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The Gender Difference in Intelligence in High-status Jobs

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Abstract

IQ and conscientiousness are the most important predictors of job performance. The jobs in the higher end of the socioeconomic spectrum are more complex, so a higher IQ is favorable and a higher score on certain personality traits, such as conscientiousness, is necessary to perform well. Job performance is not the only deciding factor to obtain a high-level job, as gender also matters, since there is an underrepresentation of females in executive functions. Another fact is that the gender wage gap has decreased more in the bottom and the middle part of the wage distribution, relative to the highest part of the distribution. The research question if higher intelligence and conscientiousness increases the chance of being in a high-end job, and if this effect weaker for females than for males, will be tested with the aid of an ordinary least squares regression model. The results show that a higher level of intelligence increases the chance of being in a high-level socioeconomic job. Higher conscientiousness also increases the chance of being in a high-level socioeconomic but not as unambiguously as intelligence does. The effect of intelligence is weaker for females, implying they need to possess a higher intelligence than males to have the same chance of being in a high-level socioeconomic job. My results don't show a gender difference in the effect of conscientious on being in a high-level socioeconomic job.

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1. Introduction

When people are asked to provide a measure of ability to gauge one's performance in, for instance, academics or their job, IQ is one of the first things that comes to mind. It is quite easy to assume that people with a higher IQ are more likely to be successful. IQ is associated with 'smartness' and 'intelligence' because we know many successful individuals that possess a high IQ, ranging from the ultra-rich like Bill Gates or Elon Musk, to famous scientists like Nikola Tesla and Albert Einstein. These people are all, of course, at the very top layer of our global society in terms of socioeconomic status. Even though IQ is sometimes dismissed as antiquated or misguided, it is still oftentimes considered to be a good measure of judging someone's general ability to perform in the workforce or academics (Gottfredson, 1997; Hauser, 2000).

However, we are obviously not only defined by our intelligence. Using IQ alone to predict job performance is insufficient as it is too one-dimensional (Gottfredson, 1997). Research by Borghans et al. (2016) suggests that someone's personality can also influence their job performance. The Big Five personality model developed by Goldberg (1992) can give some more insight in this matter. It is a model that is used to measure how individuals score on the five most important personality traits: 'Extraversion', 'Agreeableness', 'Conscientiousness', 'Neuroticism', and 'Openness'. Research by Barrick & Mount (1991) and Hough et al. (1990) shows that ranging across different professions, conscientiousness has the strongest relation with respect to job performance. The other traits were not as universally interpretable as positive or negative, and their impact varied based on job type.

It is likely that these personality traits present differently in men and women. Women tend to score higher on neuroticism, agreeableness, and extraversion, but they do not score significantly different on conscientiousness and openness (Weisberg, DeYoung & Hirsh, 2011). Research by Mueller & Plug (2006) has already shown that differences in big five personality traits are associated with differences in earnings between males and females. For men, a low score on agreeability and high score on openness was favorable and for women a high score on conscientiousness was favorable.

It has also been established that there are different gaps between men and women, such as the gender wage gap and the gender promotion gap. There are currently more males than females working at the top (Bertrand & Hallock, 2001). Even though the number of females in management positions has increased over the years (Powell, 2014), they are still underrepresented in executive functions. (Metz & Kulik, 2014). Similarly, the gender wage gap has decreased in the bottom to mid part of the wage distribution, relative to the high part of the distribution. (Blau & Kahn, 2017). This suggests that females are still falling behind in the high-end part of the job market. The jobs in this segment are more complex so a higher IQ is favorable and a higher score on certain personality traits is necessary to perform well

(Gottfredson, 1997). This gives rise to the question: Do females lack these characteristics or are they being held to a different standard? Yet another possibility is that women do not want these jobs. Self-selection bias differences in competitiveness between men and woman could limit women from entering certain jobs (Dariel, Nikiforakis & Stoop, 2020). It is likely that females might need a higher IQ or a higher score on certain personality traits compared to males to enter high-end jobs. Therefore, the research question is:

Does higher intelligence and conscientiousness increase the chance of being in a high-end job? Is this effect weaker for females than for males?

Where other research like Hauser (2000) focuses on broader interactions, this paper will focus on the top-level job. The focus on top-level jobs will add to the findings of underrepresentation of females in executive functions and the bigger gender pay gap in people with a high wage. This paper aims to shed light on the components of the gender pay cap and discrimination against women in top-level jobs. Insight in this matter could help society identify factors of the problem so it can be addressed.

This paper will continue as follows. First, the most important concepts are defined, and the related literature is explored. In this part the hypotheses are introduced as well. Next, information about the data selection, why the sample is picked and what variables are used, are provided. The method of researching the research question and hypothesis is explained in the next section, including the formula's used. The results are then presented, including an interpretation of the most important coefficients. Finally, in the conclusion the meaning and implication of the results are given, which is then followed up by the discussion.

2. Literature Review

2.1. Concepts

There are several important concepts that are explored in this paper. The first concept that is explored is IQ. Afterwards, the Big Five Personality model is discussed, with a focus on the personality trait 'conscientiousness'.

IQ, short for Intelligence Quotient, is the outcome of a test, in this case the Wechsler Intelligence Scale for Children, designed to measure someone's intelligence. IQ is a valid measure to compare the ability of people in different social layers (Guterman, 1979; Sternberg, Grigorenko & Bundy, 2001). The second concept that needs to be defined is the 'Big Five personality model'. The model by Costa & McCrae (1985), lists five major personality factors: extraversion, agreeableness, conscientiousness, neuroticism, and openness. Extraversion is how sociable, energetic, and assertive someone is. Agreeableness is how forgiving; warm and sympathetic someone is. Conscientiousness is how organized, disciplined, and efficient someone is. Neuroticism is how tense, irritable, and shy someone is. Finally, openness is how curious, imaginative, and open to new experiences someone is. In this paper, there will be a focus on the personality trait 'conscientiousness'. The Big Five personality traits are also a good supplementation for IQ as IQ alone can be too one dimensional.

2.2. Gender and personality characteristics

In this next part, the difference between the IQs and perceived IQs between the two genders will be discussed. Afterwards, the difference between the level of conscientiousness in relation to gender will be explored.

2.2.1.IQ and gender

The scores of IQ tests do not significantly differ between the sexes (Brody, 1992; Halpern, 1992). Brody states that this is because the tests are constructed in a way that no gender differences can arise. However, there are still differences that can be found between the two sexes regarding IQ.

Firstly, females tend to be better at answering questions regarding verbal ability, while men tend to be better at answering questions regarding spatial ability (Hyde & Linn, 1988). Secondly, males self-estimate their IQ significantly higher compared to their measured IQ than females. Females, on the other hand, did not significantly underestimate their IQ (Reilly & Mulhern, 1995). Later studies show a similar result with males overestimating their IQ (Furnham & Rawles, 1999). A self-selection bias in competitive environments between men and woman has been observed (Niederle & Vesterlund, 2011; Dariel, Nikiforakis & Stoop, 2020). This suggests that women were less inclined to participate in competitive environments.

Finally, women are often underestimated in terms of intelligence. To illustrate, there is a bias against women in contexts where intelligence matters (Bian, Leslie & Cimpian, 2018). The odds of referring a woman for a job requiring 'brilliance' were lower than for the control group and this suggested that participants, both male and female, had an implicit bias against women in terms of intelligence. In another study by Hogan (1978) participants were asked to judge their own IQ and that of their parents. The result of the judgment of their own IQ was in line with the results of Reiley & Mulhern (1995). Males overestimated their own IQ scores while the females did not. Both male and female, perceived their fathers having a higher IQ than their mothers. A replication of this study also suggested that fathers were perceived to have a higher IQ than mothers by their own children (Bennett, 1996). Thus, women are often perceived as 'less intelligent'.

2.2.2. Conscientiousness and gender

According to research by Weisberg, DeYoung & Hirsh (2011) the expression of personality traits differs among the genders. Their research showed that women have a higher expression of neuroticism, agreeableness, and extraversion. No significant differences in conscientiousness and openness were reported between the genders. There is a lot of debate whether the level of conscientiousness differs across the genders. Some researchers report no significant gender differences in conscientiousness (Costa et al., 2001; Vianello et al., 2013), while others report a negative effect of being female on conscientiousness (Shokri, Kadivar & Daneshvarpoor, 2007), or even a positive effect (Goodwin, & Gotlib, 2004; Schmitt, Realo, Voracek & Allik, 2008). Conscientiousness is made up of smaller elements like order, dutifulness, and self-discipline. Research by Feingold (1994) and Costa et al. (2001) suggests that women score higher in these elements. Costa, Terracciano, & McCrae (2001) have hypothesized that these mixed results in conscientiousness across the genders could be due to variations in those smaller elements of the factor conscientiousness. In conclusion, beforementioned literature does not show a clear relationship between conscientiousness and gender.

2.3. How IQ and Big Five personality influences your success

In this next part, the impact of having a high IQ on your job performance will be discussed. This is then followed up with a discussion of the impact of a high level of conscientiousness on your job performance.

2.3.1. IQ and its influence on success

IQ is the single most powerful predictor of job performance (Gottfredson, 1997). According to Gottfredson (1997) this ranges across all levels of jobs, from low to high complexity. This is in line with research of Hauser (2000) who has also shown a positive relation of IQ on the socioeconomic score of a job. The socioeconomic score of jobs was defined by a metric which took years of education and salary into account. Hauser's research suggests that IQ is positively correlated with success in terms of career.

2.3.2. Conscientiousness and its influence on success

Unlike the other traits of the big five personality model, conscientiousness is of positive influence on workplace performance in every context, as suggested by Barrick & Mount (1991) and Hough et al. (1990). While the other traits also impact job performance, this impact is not as generally applicable as conscientiousness, because these traits positively impact certain jobs, while at the same time negatively impact others. The effects of conscientiousness are broad and influence things far beyond workplace performance (Duckworth et al., 2012). In this research Duckworth et al. tested the effects of the big five personality traits on life success of individuals, in terms of wealth, income, and life satisfaction. It is worth noting that the effect of conscientiousness was not as high as other variables like ability, but its effect was ubiquitous.

2.4. Success and Gender

Up to this point, three things have been explored: the concepts of IQ and conscientiousness, how these two concepts present in the two sexes and what influence these two concepts have on success in later life. This means that there might be an interesting relationship between someone's sex and their success in later life in relation to IQ and conscientiousness.

There are no significant differences between the two genders in terms of IQ. However, there are still differences between the two sexes. Self-selection based on perceived intelligence can also influence one's success. A higher ability level, like high IQ, causes a self-selection bias, as suggested by Jacobs, Hartog & Vijverberg (2009). Because men overestimate their intelligence (Reilly & Mulhern, 1995), they could be more likely to have a self-selection bias for certain jobs that benefit from a high IQ. When an individual thinks that he or she is less capable than others they might be more included to not apply for a job that requires high ability. Women are also less associated with jobs that require intelligence (Bian, Leslie & Cimpian, 2018), which negatively impacts their chances of being selected for a job that required high ability. These two biases lead to the first hypothesis:

H_1: A higher IQ increases the chance of being in a top-level job and this effect is smaller for females.

Just like IQ, big five personality traits like conscientiousness are also associated with an increase in workplace performance (Barrick & Mount, 1991; Duckworth et al., 2012; Hough et al., 1990). It must be noted that even though differences are observed among the genders in expression of big five personality traits (Weisberg, DeYoung & Hirsh, 2011), these differences are based on the mean scores of men and women. Therefore, some women will have higher scores on these factors as an individual than predicted by the mean scores of their gender. For women, a high score on conscientiousness was linked to a higher job performance (Mueller & Plug, 2006). These things combined bring us to the second hypothesis:

H_2: A higher level of conscientiousness increases the chance of being in a top-level job. And this effect is smaller for females.

3. Methodology

3.1. Research Population

The population of interest for this research are people near the end of their career and who differ in personality or intelligence. They should be near the end of their career, so the socioeconomic status of their job reflects the progress they made in their career. To test the effect on top-level jobs only the high-end socioeconomic part of this population is selected. The population used in the research should not differ much in cultural background as this can correlate with personality and skew the results.

3.2. Data

The data used for the research stems from the Wisconsin Longitudinal Study of Social and Psychological Factors in Aspiration and Attainment (WLS) (Hauser et al., 1957), which can be accessed through their website. The dataset is a randomly drawn sample of one third of the high school graduates in 1957 in the state Wisconsin and contains 10,317 observations (Herd, Carr & Roan, 2014). The data on IQ and gender comes from the first wave in 1957, while the rest of the data used comes from the follow up interview in 1992-1993.

3.3. Variables

There are several variables used in the regression. The dependent variable is a binary variable for high-level job. It is constructed using the socioeconomic score of jobs, which uses the Duncan socioeconomic score (Duncan SEI) as a metric. This score is based on the level of education needed to work in the specified profession and the income level. The Duncan SEI score is derived from the socioeconomic scores given by the National Opinion Research Center (NORC). Duncan and Reiss used the NORC scores as a base to give a socioeconomic score to a wide variety of jobs (Duncan & Reiss, 1961). The variable contains the Duncan SEI score of the last or only job the participant. At the time of measurement some people are not working anymore and this way they can still be included in the sample. Previous jobs are not taken into account as this would give too much weight to lower status socioeconomic jobs as many people work in lower status jobs before moving to higher status jobs. The Duncan SEI scores range 1 to 100. The Duncan SEI score is then transformed into three binary variables which represent the threshold of 'a high-level job'. Three different thresholds are used to create variation in the definition of what a high-level job is. The threshold for the low-end cutoff is 70 Duncan SEI score, for the middle one it is 75 Duncan SEI score and for the high one it is at 80 Duncan SEI score. These binary variables will be called 'LT high-level job', 'MT high-level job' and 'HT high-level job' respectively from now on.

The first variable of interest 'IQ' describes the IQ of the individual. For the creation of this variable a standard IQ score test was used, which is derived from the Henmon-Nelson test (Henmon, Nelson & Lamke, 1957). This score is used because it is the only IQ score available in the dataset. This variable is mean centered around 0 for the regression on a binary variable as shown in Table 1.

Table 1

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
HT high-level job	6420	.073	.261	0	1
MT high-level job	6420	.155	.362	0	1
LT high-level job	6420	.276	.447	0	1
IQ	6420	0	14.597	-41.34	42.66
Gender	6420	.521	.5	0	1
Extraversion	6420	0	5.343	-17.03	12.97
Agreeableness	6420	0	4.417	-20.465	7.535
Conscientiousness	6420	0	4.077	-20.244	6.756
Neuroticism	6420	0	4.882	-10.977	14.023
Openness	6420	0	4.79	-15.919	14.081
Degree of Urbanization	6420	4.743	2.33	1	8

Note. The mean of zero for some variables means they are mean centered around zero.

The variables 'Openness', 'Extraversion', 'Agreeableness', 'Neuroticism' and 'Conscientiousness', describes the individual's score for the respective big five personality traits. These scores are all based on the sum of the score of six questions, except for 'Openness', which is based on the sum of the score of five questions. The questions are constructed using a Likert scale, where 'strongly agree' gets a score of six, and 'strongly disagree' gets a score of one, so high values indicate a high expression of the personality trait. The variables for personality traits are also mean centered around 0, as shown in Table 1. Finally, a variable for the degree of urbanization is used. This is based on the residential area of the graduate in 1957. The types of residential areas that correspond with the variable value for 'Degree of Urbanization are listed in Appendix 1.

3.4. Gender differences

In Figure 1 a histogram with a normal distribution for IQ per gender is shown. These curves look very similar and imply that there are no significant differences in IQ between the genders in this sample. The same can be observed from the very small differences in mean and standard deviation between the genders in Table 2, the mean IQ of men is 102.341 points and for women the mean IQ is 102.340 points. The original values before being mean centered are used in Figure 1 and Table 2.

Table 2

Differences between the summary statistics of IQ between the genders

Variable	Mean	Std. Dev.	Obs
Male	102.341	14.962	3075
Female	102.340	14.256	3345

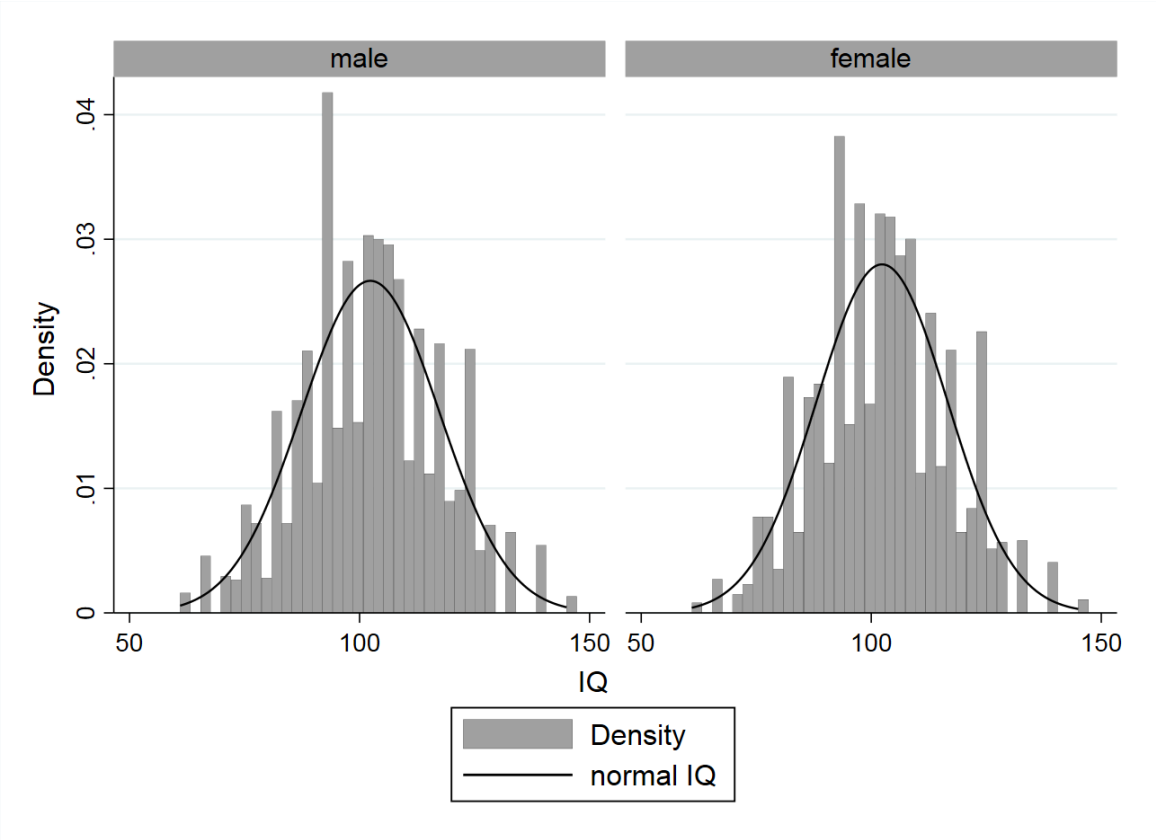

Figure 1. Histogram with the normal distributions of IQ by gender.

Figure 2 shows a histogram with a normal distribution of conscientiousness for each gender. The distributions look very similar, which implies that there are no significant differences in IQ between the genders in this sample. The mean values for conscientiousness in Table 3, 29.210 for males and 29.280 for females, also show that the means between the genders are similar. The original values before being mean centered are used in Figure 2 and Table 3.

Table 3

Differences between the summary statistics of conscientiousness between the genders

Variable	Mean	Std. Dev.	Obs
Male	29.210	4.094	3075
Female	29.280	4.063	3345

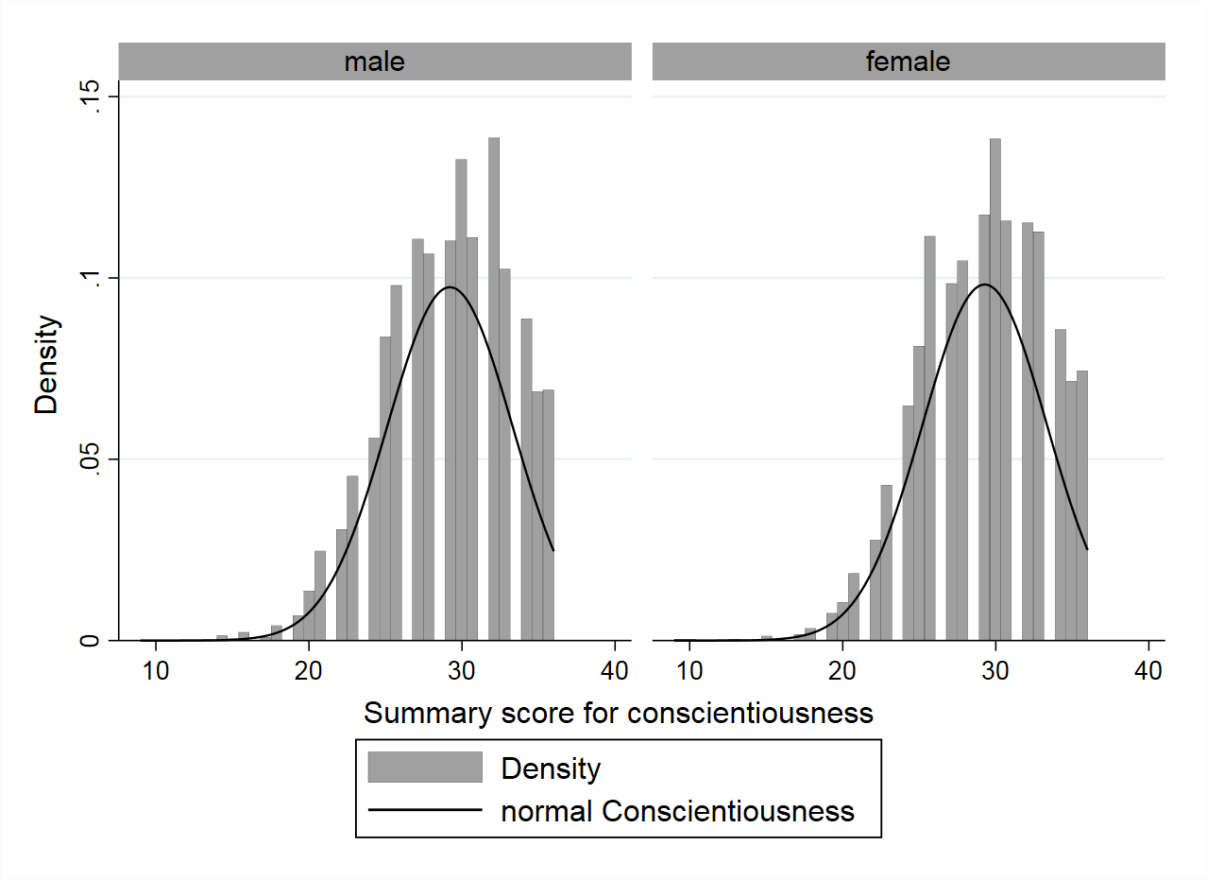

Figure 2. Histogram with the normal distributions for conscientiousness by gender.

The share of women that end up in a high-end job in the sample depends on the level of the threshold that is chosen, as shown in Table 4. There are 1775 individuals who fall in the high-level job category when the threshold is low, 41.41% of this group is female. The distribution of females becomes even more skewed when the threshold is moved up. For the mid-level threshold, the percentage of females drops to 31.52% and for the high threshold it drops even further to 27.18%. These numbers imply that females are underrepresented in high-level jobs in the sample.

Table 4

The number of observations and gender of the individuals per threshold category

Variable	Obs	percent
LT high-level job	**1775**	**100**
Male	1040	58.59
Female	735	41.41
MT high-level job	**993**	**100**
Male	680	68.48

Female	313	31.52
HT high-level job	**471**	**100**
Male	343	72.82
Female	128	27.18

Note. The number of observants that fall in the categories 'Low-threshold high-level job.', 'Mid-threshold high-level job' and 'High-threshold high-level job'. Per category the number of males and females is given both in absolute numbers and percentages.

3.5. Methods

Both hypotheses are tested using an ordinary least squares regression (hereafter: OLS) with an interaction term of IQ on gender, and conscientiousness on gender. The OLS regression includes the binary variables 'high-level job', 'Gender' and the continuous variables, 'IQ' and the five big five personality traits and the categorical variable 'Degree of urbanization'. The dependent variable is 'LT high-level job', 'MT high-level job' or 'HT high-level job'. Age is omitted because the respondents are around the same age and all graduated in 1957, so they can be considered similar in age. Both models are constructed using the top-down strategy.

3.5.1.IQ OLS model

The model is built using the top-down strategy. The first model includes the variables of interest and all control variables. In the subsequent model all variables that are not significant at the 10% level are removed. The first hypothesis states that women at the top have a higher level of IQ compared to men. The first regression model looks as follows:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \beta 4 * \text{Extraversion} + \beta 5 * \text{Agreeableness} + \beta 6 * \text{Conscientiousness} + \beta 7 * \text{Neuroticism} + \beta 8 * \text{Openness} + \beta 9 * \text{Degree of Urbanization} + \varepsilon$$

Then in the second model all control variables that are insignificant at the 10% level are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \beta 4 * \text{Conscientiousness} + \beta 5 * \text{Openness} + \beta 6 * \text{Degree of Urbanization} + \varepsilon$$

Finally, all control variables are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \varepsilon$$

The models for the mid and high threshold high-level jobs are constructed in the same way as the model above.

3.5.2. Conscientiousness OLS model

The second hypothesis states that women at the top have a higher level of conscientiousness compared to men. This will be measured using the same top-down method as the first hypothesis. First, all the relevant variables are added to the model:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{Conscientiousness} + \beta 2 * \text{Gender} + \beta 3 * \text{Conscientiousness} * \text{Gender} + \beta 4 * \text{Extraversion} + \beta 5 * \text{Agreeableness} + \beta 6 * \text{Conscientiousness} + \beta 7 * \text{Neuroticism} + \beta 8 * \text{Openness} + \beta 9 * \text{Degree of Urbanization} + \varepsilon$$

Then in the second model all control variables that are insignificant at the 10% level are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{Conscientiousness} + \beta 2 * \text{Gender} + \beta 3 * \text{Conscientiousness} * \text{Gender} + \beta 4 * \text{Extraversion} + \beta 5 * \text{Agreeableness} + \beta 6 * \text{Conscientiousness} + \beta 7 * \text{Neuroticism} + \beta 8 * \text{Openness} + \beta 9 * \text{Degree of Urbanization} + \varepsilon$$

Then in in the last model all control variables are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{Conscientiousness} + \beta 2 * \text{Gender} + \beta 3 * \text{Conscientiousness} * \text{Gender} + \varepsilon$$

The models for the mid and high threshold high-level jobs are constructed in the same way as the model above.

3.5.3. Combined IQ and Conscientiousness model

A combined model with both interaction terms IQ on Gender and Conscientiousness on Gender is included in the appendix because it differs very little from the previous models and these separate models allow for better visualization of the data. IQ and Conscientiousness are already control variables in the models where they are not used as regressor, and the interaction term of Conscientiousness on Gender is insignificant in most models. The combined model looks as follows:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \beta 5 * \text{Conscientiousness} + \beta 6 * \text{Conscientiousness} * \text{IQ} + \beta 7 * \text{Extraversion} + \beta 8 * \text{Agreeableness} + \beta 9 * \text{Neuroticism} + \beta 10 * \text{Openness} + \beta 11 * \text{Degree of Urbanization} + \varepsilon$$

Then in the second model all insignificant variables are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \beta 5 * \text{Conscientiousness} + \beta 6 * \text{Conscientiousness} * \text{IQ} + \beta 7 * \text{Openness} + \beta 8 * \text{Degree of Urbanization} + \varepsilon$$

In the last model all control variables are removed:

$$\text{Chance of being in a high-level socioeconomic job} = \beta 0 + \beta 1 * \text{IQ} + \beta 2 * \text{Gender} + \beta 3 * \text{IQ} * \text{Gender} + \beta 5 * \text{Conscientiousness} + \beta 6 * \text{Conscientiousness} * \text{IQ} + \varepsilon$$

The results for this model are in Appendix 2, 3 and 4.

4. Results

4.1. Results IQ OLS model

Table 5
The effect of IQ on low threshold high-level jobs

	(1) LT high-level job	(2) LT high-level job	(3) LT high-level job
IQ	.009***	.009***	.01***
	(.001)	(.001)	(.001)
Female	-.126***	-.122***	-.118***
	(.011)	(.011)	(.011)
Female x IQ	-.004***	-.004***	-.003***
	(.001)	(.001)	(.001)
Extraversion	.001		
	(.001)		
Agreeableness	.001		
	(.001)		
Conscientiousness	.005***	.005***	
	(.001)	(.001)	
Neuroticism	.002		
	(.001)		
Openness	.014***	.014***	
	(.001)	(.001)	
Degree of urbanization	.006***	.006***	
	(.002)	(.002)	
Constant	.314***	.311***	.338***
	(.013)	(.013)	(.008)
Observations	6420	6420	6420
R-squared	.114	.114	.088

Robust standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

In Table 5 the regression models for low-threshold high-level socioeconomic jobs are shown. The effects of IQ on being in a low threshold high-level socioeconomic job are positive and significant at the 1% significance level for all three models. An extra point of IQ increases the chance of being in a high-level job by 0.9%. When insignificant control variables are removed in model (2) the chance remained 0.9% and then increased to 1% in the reduced model (3), holding all other factors constant. The effect of being female is negative and significant at the 1% level for all three models. The effect of being female is a 12.6% decline in chance of being in a high-level job. In model (2) this effect was 12.2% and in model (3) it was 11.8%. The interaction term of being female on IQ is significant at the 1% level and negative for all the models. For females the effect of IQ on being in a high-level job decreased with 0.4% per point of IQ in model (1) and (2). In the reduced model (3) this effect decreased by 0.3%. Conscientiousness, Openness, and Degree of urbanization are significant and positive covariates at the 1% level. The R2 of the model does not change when removing insignificant control variables. The constant in the models in Table 5, but also in all the other models that follow, is the baseline chance that someone has a high-level job given the fact that his gender is male, and he has mean values for IQ and the big five personality traits, and lives in a county with no city over 2,500 inhabitants. The differences in IQ between men and women in the regression model for low-threshold high-level socioeconomic jobs are visualized in Figure 3. The gender differenes become greater when IQ is higher.

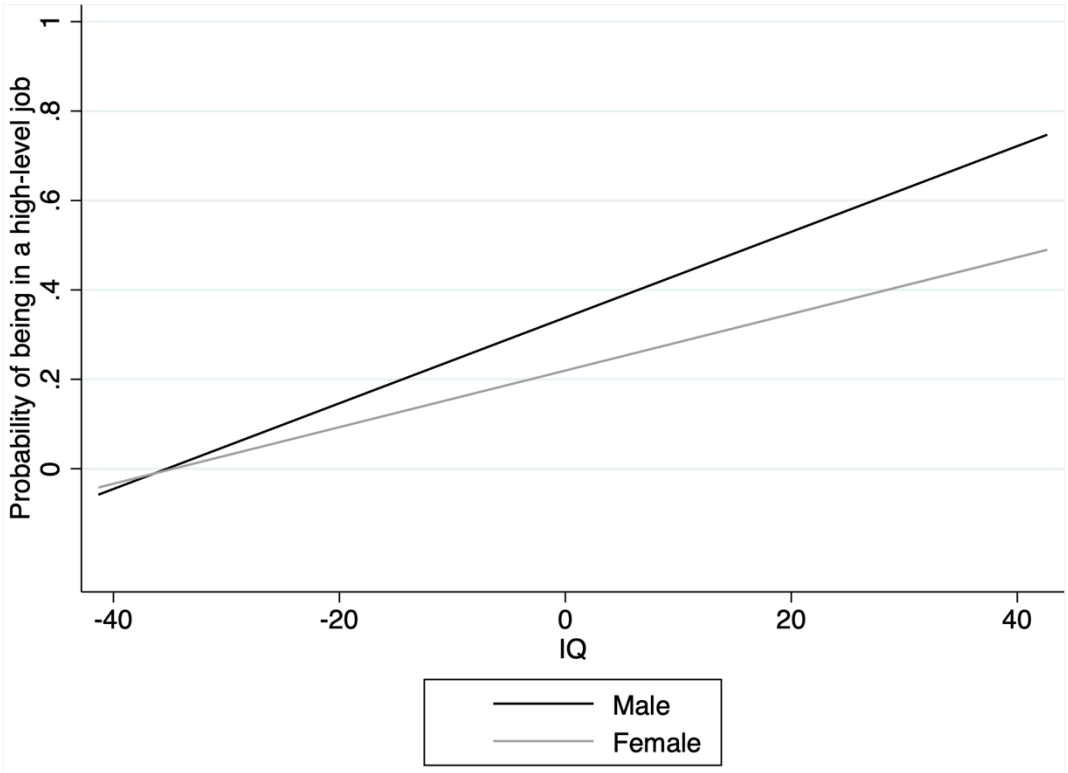

Figure 3. The graphical representation of the differences between men and women in the regression model for the effect of IQ on low-threshold high-level socioeconomic jobs. On the x-axis IQ is mean centered, to get the corresponding IQ value, 102 points need to be added to the values. The probability on the y-axis ranges from 0 to 1.

Table 6

The effect of IQ on mid-threshold high-level jobs

	(4) MT high-level job	(5) MT high-level job	(6) MT high-level job
IQ	.007***	.007***	.008***
	(0)	(0)	(0)
Female	-.127***	-.13***	-.128***
	(.009)	(.009)	(.009)
Female x IQ	-.005***	-.005***	-.005***
	(.001)	(.001)	(.001)
Extraversion	0		
	(.001)		
Agreeableness	-.001		
	(.001)		
Conscientiousness	.003**	.003***	
	(.001)	(.001)	
Neuroticism	-.001		
	(.001)		
Openness	.006***	.007***	
	(.001)	(.001)	
Degree of urbanization	.009***	.009***	
	(.002)	(.002)	
constant	.18***	.182***	.221***
	(.011)	(.011)	(.007)
Observations	6420	6420	6420
R-squared	.105	.105	.092

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

In Table 6 the regression models for mid-threshold high-level socioeconomic jobs are shown. The effects of IQ on being in a mid-threshold high-level socioeconomic job are positive and significant at the 1% level for all three models. An extra point of IQ increases the odds of being in a high-level socioeconomic job with 0.7%. This effect remains the same for the model where the insignificant control variables are removed (5) and increases to 0.8% in the reduced model (6). The effect of IQ in the mid-threshold model is smaller than in the low-threshold model. The effect of being female is significant and negative at the 1% level for all three models. Being female results in a 12.7% decline in chance of being in a high-level job. In model (5) this effect was 13% and in model (6) it was 12.8%. The interaction term of being female on IQ is significant at the 1% level and negative for all the models. For females the effect of IQ on being in a high-level job decreased with 0.5% per point of IQ in all three models of Table

6. Conscientiousness, openness, and Degree of urbanization are significant and positive covariates at the 1% level. The R2 of the full model (5) and the model where insignificant covariates are left out (6) are identical. The differences in IQ between men and women in the regression model for mid-threshold high-level socioeconomic jobs are visualized in Figure 4. The gender differenes become greater when IQ is higher, but the slope is less steep than the slope of the low-threshold model.

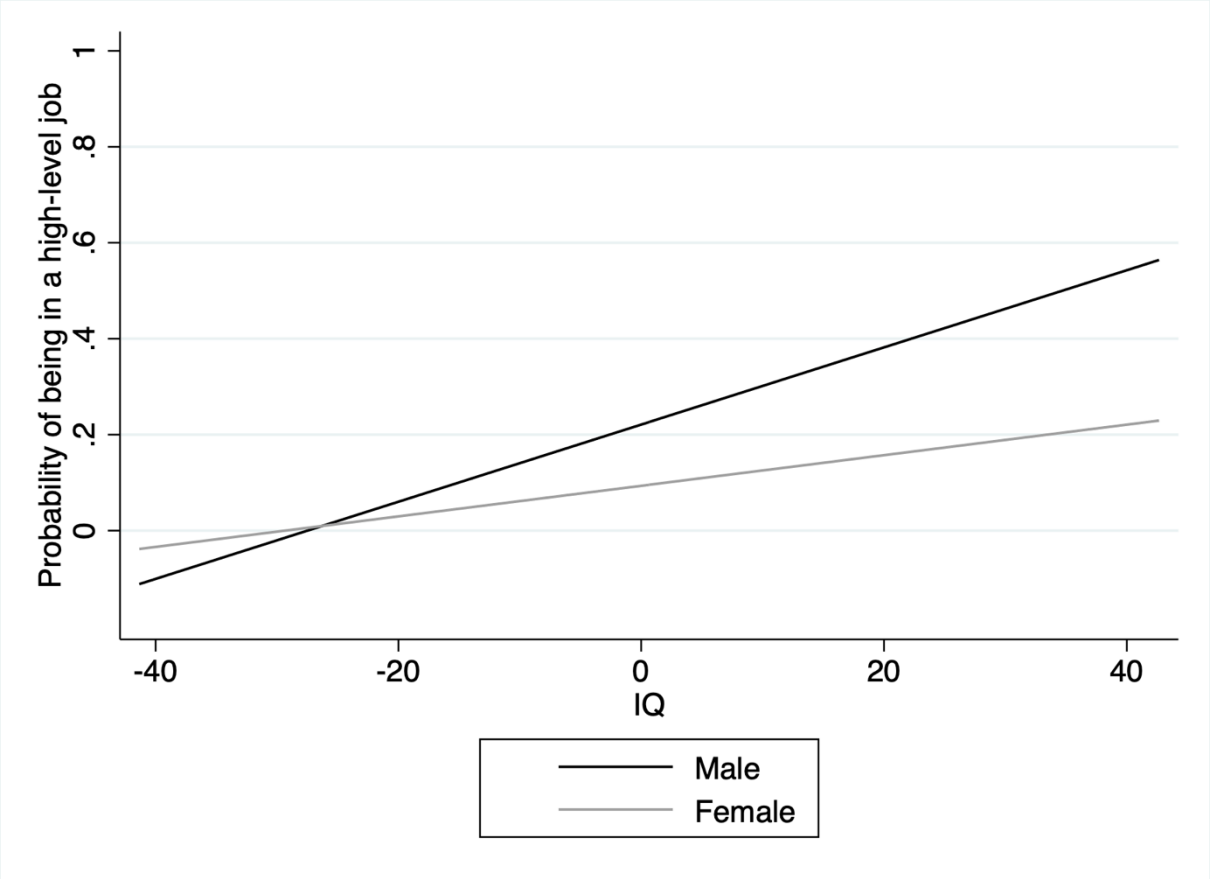

Figure 4. The graphical representation of the differences between men and women in the regression model for the effect of IQ on mid-threshold high-level socioeconomic jobs. On the x-axis IQ is mean centered, to get the corresponding IQ value 102 points need to be added to the values. The probability on the y-axis ranges from 0 to 1.

Table 7

The effect of IQ on high threshold high-level jobs

	(7)	(8)	(9)
	HT high-level job	HT high-level job	HT high-level job
IQ	.004***	.005***	.005***
	(0)	(0)	(0)
Female	-.071***	-.074***	-.073***
	(.007)	(.006)	(.006)

Female x IQ	-.003***	-.003***	-.003***
	(0)	(0)	(0)
Extraversion	-.001		
	(.001)		
Agreeableness	-.001*		
	(.001)		
Conscientiousness	0		
	(.001)		
Neuroticism	-.001		
	(.001)		
Openness	.004***	.004***	
	(.001)	(.001)	
Degree of urbanization	.004***	.004***	
	(.001)	(.001)	
Constant	.089***	.091***	.112***
	(.008)	(.008)	(.006)
Observations	6420	6420	6420
R-squared	.072	.071	.064

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

The last regression model takes high-threshold high-level socioeconomic jobs as dependent variable and the output is shown in Table 7. The effects of IQ on being in a high-threshold high-level socioeconomic job are positive and significant at the 1% level for all three models. An increase of a point in IQ increases the chance of being in a high-level socioeconomic job with 0.4%. In the model without insignificant control variables (7) and in the reduced model (8) this effect is 0.5%. This is lower than the previous low- and mid-threshold models. The effect of being female is significant and negative at the 1% level for all three models. In the full model (6), the chance of being female in a high-level socioeconomic job is 7.1% lower compared to males. This effect is 7.4% when insignificant control variables are dropped (7) and 7.3% in the reduced model (8). The effect of being female in this high-threshold model is of a smaller negative effect than the low- and mid-threshold models. The interaction term of being female on IQ is significant at the 1% level and negative for all the models. For females the effect of IQ on being in a high-level job decreased with 0.4% per point of IQ in all of Table 7. There are no noteworthy changes in the interaction term of being female on IQ between the models in Table 5, Table 6, and Table 7. Openness and Degree of urbanization are significant and positive covariates at the 1% level. The impact of conscientiousness is no longer significant in this model and thus it is also dropped in model

(7). When the threshold of high-level jobs is increased, the effect of IQ, Gender, and the interaction term of gender on IQ decline but remain significantly positive at the 1% level. The R2 of the models declines when the threshold is moved from low to mid and from mid to high. Just like in the low- and mid-threshold models, the R2 between the model with all control variables and the model with only the control variables that are significant at the 1% level is nearly identical. The value of the constant decreases when the threshold moves up, because the group of people in high-level jobs becomes smaller, and thus the baseline chance of being in this group also becomes smaller. The differences in IQ between men and women in the regression model for mid-threshold high-level socioeconomic jobs are visualized in Figure 5. The gender differenes become greater when IQ is higher, but the slope is less steep than the slope of the mid- and low-threshold model.

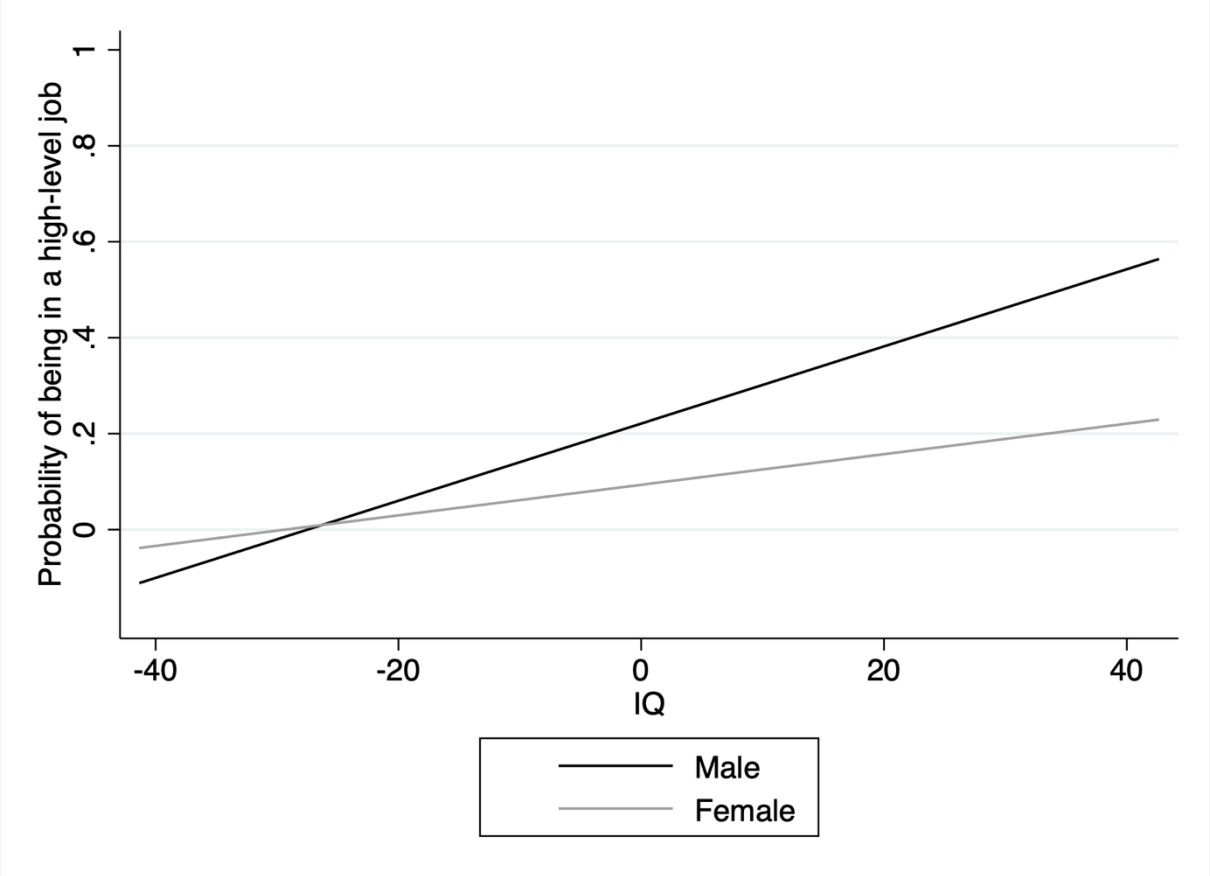

Figure 5. The graphical representation of the differences between men and women in the regression model for the effect of IQ on high-threshold high-level socioeconomic jobs. On the x-axis IQ is mean centered, to get the corresponding IQ value 102 points need to be added to the values. The probability on the y-axis ranges from 0 to 1.

4.2. Results Conscientiousness OLS model

Table 8

The effect of conscientiousness on low-threshold high-level jobs

	(10)	(11)	(12)
	LT high-level job	LT high-level job	LT high-level job
Conscientiousness	.005**	.005**	.005**
	(.002)	(.002)	(.002)
Female	-.125***	-.122***	-.119***
	(.011)	(.011)	(.011)
Female x Conscientiousness	-.002	-.002	.002
	(.003)	(.003)	(.003)
IQ	.007***	.007***	
	(0)	(0)	
Agreeableness	.001		
	(.001)		
Neuroticism	.002		
	(.001)		
Openness	.014***	.014***	
	(.001)	(.001)	
Degree of urbanization	.006***	.006***	
	(.002)	(.002)	
constant	.313***	.311***	.338***
	(.013)	(.013)	(.009)
Observations	6420	6420	6420
R-squared	.111	.11	.02

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

The effect of conscientiousness on being in a low-threshold high-level job is significant at the 1% significance level and positive in all three models in Table 8. An increase of one point on the scale of conscientiousness increases the chance of being in a low-threshold high-level job by 0.5% across all three models of Table 8. The effect of being female is significant at the 1% level and negative. Being female decreases the change of being in a high-level job with 12.5% in the model with all control variables (10) and with 12.2% in model (11) and 11.9% in model (12). The interaction term of being female on conscientiousness is not significant and thus cannot be interpreted. Control variables IQ,

Openness and Degree of urbanization are significant at the 1% level and positive. The model with all control variables and the model with only the control variables that are significant at the 1% level have a near identical R2. The differences of conscientiousness between men and women in the regression model for low-threshold high-level socioeconomic jobs are visualized in Figure 6. The gender differenes become greater when the score for conscientiousness is higher.

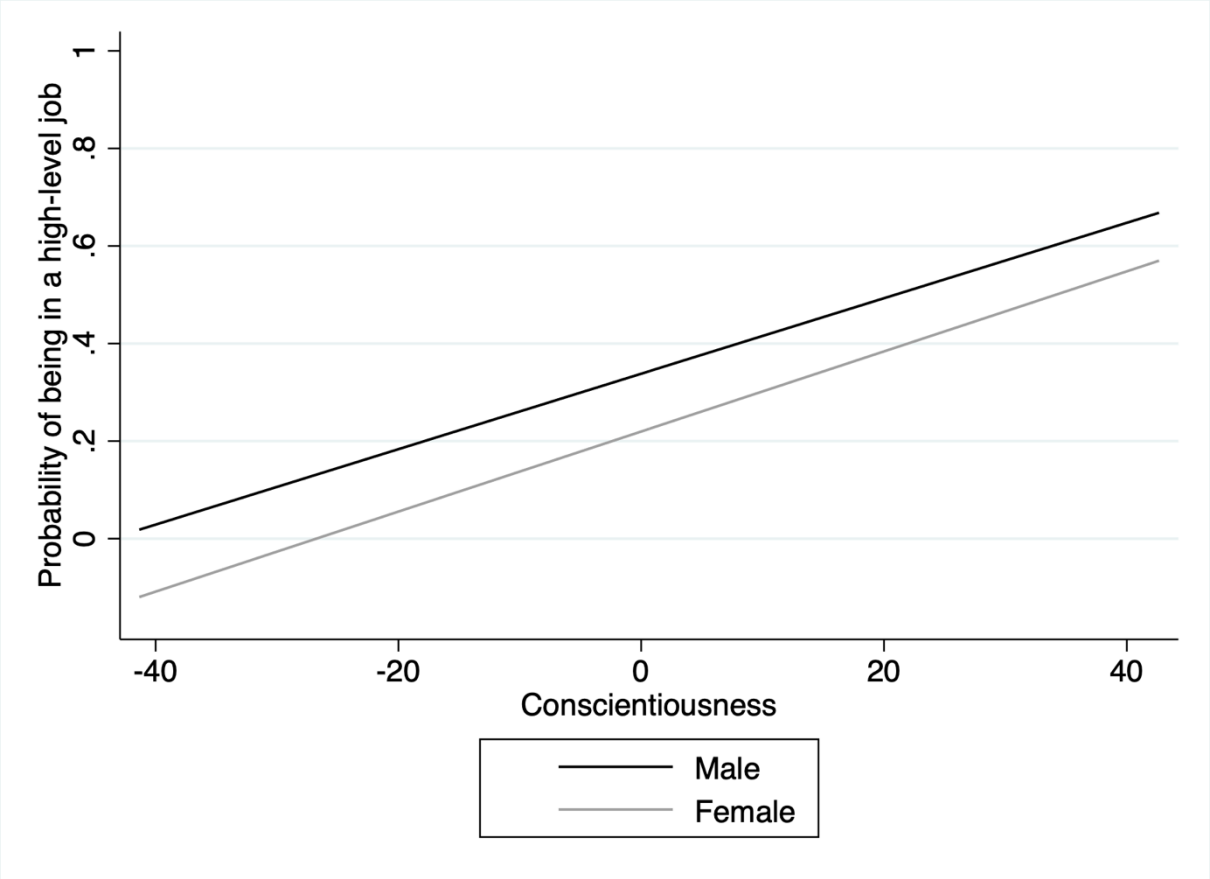

Figure 6. The graphical representation of the differences between men and women in the regression model for the effect of 'Conscientiousness' on low-threshold high-level socioeconomic jobs. On the x-axis 'Conscientiousness' is mean centered, all values below 0 are lower than the mean score and all values higher than 0 are above the mean score.

Table 9

The effect of conscientiousness on mid threshold high-level jobs

	(13)	(14)	(15)
	MT high-level job	MT high-level job	MT high-level job
Conscientiousness	.004**	.004**	.003*
	(.002)	(.002)	(.002)
Female	-.127***	-.13***	-.128***
	(.009)	(.009)	(.009)

Female x Conscientiousness	-.004*	-.004*	-.001
	(.002)	(.002)	(.002)
IQ	.005***	.005***	
	(0)	(0)	
Agreeableness	-.001		
	(.001)		
Neuroticism	-.001		
	(.001)		
Openness	.006***	.006***	
	(.001)	(.001)	
Degree of urbanization	.009***	.009***	
	(.002)	(.002)	
constant	.18***	.181***	.221***
	(.011)	(.011)	(.007)
Observations	6420	6420	6420
R-squared	.095	.095	.032

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

In the full model and the model that only includes the significant control variables, the effect of conscientiousness is significant at the 1% level and positive. A one-point increase on the scale of conscientiousness increases the chance of being in a low-threshold high-level job by 0.4% across these two models (13) (14). In the model without control variables, the effect of conscientiousness is only significant at the 10% level and smaller than in other models. Because the coefficient is only significant at the 10% level it is not useful to interpret it. The effect of being female is significant at the 1% level and negative for all three models. Being female reduces the chance of being in a high-level job with 12.7% in the model with all control variables (13), with 13% in the model with only the significant control variables (14) and with 12.8% in the reduced model (15). The interaction effect of being female on conscientiousness is significant and negative at the 10% level for the full model (13) and the model with only the significant control variables (14) but is not significant in the reduced model (15). Because it is only significant at the 10% level, no conclusions can be drawn. Control variables IQ, Openness and Degree of urbanization are significant at the 1% level and positive. The R2 of the model with only significant control variables and the full model is identical. The differences of conscientiousness between men and women in the regression model for mid-threshold high-level socioeconomic jobs are visualized in Figure 7. The gender differenes become greater when conscientiousness is higher, but the slope is less steep than the slope of the low-threshold model.

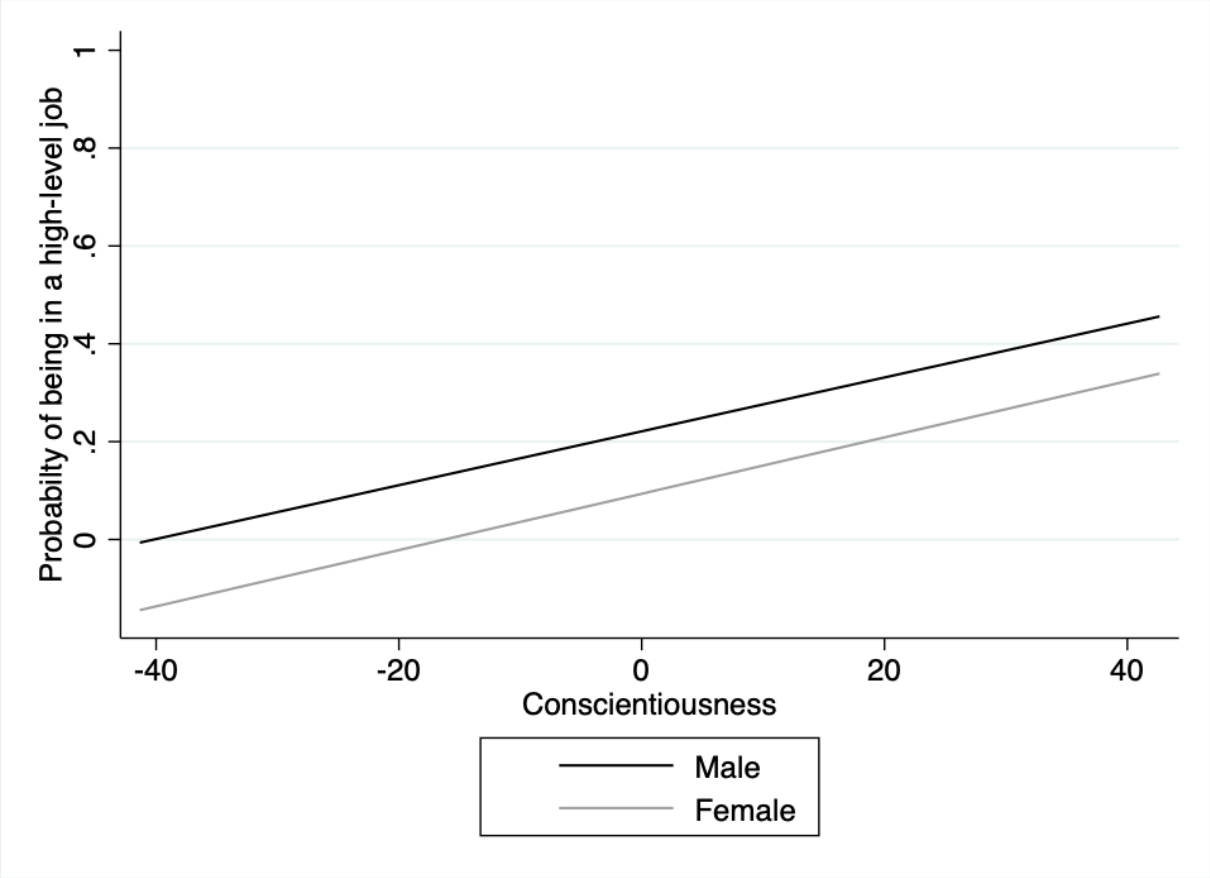

Figure 7. The graphical representation of the differences between men and women in the regression model for the effect of 'Conscientiousness' on mid-threshold high-level socioeconomic jobs. On the x-axis 'Conscientiousness' is mean centered, all values below 0 are lower than the mean score and all values higher than 0 are above the mean score.

Table 10

The effect of conscientiousness on high threshold high-level jobs

	(16) HT high-level job	(17) HT high-level job	(18) HT high-level job
Conscientiousness	0	0	-.001
	(.001)	(.001)	(.001)
Female	-.071***	-.074***	-.073***
	(.007)	(.006)	(.007)
Female x Conscientiousness	-.002	-.002	0
	(.002)	(.002)	(.002)
IQ	.003***	.003***	
	(0)	(0)	
Agreeableness	-.002*		
	(.001)		
Neuroticism	-.001		

	(.001)		
Openness	.004***	.004***	
	(.001)	(.001)	
Degree of urbanization	.004***	.005***	
	(.001)	(.001)	
constant	.089***	.091***	.112***
	(.008)	(.008)	(.006)
Observations	6420	6420	6420
R-squared	.065	.064	.02

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

As shown in Table 10, in this model the effect of conscientiousness is insignificant and the interaction effect of being female on conscientiousness is also insignificant, thus both cannot be interpreted. The effect of being female is significant at the 1% level and negative for all three models. Control variables IQ, Openness and Degree of urbanization are positive and significant at the 1% level. Being female reduces the chance of being in a high-level job with 7.1% in the model with all control variables (16), with 7.4% in the model with only the significant control variables (17) and with 7.3% in the reduced model (18). Control variables IQ, Openness and Degree of urbanization are significant at the 1% level and positive. The R2 of the model with just the significant control variables and the full model is nearly identical. The first two models in Table 8 and Table 9 showed results for the effect of conscientiousness that were significant and positive. The significance of the interaction term for gender on conscientiousness was not found in any of the models. It can also be observed that the value of the effect of being female in the high-threshold model is smaller than in the low- and mid-threshold models. The differences of conscientiousness between men and women in the regression model for high-threshold high-level socioeconomic jobs are visualized in Figure 8. Only the difference between the lines of males and females can be interpreted because the effect of conscientiousness is not significant in this model.

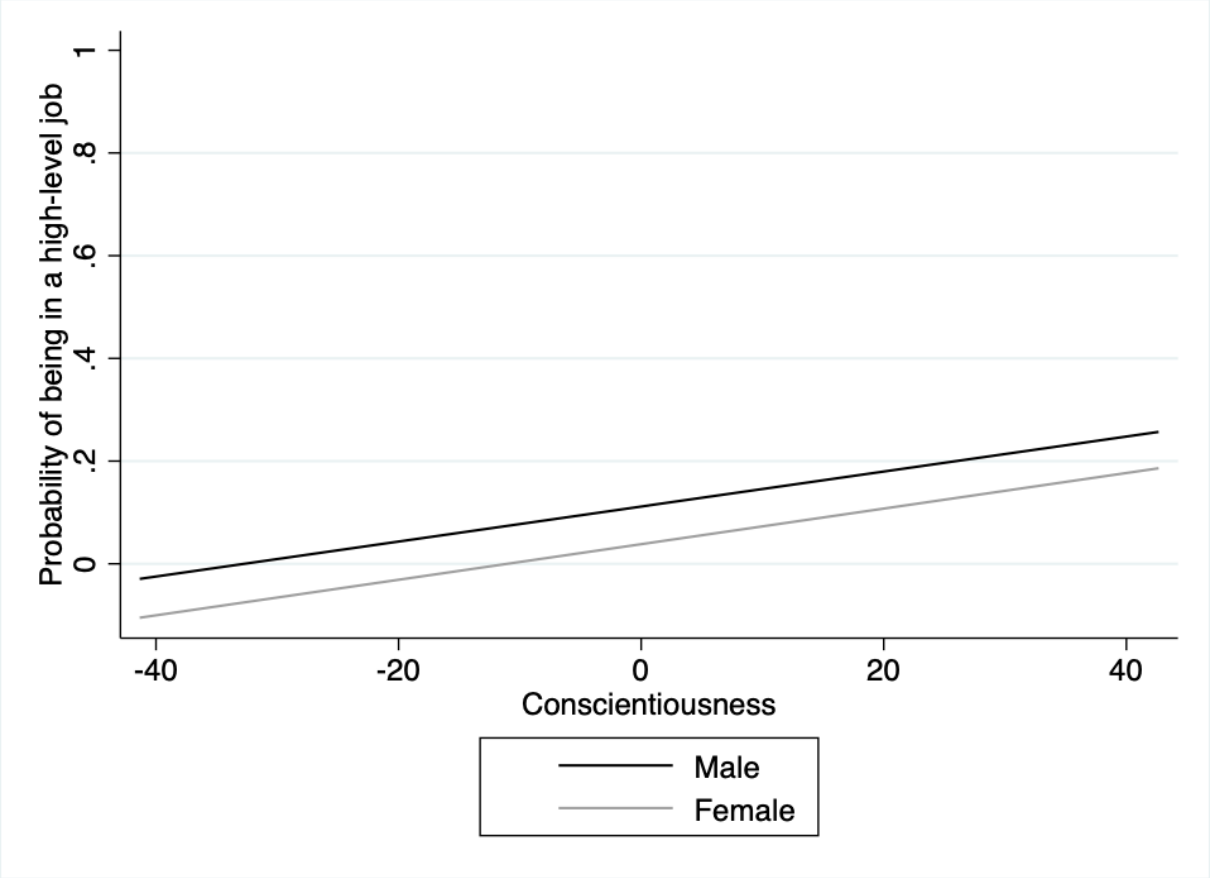

Figure 8. The graphical representation of the differences between men and women in the regression model for the effect of 'Conscientiousness' on high-threshold high-level socioeconomic jobs. On the x-axis 'Conscientiousness' is mean centered, all values below 0 are lower than the mean score and all values higher than 0 are above the mean score.

4.3. Results combined model

The results from the combined model are nearly identical to the previous models in 4.2 and 4.1, as shown in Appendix 2, 3 and 4.

5. Conclusion and discussion

Now to come back to the research question this paper aims to shed light onto:

Does higher intelligence and conscientiousness increase the chance of being in a high-end job? Is this effect weaker for females than for males?

The first hypothesis states that a higher IQ increases the chance of being in a top-level job, and that this effect is smaller for females. The effect of IQ and gender suggest that in top-level jobs there are more high-IQ people, and they are more likely to be male. A higher IQ increases the chance of being in a top-level job and because of the negative interaction term between gender and IQ, this effect is smaller for females. This means that for a woman to be in a high-level job she needs to have a higher IQ than a male when all other factors are kept constant.

The second hypothesis states that a higher level of conscientiousness increases the chance of being in a top-level job, and that this effect is smaller for females. A significant effect of conscientiousness is only observed in the low- and mid-threshold models. The effect declines in significance when the threshold for a high-level job is moved up, until it is no longer significant in the high-threshold model. Similar to the IQ model, being female reduces the chance of being in a top-level job. The interaction effect of being female on conscientiousness has not been observed, thus effect of conscientiousness does not differ significantly between the genders. This is not in line with the second hypothesis.

There are some points of discussion about the real-world value of the outcomes. The first point of discussion concerns some problems with the dataset. Since it is from Wisconsin, and it contains information about respondents who graduated high school in 1957 it does not reflect the current situation well. The sample contains mostly white respondents, which on the one hand means that the cultural aspects are controlled for, but, on the other hand, the predictive value for ethnic minority groups is lower. Additionally, the data is quite old as it stems from 1957 and there have been many improvements in the last couple of years in terms of gender equality. It would, therefore, be interesting to see if these same results hold up in the current climate.

The second point of discussion is the construction of some of the variables. The variable ‘high level job’ contains a certain threshold between low-end and high-end jobs, which could be seen as subjective, which is why three cut-off levels were included. Nevertheless, Socioeconomic scores of jobs are not fixed and subject to change over the years (Duncan, & Reiss, 1961). This makes it hard for the data to be 1:1 interpretable in today’s world.

The variables for the big five personality traits were constructed using only (Herd, Carr & Roan, 2014) six questions and in the case of 'Openness' five questions. The relatively small number of questions hurts the accuracy of the psychometric values, as suggested by Gosling, Rentfrow & Swann Jr. (2003). They also note, however, that with a small set of questions the results of longer tests can be accurately predicted. Nevertheless, these predictions remain less accurate than having the respondents answer a more elaborate set of questions.

Next, the 'Degree of Urbanization' variable describes the place the respondents lived in 1957. This does not necessarily reflect where they live at the time that they are working (1992-1993). This data is classified to protect the privacy of the participants and therefore cannot be used. Thus, the degree of urbanization of the area where the participants lived in 1957 was used as a proxy, because it still offers a control variable. High-end socioeconomic jobs are more prevalent in cities, and there are more structures in place to facilitate those jobs than in places with low population density (Molotch, 1976). The assumption was made that people could benefit of this advantage, and it would impact their job in later life. The variable was kept as a control variable because it was statistically significant at the 1% level in all models. Furthermore, using IQ as the only measure of someone's ability is also something that has been disputed (Sternberg, Grigorenko & Bundy, 2001; Naglieri, 2015). These studies suggest that IQ it must be used with caution and in a subjective way by controlling for other variables.

Lastly, the regressions performed are subject to omitted variable bias. There might be factors of influence, which are not included in the model, for example the level of education which is correlated with both socioeconomic status and IQ. The level of earnings also correlates with socioeconomic status and IQ. Omitted variable bias causes the error term to be correlated with independent variables, and this is a violation of the OLS assumption that the error term and independent variables must be uncorrelated. This means the coefficients might be biased and inconsistent.

To conclude, a higher level of intelligence increases the chance of being in a high-level socioeconomic job. The effect of conscientiousness also increases the chance of being in a high-level socioeconomic but not as unambiguously as intelligence does. The effect of intelligence is weaker for females, thus they need higher intelligence than males to have the same chance of being in a high-level socioeconomic job. A gender difference in the effect of conscientious has not been observed.

The reason behind these effects cannot be explained by this paper. It could be an effect caused by a self-selection bias, or because men overestimate their intelligence (Reilly & Mulhern, 1995). Discrimination against women can also be a factor at play. In all likeliness it could be a combination of multiple effects. This provides for an interesting opportunity for future research to explore the reasons behind the effects.

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7. Appendix

Appendix 1

The different variable values for Degree of Urbanization

1957 residential area of respondent (counties)	Variable value	Freq.	Percent	Cum.
Counties with no city over 2,500	1	735	11.45	11.45
Counties with a city of 2,500-4,999	2	581	9.05	20.50
Counties with a city of 5,000-9,999	3	916	14.27	34.77
Counties with a city of 10,000-24,999	4	442	6.88	41.65
Counties with a city of 25,000-49,999	5	1492	23.24	64.89
Metropolitan areas other than Madison and Milwaukee (Brown, Kenosha, Racine, Douglas counties)	6	580	9.03	73.93
Madison metropolitan area (Dane County)	7	296	4.61	78.54
Milwaukee metropolitan area (Milwaukee and Waukesha counties)	8	1378	21.46	100.00
Total		6420	100.00	

Note. The different criteria of inhabitants per residential area of the respondent and how they correspond to the variable value of the variable Degree of Urbanization.

Appendix 2

The effect of conscientiousness and IQ on low-threshold high-level jobs

	(19) LT high-level job	(20) LT high-level job	(21) LT high-level job
IQ	.009***	.009***	.01***
	(.001)	(.001)	(.001)
Gender	-.126***	-.122***	-.119***
	(.011)	(.011)	(.011)
Gender x IQ	-.004***	-.004***	-.004***
	(.001)	(.001)	(.001)
Conscientiousness	.005***	.006***	.008***
	(.002)	(.002)	(.002)
Gender x Conscientiousness	-.002	-.002	-.002
	(.003)	(.003)	(.003)
Extraversion	.001		
	(.001)		
Agreeableness	.001		
	(.001)		
Neuroticism	.002		
	(.001)		

Openness	.014***	.014***	
	(.001)	(.001)	
Degree of Urbanization	.006***	.006***	
	(.002)	(.002)	
constant	.314***	.311***	.338***
	(.013)	(.013)	(.008)
Observations	6420	6420	6420
R-squared	.114	.114	.092

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Appendix 3

The effect of conscientiousness and IQ on mid-threshold high-level jobs

	(22)	(23)	(24)
	MT high-level job	MT high-level job	MT high-level job
IQ	.008***	.008***	.008***
	(0)	(0)	(0)
Gender	-.127***	-.13***	-.128***
	(.009)	(.009)	(.009)
Gender x IQ	-.005***	-.005***	-.005***
	(.001)	(.001)	(.001)
Conscientiousness	.005***	.005***	.006***
	(.002)	(.002)	(.002)
Gender x Conscientiousness	-.004*	-.004**	-.004**
	(.002)	(.002)	(.002)
Extraversion	0		
	(.001)		
Agreeableness	-.001		
	(.001)		
Neuroticism	-.001		
	(.001)		
Openness	.006***	.007***	
	(.001)	(.001)	
Degree of Urbanization	.009***	.009***	
	(.002)	(.002)	
constant	.18***	.182***	.221***

	(.011)	(.011)	(.007)
Observations	6420	6420	6420
R-squared	.105	.105	.095

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Appendix 4

The effect of conscientiousness and IQ on high-threshold high-level jobs

	(25)	(26)	(27)
	HT high-level job	HT high-level job	HT high-level job
IQ	.004***	.005***	.005***
	(0)	(0)	(0)
Gender	-.071***	-.074***	-.073***
	(.007)	(.006)	(.006)
Gender x IQ	-.003***	-.003***	-.003***
	(0)	(0)	(0)
Conscientiousness	.001	0	.001
	(.001)	(.001)	(.001)
Gender x Conscientiousness	-.002	-.002	-.002
	(.002)	(.002)	(.002)
Extraversion	-.001		
	(.001)		
Agreeableness	-.001*		
	(.001)		
Neuroticism	-.001		
	(.001)		
Openness	.004***	.004***	
	(.001)	(.001)	
Degree of Urbanization	.004***	.004***	
	(.001)	(.001)	
constant	.089***	.091***	.112***
	(.008)	(.008)	(.006)
Observations	6420	6420	6420
R-squared	.072	.071	.064

Robust standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*