The whiskers indicate variability

Table 1 Descriptive statistics

	"Both Swe"	"Non-EU-15"	Diff: (1)-(2)		t-test (p-value)	Cohen's d
	Mean	Mean (SD)	Diff	Std. error		
1). Labor market outcomes						
Full sample at 30 years in 2018 income (SEK)	281,576 (246,366)	248,937 (171,091)	32,638	1861	<0.001	
p10/p50/p95	127,454/277,831/457,227	64,067/252,223/450,451				
N	261,090	17,570				
Analytic sample* in 2018 income SEK	300,673 (244,879)	285,453 (156,791)	15,219	2025	<0.001	
p10/p50/p95	176,716/285,360/465,300	147,509/269,593/465,425				
N	218,273	15,026				
In income at 30 years	12.54 (0.36)	12.47 (0.40)	0.066	0.003	<0.001	
Unemployed days	7.42 (35.65)	16.58 (56.69)	−9.15	0.31	<0.001	
2). Personality traits						
Social maturity	3.05 (0.77)	2.88 (0.77)	0.17	0.006	<0.001	0.22
Psychological energy	3.11 (0.76)	2.92 (0.75)	0.18	0.006	<0.001	0.25
Intensity	2.90 (0.86)	2.69 (0.77)	0.20	0.007	<0.001	0.27
Emotional stability	2.90 (0.78)	2.62 (0.79)	0.27	0.006	<0.001	0.35
3). Socio-demographics						
Individual years of edu.	14.20 (1.78)	14.06 (1.91)	0.14	0.01	<0.001	
Parents' years of edu.	14.41 (1.75)	13.92 (2.18)	0.49	0.01	<0.001	
Year of birth	1983 (2.81)	1983 (2.74)	−0.02	0.023	0.2477	
Year of conscription	2001 (2.83)	2001 (2.62)	−0.34	0.023	<0.001	
Age at conscription	18.23 (0.47)	18.55 (0.85)	−0.31	0.004	<0.001	
Year of migration	-	1989 (4.57)	-	-		
Birth cohort	-	1952/2004				
Year of migration prior to conscription	-	12.17 (3.80)	-	-		
Age at migration (years)	-	6.32 (4.00)	-	-		

*Specified analytical sample presented for individuals having incomes of at least 100,000 SEK (Swedish crowns)
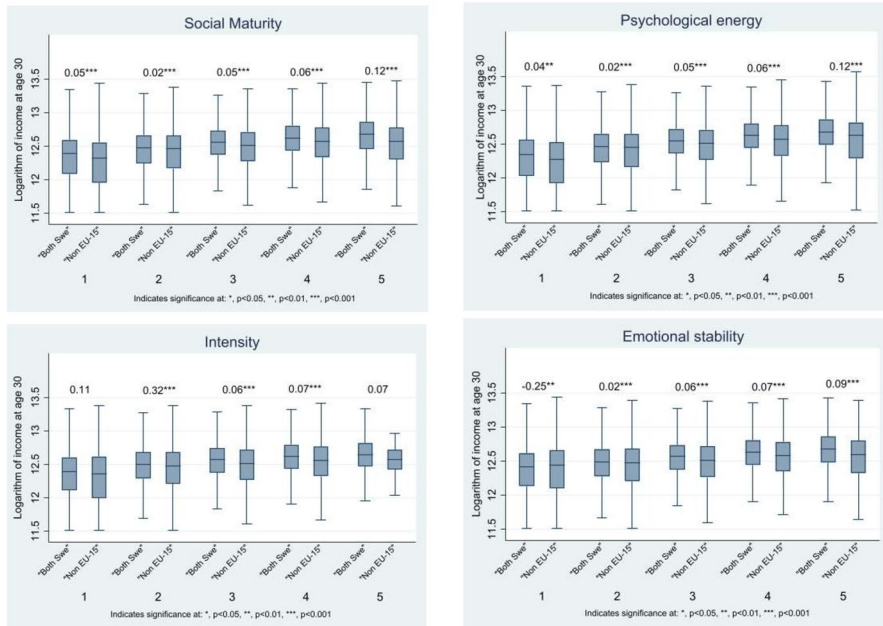
Fig. 1 Personality traits from the Swedish Military Enlistment (SME) and incomes at 30 years. *Notes*: Boxplots illustrate (log) deflated income in the year 2018 in Swedish crowns (SEK) for the birth cohorts 1975–1990. Scores for personality traits 1 (lowest)–5 (highest). The mean difference with corresponding significance level. *$p < 0.01$, **$p < 0.01$, and ***$p < 0.001$

outside the upper and lower percentile. The figure also displays the mean difference between groups with corresponding significance levels from *t*-tests.

Figure 1 shows several aspects of the personality trait income distribution. Although the income distributions are overlapping, men born in "non-EU-15" had, on average, lower incomes compared to "Both Swe" with the same personality test scores. This pattern was observed across all four personality traits and from scores 1 to 5. The results were consistent at the age of 35 (Fig. B1 in Appendix B).

Linear Regression – Average Wage Differences

The main results from the estimation of Eq. (3.1) are reported in Table 2.

The estimates in model 1 are obtained without controls and show differences in log wages between "Both Swe" and "non-EU-15" of −0.06 (95% CI = −0.05, −0.07), which can be interpreted as though "non-EU-15" would obtain approximately 6% lower wages than "Both Swe" at age 30 (Benoit, 2011). In model 2, we controlled for parental education, which reduced the wage gap to 4%. Model 3 shows estimates for when the four different personality trait scores are included. The unexplained wage gap was further reduced to 2%, and the model's explanatory power R^2 increased. We found that all personality traits had a positive and statistically significant impact on income at age 30. We also observed that the

Table 2 Personality traits and log wage

	Model 1	Model 2	Model 3	Model 4
Log wage difference between "non-EU-15" and "Both Swe"	−0.06***	−0.04***	−0.02***	−0.04**
	(0.003)	(0.003)	(0.003)	(0.01)
Social maturity	-	-	0.02***	0.02***
			(0.001)	(0.001)
Psychological energy	-	-	0.04***	0.04***
			(0.001)	(0.001)
Intensity	-	-	0.03***	0.03***
			(0.001)	(0.001)
Emotional stability	-	-	0.01***	0.01***
			(0.001)	(0.001)
Social maturity "non-EU-15" vs. "Both Swe"	-	-	-	0.01*
				(0.007)
Psychological energy "non-EU-15" vs. "Both Swe"	-	-	-	0.003
				(0.007)
Intensity "non-EU-15" vs. "Both Swe"	-	-	-	−0.01***
				(0.006)
Emotional Stability "non-EU-15" vs. "Both Swe"	-	-	-	−0.02***
				(0.006))
Controls	No controls	Parental education	Parental education	Parental education
No. of obs.	233,299	230,361	230,361	230,361
R^2	0.0020	0.0042	0.0511	0.0513

Clustered robust standard errors are reported in parentheses

* Significance at 10% level

** Significance at 5% level

*** Significance at 1% level

coefficients of psychological energy and intensity had the largest impact on wages, whereas emotional stability seemed to yield the lowest income return. In model 4, we included an interaction term to examine whether income returns from personality traits differed between groups. While all personality traits had a positive and statistically significant impact on income, the interaction term revealed some differences in income return from personality traits between "Both Swe" and "non-EU-15". The interaction analysis suggested that the income returns from personality traits differ significantly between the two groups for three of the four personality traits. For the "non-EU-15", social maturity had a positive impact on income (0.02 + 0.01) that was significantly higher than for "Both Swe" (0.02). We found that "non-EU-15" had a significantly lower return from the traits intensity (0.03–0.01) than "Both Swe" (0.03). For emotional stability, "non-EU-15" had an average wage reduction of 0.01–0.02, which should be compared with "Both Swe," which had an increase in wage (0.01). Given our "pre-labor market" strategy (Neal & Johnson, 1996), we performed a mediation analysis on our main analysis to examine whether personality traits affect wages via education and whether the potential impact is different between groups. The mediation results (Table B1 in Appendix B) showed that personality traits may predict educational attainment and that the impact differs for trait intensity and emotional stability. Therefore, education may have mediated the wage gap between the two groups. In addition, we estimated a full model that included individual educational attainment. These results are displayed in model 5 in Table B1 in the Appendix and are supportive of the main results. The results in Table 2 were consistent when we examined the impact of personality traits on wages at the age of 35 (Table B2 in Appendix B) and when estimating the main analysis using birth cohort and year of conscription fixed effects to control for factors related to birth cohort and potential conscription selectivity.

Oaxaca–Blinder (OB) Decomposition – Average Wage Gap

To better understand the contribution of personality traits in the observed immigrant-native wage gap, we used the Oaxaca–Blinder decomposition. This approach decomposes the wage gap in a counterfactual manner and indicates whether similar personality traits are differently rewarded. The results are presented in Table 3.

Table 3 presents the results of the threefold OB analysis, with "Both Swe" as the reference group. The mean predicted log wage is 12.54 for "Both Swe" and 12.47 for "non-EU-15," resulting in a wage gap of approximately 6% (−0.06, 95% CI = −0.05, −0.07). The threefold OB decomposes the wage gap into three components: The endowments indicate that 26% (0.017/0.067) of the wage gap can be explained by differences in personality traits between the two groups. However, the contribution of each personality trait to the endowments is small. The coefficients suggest that 63% (0.042/0.067) of the wage gap is due to differences in returns of the personality traits. The coefficients also indicate that significant differences in the return of personality traits contribute to the wage gap, with emotional stability (0.065) and intensity (0.047) having the most pronounced effect. The positive contribution of these traits implies that differences between them widen the wage gap, while the

Table 3 Oaxaca–Blinder (OB) decomposition

	Endowments	Coefficients	Interaction
"Both Swe" *(ref)*	12.540***		
	(0.001)		
"non-EU-15"	12.474***		
	(0.003)		
Difference	0.067***		
	(0.003)		
Overall endowments	0.017***		
	(0.001)		
Overall coefficients	0.042***		
	(0.003)		
Overall interaction	0.008***		
	(0.001)		
Explained	25%		
Social maturity	0.007***	−0.036*	−0.002*
	(0.001)	(0.019)	(0.001)
Psychological energy	0.009***	−0.010	−0.001
	(0.001)	(−0.010)	(0.001)
Intensity	0.003**	0.047***	0.004***
	(0.001)	(0.047)	(0.001)
Emotional stability	−0.002	0.065***	0.007***
	(0.002)	(0.015)	(0.002)
Constant		−0.024	
		(0.015)	
No. of obs. "Both Swe"	233,299		
No. of obs. "non-EU-15"	15,026		

difference in return from social maturity slightly attenuates the gap. Finally, the interaction is due to the combined effects of both personality traits and differences in returns, which account for 12% of the wage gap (0.008/0.067). We also conducted a decomposition of the effect of personality traits at age 35 (Table B3 in Appendix B), which yielded rather consistent results for the individual components except for psychological energy. Overall, the endowments, i.e., the explained differences between groups in log wages, were somewhat higher at age 35 but still accounted for less than half of the difference in log wages.

Sensitivity and Robustness Analysis

First, we repeated the analysis for the two modeling approaches using various income thresholds. The results from the unconditional regression revealed a wage gap of approximately 15% when there was no restriction on income, which decreased at higher income restrictions and was only around 3% when the income cut-off was set at 150,000 SEK (Table B4–B6 in Appendix B). The OB results for personality traits confirmed those in the main analysis, especially for the lower return from Intensity and Emotional stability for "non-EU-15" (Table B7–B9 in Appendix B).

The OB results also confirmed those in the main analysis, with "non-EU-15" as the reference group and using different group weights (Table B10–B11 in Appendix B). Second, we estimated potentially differential returns on personality traits along the wage distribution using unconditional quantile regression (UQR). Overall, the results showed a narrowing immigrant-native wage gap as wages increased. The results indicate differential impacts of personality traits at different levels in the wage distribution – and for the different groups (graphically displayed in Fig. B2 in Appendix B). Generally, most traits are better remunerated at the bottom of the wage distribution, but the effects decrease by higher quantiles and become negative after the median. The magnitudes of the return of the traits of social maturity and psychological energy were in the same range for both groups. In contrast, rewards for the traits intensity and emotional stability were substantially lower for "non-EU-15" compared to "Both Swe" over most of the part of the income distribution, and for "non-EU-15," there was no wage reward for the trait emotional stability, although the estimates remained insignificant over the whole wage distribution. Personality traits also had a similar importance in explaining wage differences in the upper part of the wage distribution (Table B12 in Appendix B). Third, we found that the overall results were more or less consistent over birth year (Figure B3 in Appendix B). Fourth, we examined the impact of potential changes in the conscription process by comparing the years before and after conscription was mandatory in 1997 ≤ 2006 and ≥ 2007. In general, the differences in return from traits between "Both Swe" and "non-EU-15" were similar for those who were conscripted after 2006 (Table B13-B14 in Appendix B). This suggests a possible positive selection of the "non-EU-15" conscripts in later years. In the country-specific analysis for the five largest immigrant groups in our sample (Iran, Yugoslavia, Bosnia, Iraq, and Lebanon), the results generally aligned with the main analysis with small variations. For example, Bosnians had slightly higher wages than the native Swedes ("Both Swe") and somewhat lower rewards on the labor market than the native Swedes from the trait psychological energy (data not shown in tables or figures).

Discussion

Summary of the Findings and Relation to Previous Evidence

Sweden and most other Western European countries have an immigrant-native wage gap that needs further examination. Previous studies have explained parts of the wage gap (Nordin & Rooth, 2009; Hanes & Norlin, 2011), and personality traits are one of the newer avenues for examining group differences in labor market outcomes, which may impact wages. The present study examined the impact of four personality traits on wages, including the immigrant-native gap, in Sweden using a unique dataset that contains these personality traits evaluated by a psychologist during the SME. The first finding of this study showed a small difference in average personality traits between "Both Swe" and "non-EU-15." However, the effect size at the group level was small (as measured with Cohen's *d*), and the variation within the group was larger than between groups. Second, our empirical results

showed that personality traits impact wages and that the wage gap decreased after adjustments. The interaction tests showed that the return from certain traits differed between the groups. Overall, the returns from social maturity and psychological energy were high in the Swedish labor market. However, while "Both Swe" had high returns from all traits, the return from emotional stability was lower (negative) for men from "non-EU-15" countries. Third, we further examined these findings using a threefold Oaxaca–Blinder decomposition to examine whether similar personality traits are rewarded differently in the Swedish labor market. The decomposition analysis showed that "Both Swe" and men from "non-EU-15" countries had different labor market returns from similar personality traits and suggested that more than 60% of the wage gap could be attributed to the coefficients. This part will contain but does not exclusively consist of discrimination in the labor market. In particular, the returns from intensity and emotional stability traits were greater for "Both Swe." These findings were consistent in the robustness checks. The Oaxaca–Blinder results in our study are consistent with those presented by Laible and Brenzel (2022), who found that emotional stability contributes to the immigrant-native wage gap in Germany. Emotional stability is the predictability and consistency of emotional reactions in the absence of rapid mood changes, whereas neuroticism includes a chronic level of anxiety and proneness to psychological distress. Studies have shown a general wage penalty from neuroticism, whereas employers reward emotional stability (Heineck, 2011). Our results suggest that similar traits may be perceived differently between groups and that men with an immigrant background may be perceived as less emotionally stable by employers.

The findings from the Oaxaca–Blinder decomposition indicated that 26% of the mean wage gap could be explained by differences in personality traits. This can be compared to an explained 9–40% in previous Swedish wage gap studies (depending on the estimated model). We extended previous wage gap studies by adding personality traits to the models. Rooth and Ekberg's (2003) model explained 26–34% (depending on the estimated model) of the immigrant-native wage gap. By adding personality traits to their model, we were able to explain 42% of the difference. Similarly, when building upon Nordin and Rooth (2009), who explained 9–40%, we were able to explain 60% of the wage gap. When comparing with the corresponding figures from the study by Hanes and Norlin (2011), who explained 30–40%, we were able to increase the explained proportion to 40–50% in our model when controlling also for personality traits. Our findings clearly indicate that the addition of personality traits when examining returns to wages increases the explanatory power. Based on these findings, studies using traditional human capital factors (education and experience) may explain the wage gap only to a partial extent. However, previous studies were unable to decompose the wage gap per single personality trait, which is a novel contribution of the present study. We performed mediation analyses (using education as the mediator) to examine the potential pathway between personality traits and wages and found that all four traits had a significant and positive impact on educational attainment. However, we also suggest differential impacts across groups where the results show differences in the impact of emotional stability on educational attainment. Thus, the impact of personality traits on wages seems to be partly mediated by post-secondary education.

Collischon ([2020](#)) suggested differences in returns from traits across the whole wage distribution based on British and German data. Unlike previous Swedish studies, we also examined potential heterogeneity across wage distributions, similar to the study by Collischon ([2020](#)) and Firpo et al. ([2009](#)) using wage decompositions. Our results indicate that the return from personality traits varies across the wage distribution and that the immigrant-native wage gap varies significantly across the wage distribution: The wage gap was larger at the lower end of the wage distribution and decreased at the upper level of the distribution. In the upper distribution level, we were able to explain as much as 70–80% of the wage gap. Overall, these results indicate that the "penalty" from personality traits for "non-EU-15" is more pronounced at the lower levels of the wage distribution.

Potential Underlying Mechanisms

We found that personality traits may impact the immigrant-native wage gap in Sweden and that the gap was partially mediated by educational attainment. Personality may also affect wages through other channels than education (see Almlund et al., [2011](#)). Heckman et al. ([2006](#)) predicted wage outcomes through occupational sorting. For example, individuals with certain personality traits may value the non-pecuniary benefits associated with certain occupations, such as having a certain status or secure employment. Other mechanisms include the type of compensation scheme preferred by individuals (Dur et al., [2010](#); Cobb-Clark & Tan ([2011](#)), absenteeism (Störmer & Fahr 2010), job turnover, unemployment, search behavior (Borghans et al., [2008](#)), and wage bargaining (Caliendo et al., [2015](#)). Mechanisms related to the employer may differ based on the type of occupation. For example, certain traits may be more highly rewarded, in those in managerial positions (Cobb-Clark & Tan [2011](#)). Another mechanism may be employers' beliefs about workers' unobserved characteristics, especially whether they believe that individuals with a certain ethnic background may differ in personality traits compared to the majority of workers with otherwise identical observed characteristics (Ayaita, [2021](#)), as well as labor market discrimination. For instance, employers may have a negative preference against specific groups and, therefore, avoid employing people with certain perceived traits, i.e., taste-based discrimination (Becker [1957](#)). Alternatively, because personality traits are rarely measured in job recruitment processes, employers might use their beliefs about average traits in different groups to assume an individual's characteristics and productivity, i.e., statistical discrimination (Phelps [1972](#)). It is, however, difficult to detect and determine whether certain ethnic minorities are truly discriminated against in the labor market. Some experimental studies using fictitious applications have found evidence of discrimination against ethnic minorities in the Swedish labor market (Carlsson & Rooth [2007](#); Eriksson et al., [2017](#); Åslund & Skans-Nordström, [2012](#)). However, results from experimental studies do not determine whether employers' behaviors reflect actual differences in personality traits or whether they are inaccurate (Ayaita, [2021](#); Bohren et al., [2019](#)). One of the findings of this study is that we observed actual differences in personality traits and differences between groups in return for traits. Our findings suggest that similar

personality traits are rewarded differently in the labor market, which may reflect employers' tendency to believe that ethnic minority workers usually differ in traits when some individual-level personality characteristics are unobserved.

Strengths and Limitations

This study has several strengths compared to previous immigrant-native wage gap studies. The key strength is that we used measures of single personality traits evaluated during Swedish military enlistment at the typical age of 18 years prior to post-secondary educational and labor market entry. The evaluated traits are intended to match conscripts with services within the Swedish Armed Forces but have been shown to also be valuable in predicting outcomes on the Swedish labor market (see Edin et al., 2022; Grönqvist & Lindqvist, 2016; Fredriksson et al., 2018). Immigrant-native wage gap studies in Germany, such as the study by Laible and Brenzel (2022), used personality traits measured by self-reported questionnaires. Studies have also shown that the self-reports of skills are sensitive to survey conditions (Chen et al., 2020; Heckman et al., 2018). In addition, survey data that simultaneously measure personality traits together with wages increases the risk of endogeneity. These key strengths have implications for the confidence in our results. However, a limitation of this study is the omitted variables. For example, we did not control for wage-determinant covariates on the demand side, such as firm size, type of industry, occupation, and region, including regional unemployment rate. Unfortunately, we had no access to data on these variables in our nationwide registers. Another limitation is related to a positive selection for men born abroad. The study population comprised naturalized male immigrants who came to Sweden in childhood/adolescence. Consequently, the comparisons are conducted within a selected subset of the immigrant population. However, if there is a positive selection to enlist, we should rather have underestimated the magnitude of our findings. In addition, a potential ethnic bias of the test (see Carneiro et al., 2005 and Nordin and Rooth, 2009) might have existed, and it cannot be ruled out that certain cultural and behavioral components could be misperceived as certain personality traits during the SME. In that case, this could lead to potential systematic measurement errors in the psychologists' assessment of personality traits. Lindqvist and Vestman (2011) have provided a detailed overview of potential measurement errors in the assessment of conscripts during the SME and concluded that there is a high accuracy in the evaluation process by the Swedish Armed Forces.

Conclusions and Avenues for Future Research

We found relatively small differences in average personality traits between the immigrants from "non-EU-15" countries and native Swedes, and the variation within groups was larger than between groups. We also found that parts of the immigrant-native wage gap could be explained by differences in personality traits and that the wage gap decreased after further adjustments. Our perhaps most important finding

suggests that the personality traits are differentially rewarded in terms of wages for immigrants from "non-EU-15" compared to "Both Swe" and particularly for the traits of intensity and emotional stability. Considering the integration process, immigrants may encounter discrimination in the labor market, which may contribute to the unexplained part of the Oaxaca–Blinder decomposition. Future research should delve deeper into how personality traits, alongside other factors, such as occupational sorting, influence labor market outcomes and wages for individuals with immigrant backgrounds. Such research could also investigate potential prejudice related to personality traits among immigrants and explore labor market behaviors in both the employers and the employees, such as how similar traits may be perceived differently between groups and employers' beliefs about unobserved features among immigrants. Moreover, incorporating firm-specific characteristics into future studies could offer additional insights into the dynamics of the wage gaps and their underlying mechanisms.

Declarations

References

Akerlof, G.-A., & Kranton, R.-E. (2000). Economics and identity. *The Quarterly Journal of Economics, Oxford University Press, 115*(3), 715–753.

Alderotti, G., Rapallini, C., & Traverso, S. (2021). The Big Five personality traits and earnings: A meta-analysis, *GLO Discussion Paper*, No. 902, Global Labor Organization (GLO), Essen.

Almén, D. (2020) Societal impacts of modern conscription: Human capital, social capital, and criminal behavior. Doktorsavhandling.

Almlund, M., Duckworth, AL., Heckman, JJ., & Kautz, TD. (2011). Personality psychology and economics. *National Bureau of Economic Research*. Working Paper 16822.

Antelius, J., & Björklund, A. (2000). How reliable are register data for studies of the return to schooling? *An examination of Swedish data, Scandinavian Journal of Educational Research, 44*(4), 341–355.

Åslund, O., & Skans-Nordström, O. (2012). Do anonymous job application procedures level the playing field? *Industrial and Labor Relations Review, 65*(1), 82–107.

Austen-Smith, D., & Fryer, R.-G. (2005). An economic analysis of "acting white." *The Quarterly Journal of Economics, 120*(2), 551–583.

Ayaita, A. (2021). Labor market discrimination and statistical differences in unobserved characteristics of applicants, ZBW – Leibniz Information Centre for Economics, Kiel, Hamburg.

Barrick, M.-R., & Mount, M.-K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*(1), 1–26.

Battu, H. & Zenou, Y. (2007). Oppositional identities and employment for ethnic minorities: Evidence from England, *The Economic Journal*, V. 120, I. 542, P: F52–F71.

Becker, G.-S. (1957). *The economics of discrimination* (2nd ed.). University of Chicago Press.

Benoit, K. (2011). Linear regression model with logarithm transformation. Methodology Institute.

Berry, J. W., & Sam, D.-L. (1997). Acculturation and adaptation. In J. W. Berry, M. H. Segall, & C. Kagitcibasi (Eds.), *Handbook of cross-cultural psychology* (2nd ed., Vol. 3, pp. 291–326). Allyn and Bacon.

Bertrand, M. (2011). New perspectives on gender In *The Handbook of Labor Economics*, edited by O. C. Ashenfelter and D. Card, 1545–92. Amsterdam: Elsevier, Ltd.

Bisin, A., & Verdier, T. (2000). Beyond the melting pot: Cultural transmission, marriage, and the evolution of ethnic and religious traits. *The Quarterly Journal of Economics, 115*(3), 955–988.

Blau, F.-D., & Kahn, L.-M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature, 55*(3), 789–865.

Blinder, A.-S. (1973). Wage discrimination: Reduced form and structural estimates. *Journal of Human Resources, 8*(4), 436–455.

Bohren, J., Aislinn, A.-I., & Rosenberg, M. (2019). The dynamics of discrimination: Theory and evidence. *American Economic Review, 109*(10), 3395–3436.

Borghans, L., Duckworth, A. E., Heckman, J. J., & ter Weel, B. (2008). The economics, psychology of personality traits. *Journal of Human Resources, University of Wisconsin Press, 43*(4), 3395–3436.

Borjas, G.-J. (1985). Assimilation, changes in cohort quality, and the earnings of immigrants. *Journal of Labor Economics, 3*, 463–489.

Bowles, S., Gintis, H., & Osborne, M. (2001a). The determinants of earnings: A behavioral approach. *Journal of Economic Literature, 39*(4), 1137–1176.

Bowles, S, Gintis, H., & Osborne. M. (2001b). Incentive-enhancing preferences: Personality, behavior, and earnings. *The American Economic Review,* 91(2):155-158.

Browning, M, Hansen, L-P, and Heckman, J-J. (1999). Micro data and general equilibrium models. In Handbook of Macroeconomics, ed. John B. Taylor and Michael Woodford, 543-633. Elsevier.

Brunow, S., & Jost, O. (2021). Foreign Vs. German wage differentials in Germany: Does the home country matter?. In: Cochrane, W., Cameron, M.P., Alimi, O. (eds) Labor Markets, Migration, and Mobility. New Frontiers in Regional Science: Asian Perspectives, vol 45. Springer, Singapore. https://doi.org/10.1007/978-981-15-9275-1_3

Brunow, S., & Jost, O. (2022). Wages of skilled migrant and native employees in Germany: New light on an old issue. *International Migration Review, 56*(2), 410–432.

Caliendo, M., Cobb-Clark, D., & Uhlendorff, A. (2015). Locus of control and job search strategies. *The Review of Economics and Statistics, 97*(1), 88–103.

Carlsson, M., & Rooth, D.-O. (2007). Evidence of ethnic discrimination in the Swedish labor market using experimental data. *In Labour Economics, 14*(4), 716–729.

Carlstedt, B. & Andersson, J., (2003) Urval till plikttjänst. Karlstad: Institutionen för ledarskap och management, Försvarshögskolan

Carlstedt, B. (2006). Mönstring och uttagning till plikttjänst och dess relation till provresultat och pyskologbedömningar - en jämförelse mellan svenskar och invandrare. Försvarshögskolan—ILM, Serie F:21, Institutionen för ledarskap och management (in Swedish).

Carneiro, P., Heckman, J., & Masterov, D. (2005). Labor Market Discrimination and Racial Differences in Premarket Factors. *Journal of Law and Economics, 48*(1), 1–39.

Case, A., & Paxson, C. (2008). Height, health, and cognitive function at older ages. *American Economic Review, 98*(2), 463–67.

Caspi, A., & Roberts, B.-W. (1999). Personality continuity and change across the life course. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 300–326). Guilford Press.

Chen, Y., Feng, S., Heckman, J. J., & Kautz, T. (2020). Sensitivity of self-reported noncognitive skills to survey administration conditions. *Proceedings of the National Academy of Sciences of the United States of America*

Chiswick, B.-R. (1978). The effect of Americanization on the earnings of foreign-born men. *Journal of Political Economy, 86*(5), 897–921.

Cobb-Clark, D., & Tan, M. (2011). Noncognitive skills, occupational attainment, and relative wages. *Labour Economics, 18*(1), 1–13.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.*

Collischon, M. (2020). The returns to personality traits across the wage distribution. *Labour, 34*(I. 1), 48–79.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature, 47*(2), 448–74.

Cunha, F., and Heckman, JJ., & Lochner, L., and Masterov, D-V. (2006). Interpreting the evidence on life cycle skill formation. IZA Discussion Paper No. 1675.

Cunha, F., Heckman, J. J., & Lochner, L. (2006). *Interpreting the evidence on life cycle skill formation.* Elsevier.

Dackehag, M., Gerdtham, U.-G., & Nordin, M. (2015). An economic analysis of excess-weight penalty in the Swedish labor market. *The European Journal of Health Economics., 16*, 589–601.

Dur, R., Arjan, N., & Hein, R. (2010). Reciprocity and incentive pay in the workplace, No 4782, IZA Discussion Papers, Institute of Labor Economics.

Edin, P.-A., Fredriksson, P., Nybom, M., & Öckert, B. (2022). The rising return to noncognitive skill. *American Economic Journal: Applied Economics, 14*(2), 78–100.

Erikson, E.-H. (1968). *Identity, youth, and crisis.* W. W. Norton & Company Inc.

Eriksson, S., Johansson, P., & Langenskiöld, S. (2017). What is the right profile for getting a job? A stated choice experiment of the recruitment process. *Empirical Economics, 53*, 803–826.

Fazel, M., Reed, R.-V., Panter-Brick, C., & Stein, A. (2012). "Mental health of displaced and refugee children resettled in high-income countries: Risk and protective factors. *The Lancet, 379*, 266–82.

Fernández, R., Fogli, A., & Olivetti, C. (2004). Mother and sons: Preferences formation and female labor force dynamics. *The Quarterly Journal of Economics., 119*(4), 1249–1299.

Firpo, S., Fortin, N. M., & Lemieux, T. (2009). Unconditional quantile regressions. *Econometrica, 77*(3), 953–973.

Fortin, N. M., T. Lemieux, & Firpo, S. (2010). Decomposition methods in economics. NBER Working Paper Series No. 16045, 102 p. Cambridge, MA: National Bureau of Economic Research.

Fredriksson, P., Hensvik, L., & Nordström-Skans, O. (2018). Mismatch of talent: Evidence on match quality, entry wages, and job mobility. *American Economic Review, 108*(11), 3303–38.

Gensowski, M. (2018). Personality, IQ, and lifetime earnings. *Labour Economics, 51*, 170–183.

Grönqvist, E., & Lindqvist, E. (2016). The making of a manager: Evidence from military officer training. *Journal of Labor Economics, 34*(4), 869–898.

Hammarstedt, M., & Palme, M. (2012). Human capital transmission and the earnings of second-generation immigrants in Sweden. *IZA Journal of Migration, 2012*(1), 4.

Hanes, N., & Norlin, E. (2011). Psychological traits and earnings differentials among men: A study of second-generation immigrants in Sweden. *Scandinavian Journal of Economics, 113*, 318–341.

Heckman, JJ., Stixrud J & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior, *Journal of Labor Economics*, P. 411-482.

Heckman, J.-J. (2011). The economics of inequality: The value of early childhood education. *American Educator, 35*, 31–35.

Heckman, J. J., Jagelka, T., & Kautz, T. (2021). Some contributions of economics to the study of personality. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and research* (pp. 853–892). The Guilford Press.

Heineck, G. (2011). Does it pay to be nice? Personality and earnings in the United Kingdom. *Industrial and Labor Relations Review, 64*(5), 1020–38.

Hensvik, L., & Nordström-Skans, O. (2023). The skill-specific impact of past and projected occupational decline. *Labour Economics, 81*, 825.

Ingwersen, K., & Thomsen, S.-L. (2021). The immigrant-native wage gap in Germany Revisited. *J Econ Inequal, 19*, 825–854.

Jaeger, D. A., Dohmen, T., Falk, A., Huffmann, D., Sunde, U., & Bonin, H. (2010). Direct evidence in risk attitudes and migration. *The Review of Economics and Statistics, 92*(3), 684–9.

Jann, B. (2008). The Blinder-Oaxaca decomposition for linear regression models. *The Stata Journal, 8*(4), 453–479.

Jokela, M. (2009). Personality predicts migration within and between US states. *Journal of Research in Personality, 43*(1), 79–83.

Judge, T. A., Higgins, C. A., Thoresen, C. J., & Barrick, M. R. (1999). The Big Five Personality Traits, General Mental Ability, and Career Success across the Life Span. *Personnel Psychology, 52*, 621–652.

Kautz, T., & Zanoni, W. (2014). Measuring and Fostering non-cognitive skills in adolescence: Evidence from Chicago public schools and the OneGoal program.

Laible, M.-C., & Brenzel, H. (2022). Does personality matter? Noncognitive skills and the male migrant wage gap in Germany. *International Migration Review, 56*(2), 376–409.

Lindqvist, E., & Vestman, R. (2011). The labor market returns to cognitive and noncognitive ability: Evidence from the Swedish enlistment. *American Economic Journal: Applied Economics, 3*(1), 101–28.

Ludvigsson, J. F., Berglind, D., Sundquist, K., Sundström, J., Tynelius, P., & Neovius, M. (2022). The Swedish military conscription register: Opportunities for its use in medical research. *European journal of epidemiology, 37*(7), 767–777.

Lundberg, S-J. (2013). Educational inequality and the returns to skill. IZA Discussion Paper No. 7595, 38 p. Bonn: Institute for the Study of Labor.

Lundh, C., & Ohlsson, R. (1999). Från arbetskraftsimport till flyktinginvandring. SNS

Matsumoto, D, & Juang., L. (2008). *Culture & Psychology*. CA: Thomson & Wadsworth

Matsumoto, D, & Juang, L. (2016). Culture and psychology.

McCrae, R. R., & Costa, P. T., Jr. (2008). The five-factor theory of personality. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (pp 159–181).

McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 139–153). Guilford Press.

McCrae, R. R., & Terracciano, A. (2008). The five-factor model and its correlates in individuals and cultures. In F. J. R. van de Vijver, D. A. van Hemert, & Y. H. Poortinga (Eds.), *Multilevel analysis of individuals and cultures* (pp. 249–283). Taylor & Francis Group/Lawrence Erlbaum Associates.

McCrae, R. R., Terracciano, A., and 78 Members of the personality profiles of cultures project. (2005). Universal Features of Personality Traits From the Observer's Perspective: Data From 50 Cultures. *Journal of Personality and Social Psychology., 88*, 547–561.

Mood, C., Jonsson, J.O., & Bihagen, E. (2012). Socioeconomic persistence across generations: Cognitive and noncognitive processes.

Mood, C., Jonsson, J. O., & Bihagen, E. (2012). Socioeconomic persistence across generations: Cognitive and noncognitive processes. In From parents to children: The intergenerational transmission of advantage (pp. 53–84).

Mueller, G., & Plug, E. (2006). Estimating the effect of personality on male and female earnings. *Industrial and Labor Relations Review, 60*(1), 3–22.

Neal, D. A., & Johnson, W.-R. (1996). The role of premarket factors in black–white wage differences. *Journal of Political Economy, 104*(5), 869–895.

Nilsson, Å. (2004). Efterkrigstidens invandring och utvandring. *Statistiska centralbyrån. Serie: Demografiska rapporter, 0283–8788*(2004), 5.

Nordin, M., & Rooth, D.-O. (2009). The ethnic employment and income gap in Sweden: Is skill or labor market discrimination the explanation? *Scandinavian Journal of Economics, 111*, 487–510.

Nyhus, E.-K., & Pons, E. (2005). The effects of personality on earnings. *Journal of Economic Psychology, 26*(3), 363–384.

Oaxaca, R.-L. (1973). Male-female wage differentials in urban labor markets. *International Economic Review, 14*, 693–709.

OECD. (2020). International Migration Outlook 2020. *OECD Publishing, Paris,*. https://doi.org/10.1787/ec98f531-en

Phelps, E.-S. (1972). The statistical theory of racism and sexism. *The American Economic Review, 62*(4), 659–661.

Rooth, D. O., & Ekberg, J. (2003). Unemployment, and earnings for second generation immigrants in Sweden. Ethnic background and parent composition. *J Popul Econ, 16*, 787–814.

Sáez-Martí, M, & Zenou, Y. (2005) Cultural transmission and discrimination, IZA Discussion Papers, No. 1880.

Salgado, J. F. (1997). The five factor model of personality and job performance in the European Community. *Journal of Applied Psychology, 82*(1), 30–43. https://doi.org/10.1037/0021-9010.82.1.30

Schmitt, D. P., Allik, J., McCrae, R. R., & Benet-Martínez, V. (2007). The geographic distribution of Big Five personality traits patterns and profiles of human self-description across 56 nations. *Journal of Cross-cultural Psychology*, P. 73-212.

Statistics Sweden (2021)

Triandis, H.-C. (2001). Individualism-collectivism and personality. *Journal of Personality, 69*(6), 907–924.

Triandis, H. C., & Suh, E.-M. (2002). Cultural influences on personality. *Annual Review of Psychology, 53*, 133–160.