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Article

Genetic Predisposition of Different Social Status Indicators in Men and Women

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Abstract

Although there is evidence that social status has a genetic basis, it is less known whether the genetic predisposition differs between men and women as well as among different status indicators and whether there are any intercorrelations among predispositions of status indicators. We therefore investigated the genetic predisposition for different indicators of social status separately for men and women, using polygenic scores obtained from the Wisconsin Longitudinal Study. We used multivariate polygenic regression of 7 different social status indicators on a total of 24 different polygenic scores. We find that in both men and women, wages and education show more associations with polygenic scores than the other status indicators. Also, the genetic predispositions for education and wages are correlated in both men and women, whereas in men more than in women, the genetic predispositions seem to cluster into wages and education on the one hand, and status indicators of position in the hierarchy, on the other hand, with being in a management position somewhere in between. These findings are consistent with an assumption of two different forms of selection pressure associated with either cognitive skill or dominance, which holds true particularly in men. We conclude that the genetic predisposition to higher social status may have changed even though the importance of the cultural trait of social status may have been very constant. Social status may thus be an example of a social trait of constant importance, but with a changing genetic predisposition.

Keywords: Social status; Evolution; Genetic predisposition; Men; Women

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From animals to humans, any form of social status has been thought to be of enormous importance in the context of mating and reproduction (reviewed, for instance, in Alcock, 2009; Hopcroft et al., 2024). Accordingly, although it has been claimed that social status is no longer positively associated with reproduction and therefore evolutionary forces are not at work in modern societies (Vining, 1986), more recent findings show that, as is the case in historic and premodern societies, and also in modern societies, social status is positively associated with reproduction, particularly in males (Fieder & Huber, 2007; Fieder et al., 2011; Fieder et al., 2005; Hopcroft, 2006, 2015; Hopcroft et al., 2024; Nettle & Pollet, 2008). The association between social status and reproduction, however, largely depends on how status is measured. While income is a direct measure of access to resources, education, another important status indicator, can be viewed more as a prerequisite to income. In addition, education is associated with postponing of reproduction, which may be a major reason why the association between education and reproduction is negative in both men and women (Bhrolcháin & Beaujouan 2012). The association between income and reproduction, however, is positive in men. This association between income and reproduction in men is mostly caused by the lower likelihood of low-income men to be selected as mates and thus their higher chances of childlessness. Furthermore, the importance of income as a determining factor in marriage for men has been increasing during the last few decades (Fieder & Huber, 2023).

In women, the association of reproduction and both education and income is usually negative (Fieder & Huber, 2007; Fieder et al., 2011; Hopcroft, 2006, 2015), except for the most recent cohorts in Scandinavia (Kolk, 2022), reflecting both the postponing effect of education on childbearing as well as the general difficulties of combining motherhood and career. In addition, in both men and women, a negative genetic correlation between education and reproduction has been reported (Beauchamp, 2016; Kong et al., 2017), although it has also been shown that the associations of genetic predisposition of education, educational attainment and reproduction are more complex (Fieder & Huber, 2022).

Position in a hierarchy (i.e., supervising others, having the power to hire and fire) is another status indicator that is positively associated with reproduction, but again only in men (Fieder & Huber, 2012). Although position in a hierarchy usually correlates with income, it can also be viewed as an indicator of dominance, which particularly in males of small-scale societies has been shown to predict reproductive success (Chagnon, 1988; von Rueden & Jaeggi, 2016).

The findings of a positive association of status indicators and reproduction give support to the view that evolutionary theory is still valid in modern societies. Yet, any evolutionary approach

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assumes that key traits have a genetic basis. Indeed, behavioral genetics has shown that all indicators of social status (education, income, position in a hierarchy) do have substantial genetic predispositions.

The heritability of income, for instance, was estimated by Taubmann (1976) on the basis of US white male twins as 18% to 41% due to genetics and 8% to 15% due to the common environment. Hyytinen et al. (2019) found on the basis of Finnish twins that 54% (in men) and 39% (in women) of lifetime earnings are heritable, with virtually no effect of the common environment, whereas Björklund & Jäntti (2011) found for the US that up to 40−50% of long-run income inequality is explained by the family environment, although the figures for the Nordic countries are in the range of 15−25%. Johnson and Krueger (2005) reported a twin correlation of income of .38 for monozygotic (MZ) twins and .13 for dizygotic (DZ) twins in the MIDUS dataset. In a sample of 286,301 individuals from the UK Biobank, Hill et al. (2019) identified 30 independent loci associated with household income; using data from genetically correlated traits, they further identified up to 120 genetic loci with clear functional associations.

For education, Heath at al. (1985) found a heritability of 40% to 70%, depending on the birth cohort. Silventoinen et al. (2020), using data of 28 cohorts from 16 countries, found an average heritability of 43%, the shared environment explaining 31% of the variance. According to Baker et al. (1996), genetic factors explained 57%, while environmental factors accounted for 24% of the variance in educational outcomes. In analyzing Australian twins, Miller et al. (2001) found that the heritability for education was as high as 50% and probably as high as 65%.

Using twins from the Minnesota Twin Registry, Arvey et al. (2006) found that 30% of the variance in leadership roles could be accounted for by genetic factors, while nonshared (or non-common) environmental factors accounted for most of the remaining variance. They further found that the heritability of leadership styles ranged from 48% to 59%, depending on the leadership style studied. More recently, Song et al. (2022) used a genomewide association study (British Biobank sample of 248,640 individuals of European ancestry) to identify 9 loci that are genomewide significant for leadership position and management demands. The overall SNPs heritability for leadership position was estimated to be between 3% and 10% (Song et al., 2022).

Although these studies provide ample evidence that status indicators have a genetic basis, it is less clear (1) how the predispositions for the different status indicators differ as well as interact among each other, and (2) whether the genetic predispositions for status indicators differ between men and women. Hence, by using polygenic scores (PGSs) of the Wisconsin Longitudinal Study (WLS), this article aims to investigate the genetic predisposition for specific status indicators separately for men and women.

Methods

The WLS is a long-term study of a random sample of men and women who graduated from Wisconsin high schools in 1957 and their siblings. The WLS panel began with 10,317 members of the class of 1957. We only included data from individuals for whom genetic data were available by the WLS and who are non-kin, totaling 2713 white men and 2980 white women born between 1937 and 1940. We only included white individuals because in the case of a genetically too diverse population, we would have had problems controlling for ancestry in the polygenic regressions (M. C. Mills et al., 2020).

Recently, the WLS has provided a bundle of PGSs (Benjamin et al., 2021) from several genomewide association studies (GWAS) for the WLS graduates as well as their siblings. These PGSs are based on summary statistics from three sources (as published by the WLS): GWAS based on 23andMe, UK Biobank, and other published GWAS papers. PGSs were calculated using LDpred applied to HapMap3 SNPs. The inclusion criterion was an out-of-sample predictive power of a PGS greater than 1%; if a multivariate estimate PGS (estimated by multitrait analysis of GWAS [MTAG]; Turley et al., 2018) was provided by the WLS, we used the multivariate PGSs; if no multivariate PGS was provided, we used the univariate PGS (Benjamin et al., 2021). The detailed description of the PGS can be found at https://researchers.wls.wisc.edu/data/polygenic-scores/. We included only those PGSs for which we have reason to assume they are related to socioeconomic status (SES; 24 out of 47). Table 1 shows the PGSs included according to the reason why they had been included, as well as the PGSs excluded. The included PGSs are related to educational attainment, cognitive ability, personality traits, behavioral patterns, mental health, general health and physical activity, height, reproduction and religious activity: Educational attainment is clearly positively related to almost every measure of social status (Hopcroft et al., 2024; Mirowsky, 2017), which most likely also holds true for cognitive ability (Plomin & Deary, 2015; Schneider & Newman, 2015; Trzaskowski et al., 2014), as well as certain personality traits (Cheng et al., 2010; Jokela & Keltikangas-Järvinen, 2011). Behavioral patterns indicating social competence and delayed discounting (Odum, 2011) may also be associated with higher social status (Shamosh & Gray, 2008). Also, mental and general health may affect social advancement (Brown, 2022; Marmot et al., 1991; Murphy et al., 1991; Royal et al., 2015). From the evolutionary psychology literature, it is further known that height, especially for men, is positively associated with social status (Stulp & Barrett, 2016; Stulp et al., 2015), as is reproduction (reviewed in Hopcroft et al., 2024). Finally, religiosity and cognitive development (Norenzayan, 2013), as well as social advancement, are often thought to be related; for example, through the mechanism of costly signaling (Zahavi & Zahavi, 1999).

We further included the following variables indicating social status (abbreviated SocStat) in the analyses: (1) wages before taxes in yearly sum of USD earned, surveyed in 1993; (2) years of education surveyed in 1964, ranging between 12 and 20 years of education after high school graduation; (3) being in a supervisory position (encoded as: 0 = no, 1 = yes); (4) being supervised (encoded as: 0 = no, 1 = yes); (5) being in a position to decide on hire and fire (encoded as: 0 = no, 1 = yes); (6) being in a position to decide on the payment of others (encoded as: 0 = no, 1 = yes); and (7) being in a management position (encoded as: 0 = no; 1 = yes). In addition, we included the following controlling variables in all analyses: sex (1 = male, 2 = female), year of birth, the corresponding SocStat indicator of a selected sibling (provided by the WLS) to control for potential nature by nurture effects (Mills et al., 2020), as well as the first 10 principal components of the population structure (PCAs) to control for potential population stratification, as recommended by WLS. The PCAs were calculated from the genomic data by WLS (Benjamin et al., 2021).

Separately for men and women, we regressed each SocStat variable on each polygenic score, including year of birth, the corresponding SocStat variable for a selected sibling, as well as the 10 first PCAs of the ancestry of the participants. The error structure for wages and education was Gaussian, that for being in a supervisory position, being supervised, being in a position to hire

Table 1. Polygenic scores included along with the reason/category why it was included as well as the polygenic scores excluded

PGS included	Reason/category	PGS not included
Age first birth	Reproduction	Subjective wellbeing
Number ever born (men)	Reproduction	Life satisfaction — work
Number ever born (women)	Reproduction	Near sightedness
Religious attendance	Religious activity	Life satisfaction — finance
Physical activity	Physical activity	Cannabis use
Adventurousness	Personality traits	Alcohol misuse
Extraversion	Personality traits	Drinks per week
Risk tolerance	Personality traits	Age first menses
Openness	Personality traits	Morning person
Loneliness	Personality traits	Life satisfaction — family
Neuroticism	Personality traits	Body Mass Index
Narcissism	Personality traits	Chronic obstructive pulmonary disease
ADHD	Mental health	Cigarettes per day
Depressive symptoms	Mental health	Life satisfaction — friend
Height	Height	Hayfever (allergic rhinitis)
Self-rated health	General health	Allergy — cat
Educational attainment	Education	Allergy — dust
Self-rated math ability	Cognitive ability	Allergy — pollen
Highest math	Cognitive ability	Allergy — eczema rhinitis
Cognitive performance	Cognitive ability	Asthma
Cognitive empathy	Cognitive ability	Ever smoker
Childhood reading	Cognitive ability	Migraine
Delay discounting	Behavioral patterns	Age voice deepened
Left out of social activity	Behavioral patterns	

Note: PGS, polygenic score; ADHD, attention-deficit/hyperactivity disorder.

and fire, deciding on the payment of others and being in a management position was binomial. We calculated the general linear models with the standard function glm in R and plotted the nonstandardized estimates in ggplot2.

In addition, we correlated the results of these PGS regressions (the regression coefficients) with each other using Pearson's correlation to investigate (1) whether the different SocStat variables might have, to some extent, a similar pleiotropic genetic basis, and (2) whether the impact of genetic variation on SocStat might differ between men and women as we assume that due to different selective forces (natural and sexual) the genetic basis might affect SocStat outcomes differently in men and women.

We further correlated the outcomes of the PGS regressions among the individual SocStat variables (in total 21 possible combinations of outcomes of the polygenic regressions of the 7 SocStat indicators) separately for men and women. We calculated correlations using the R function "corrplot". Significance level was set to $p < .05$.

Results

Polygenic Scores

Wages. In men, the PGSs for education, self-rated health, age at first birth, self-rated math ability, the actual highest math score, and cognitive performance are significantly positively associated with wages (ranked in descending order by effect size). The scores for loneliness and delayed discounting (i.e., the tendency of people to discount rewards as they approach a temporal horizon in the future) were significantly negatively associated with wages, with the PGS for delayed discounting having a stronger effect (Figure 1a).

In women, as in men, the PGS for education has the strongest positive association with wages, but unlike in men, followed by the scores for actual highest math score, cognitive performance and age at first birth. As in men, the PGS for delayed discounting is significantly negatively associated with wages in women (Figure 1b).

Education. In men, as expected, the PGS for education has the strongest significant positive association with education (i.e., actual educational attainment), followed by the scores for cognitive performance, highest achieved math score, age at first birth, self-rated health, self-rated math ability, religious attendance, and physical activity. The PGSs, in descending order of effect size, for ADHD, number of children and delayed discounting, are significantly negatively associated with educational attainment (Figure 1c).

In women, as in men, the PGS for education has the strongest positive association with actual educational attainment, followed by the scores for highest achieved math score, age at first birth,

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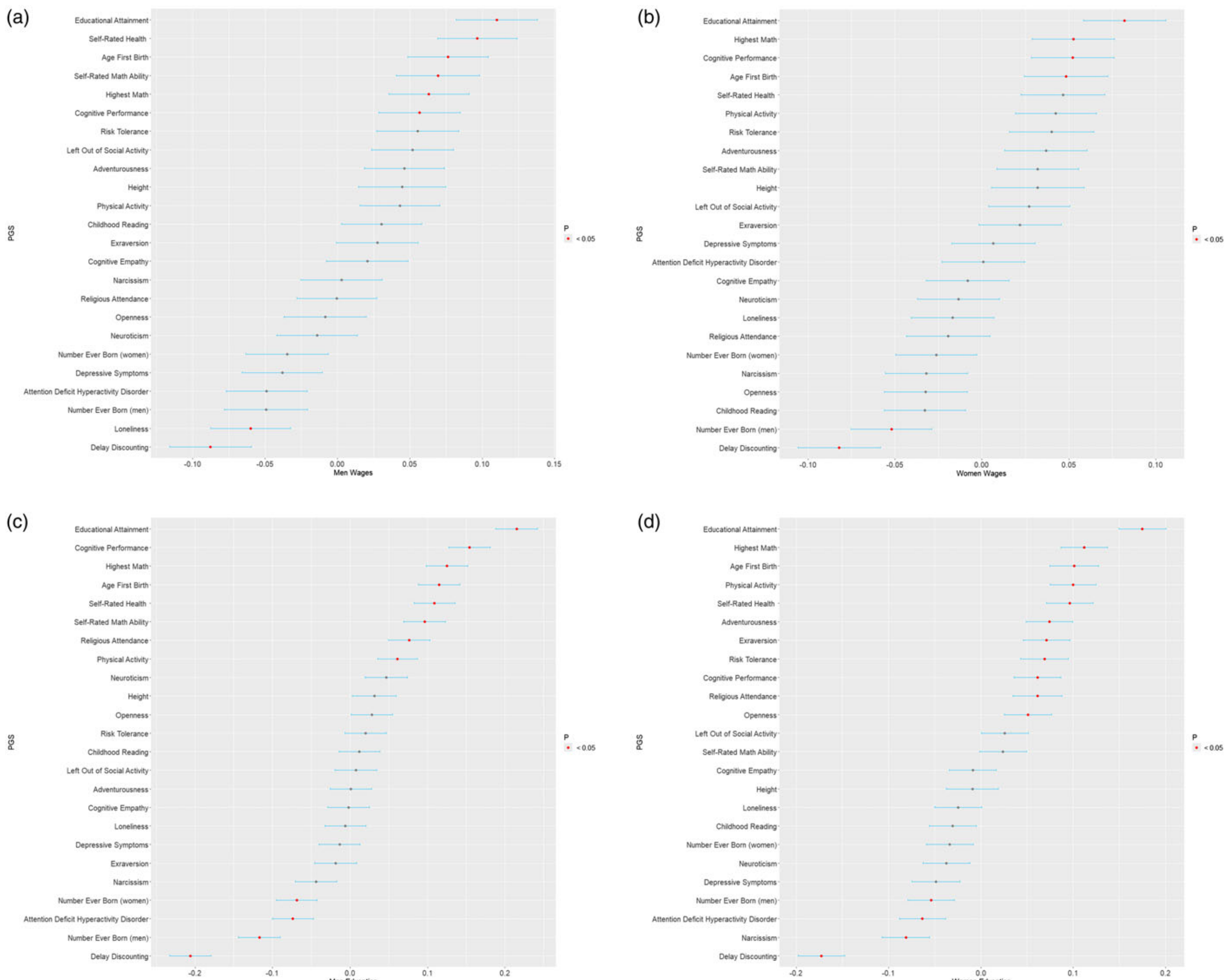

Figure 1 a–1h. Association (nonstandardized regression estimates) of the polygenic scores with wages (1a men, 1b women), education (1c men, 1d women), supervision (1e men, 1f women), and being supervised (1g men, 1h women). Dots indicate effect size estimates, blue lines indicate standard errors, and red marked dots indicate significant associations ($p < .05$).

physical activity, self-rated health, adventurousness, extraversion, risk tolerance, cognitive performance, religious attentiveness, and openness. As in men, the scores for ADHD and, most strongly, delayed discounting, are significantly negatively associated with educational attainment, as is the PGS for narcissism (Figure 1d).

Being in a supervisory position/being supervised. In men, only the PGSs for age at first birth and risk tolerance are significantly positive, and none of the scores are significantly negatively associated with being in a supervisory position (Figure 1e). In women, none of the PGSs are significantly associated with being in a supervisory position (Figure 1f).

Being supervised is significantly negatively associated with the PGSs for risk tolerance and physical activity in men (Figure 1g). In women, the PGS for left out of social activities (i.e., whether people are able to withstand social exclusion) is significantly negatively associated with being supervised (Figure 1h).

Being in a position to hire and fire. In men, only the PGS for risk tolerance is significantly positively associated with being in a position to hire and fire other employees (Figure 2a). In women, the PGS for left out of social activities is significantly positive, while the PGS for neuroticism is significantly negatively associated with being in a position to hire and fire (Figure 2b).

Influencing the pay of others. In men, none of the PGSs are significantly associated with influencing pay of others (Figure 2c). In women, only the PGS for neuroticism is significantly negatively associated with being in a position to decide on the payment of others (Figure 2d).

Being in a management position: In men, the PGSs for education, extraversion, adventurousness and highest math score are significantly positively associated with being in a management position. Only the PGS of delayed discounting is significantly negatively associated with being in a management position in men

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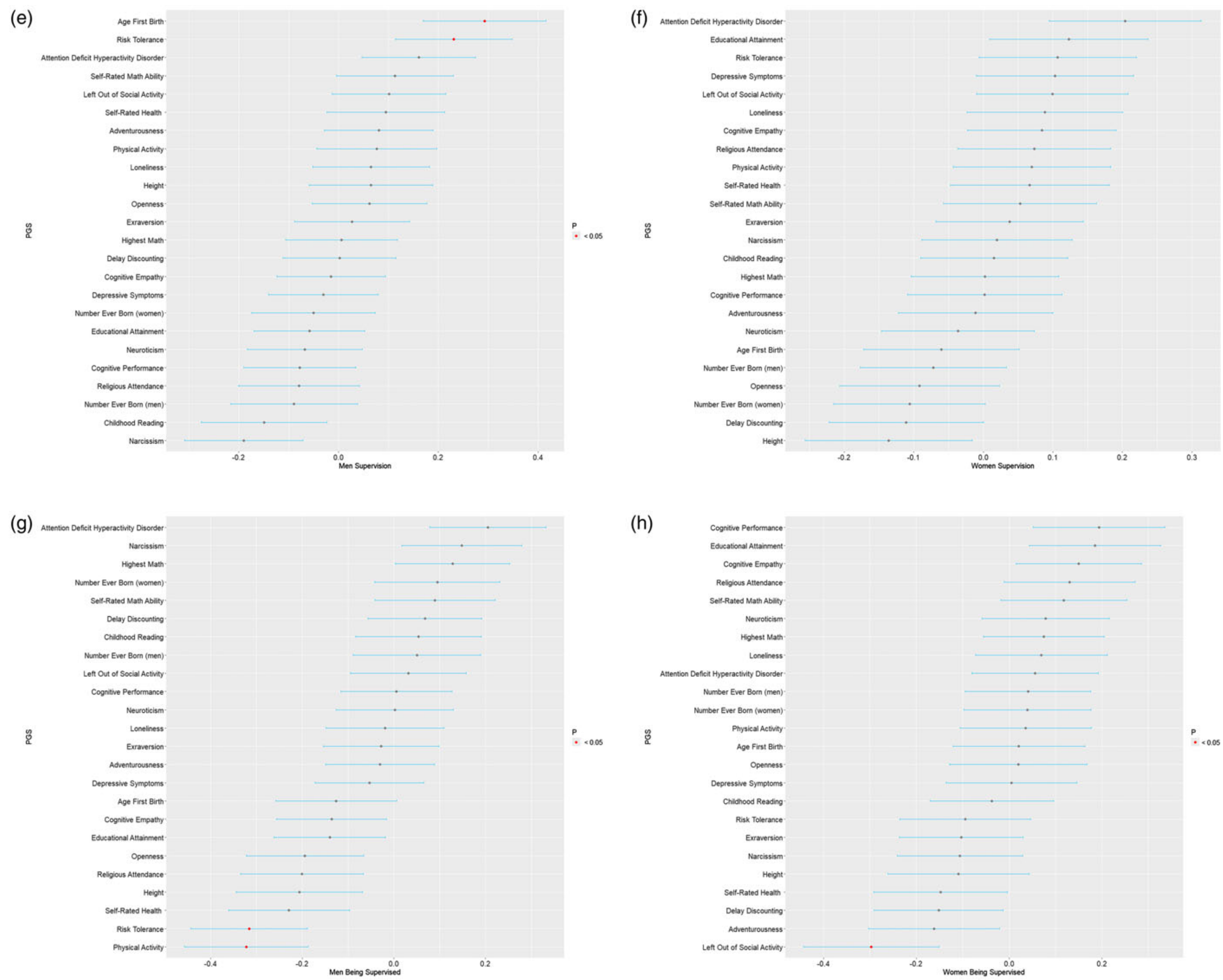

Figure 1 (*Continued.*)

(Figure 2e). In women, we find no significant association between any PGS and being in a management position (Figure 2f). Table 2 gives an overview of the associations found.

Correlations of the PGS Regression

The PGS for supervision in men is significantly positively associated with the scores for hire and fire and influence pay in men as well as with the score for wages in women (Figure 3). The PGS for hire and fire in men is significantly positively associated with the scores for supervision and influence pay in men and the score for hire and fire in women, as well as significantly negatively associated with the score for being supervised in men. The PGS for wages in men is significantly positively associated with the scores for education and management in men and the scores for wages, education and influence pay in women. The PGS for education in men is significantly positively associated with the scores for wages and management in men and the scores for wages, education and being supervised in women. The PGS for being supervised in men is significantly negatively associated with the score for hire and fire in men and the score for education in women (Figure 3). The PGS for influence pay in men is significantly positively associated with the scores for supervision, hire and fire and management in men as well as the scores for hire and fire and wages in women. The PGS for management in men is significantly positively associated with the scores for wages, education and influence pay in men as well as the scores for wages, education and influence pay in women (Figure 3).

In women, the PGS for supervision is neither significantly associated with any other score in men nor in women. The PGS for hire and fire in women is significantly negatively associated with the score for being supervised in women and significantly positively associated with the scores for influence pay and management in women as well as with the scores for hire and fire and influence pay in men. The PGS for wages in women is significantly positively associated with the score for education in women as well as the scores for supervision, wages, education, influence pay and management in men. The PGS for education in

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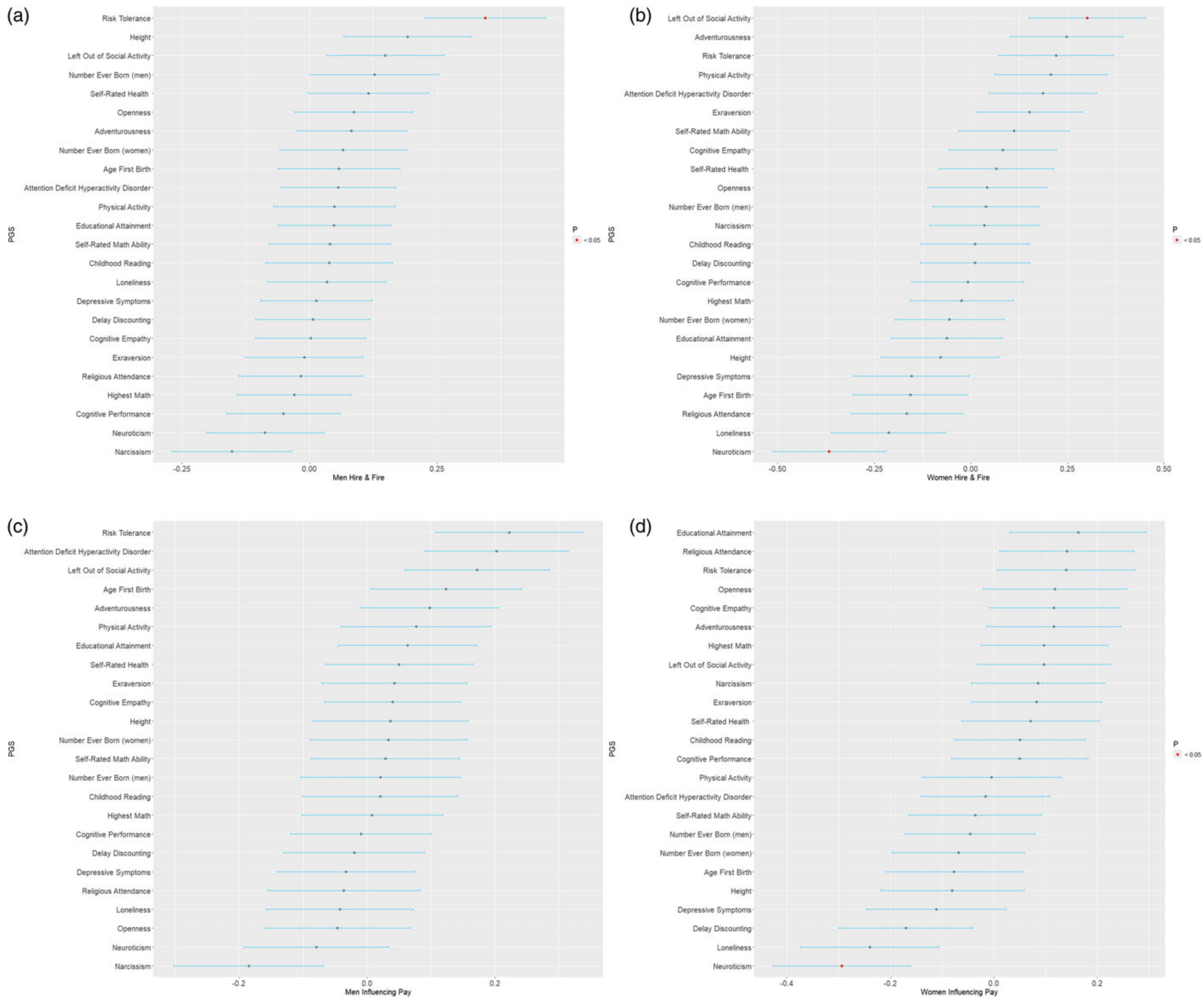

Figure 2 a-2f. Association (nonstandardized regression estimates) of the polygenic scores with being in a position to hire and fire (1a men, 1b women), influencing pay of others (1c men, 1d women), and being in a management position (1e men, 1f women). Dots indicate effect size estimates, blue lines indicate standard errors, and red marked dots indicate significant associations ($p < .05$).

women is significantly positively associated with the scores for wages and influence pay in women and the scores for wages, education and management in men, as well as significantly negatively associated with the score for being supervised in men. The PGS for being supervised in women is significantly negatively associated with the score for hire and fire in women and significantly positively associated with the score for education in men. The PGS for influence pay in women is significantly positively associated with the scores for hire and fire and education in women, as well as the scores for wages and management in men. The PGS for management in women is only significantly positively associated with the score for hire and fire in women (Figure 3).

Discussion

We find that the genetic predisposition for social status differs among different status indicators and shows similarities and differences in men and women. In both men and women, the status indicators for wages and education (i.e., actual educational attainment) not only show more but also different associations with PGSs than the status indicators of position in the hierarchy. Particularly, PGSs indicating ‘cognitive ability’, such as those of educational attainment, math ability and cognitive performance, are significantly positively associated with wages and actual education in both men and women. In addition, the PGS of age at first birth is significantly positively associated with wages and education in both men and women, replicating findings of Beauchamp (2016) and Fieder and Huber (2022). Also, the polygenic score of self-rated health is significantly positively associated with education in both men and women as well as with wages only in men. These findings are in line with Hill et al. (2019), who identified 24 genes associated with income, 18 of which had previously been associated with intelligence. Furthermore, among others, Hill et al. found several genetic correlations between

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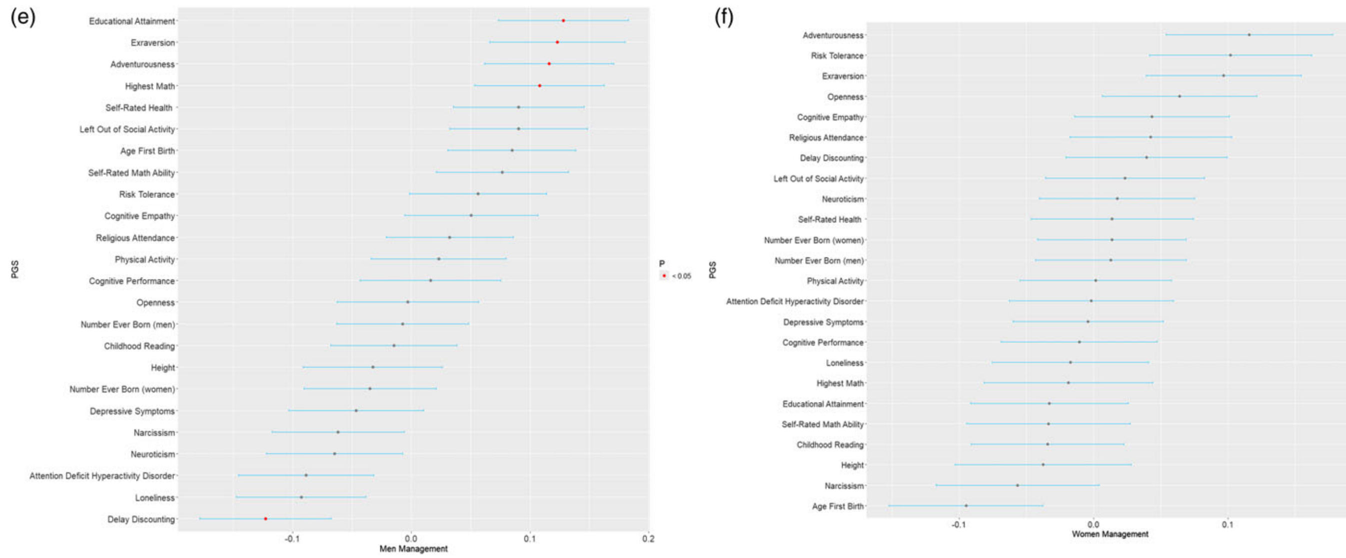

Figure 2 (*Continued.*)

Table 2. Overview of the significant and nonsignificant associations of each polygenic score with the social status (SocStat) variables in men and women

	Wages		Education		Supervision		Being supervised		Hire and fire		Influence pay others		Management position		
Polygenic score	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Nonsignificant:
Educational attainment	+	+	+	+									+		Cognitive empathy
Self-rated health_	+		+	+											Depressive symptoms
Age first birth	+	+	+	+	+										Height
Self-rated math ability	+		+												Children ever_born_(women)
Highest math	+	+	+	+									+		Childhood reading
Cognitive performance	+	+	+	+											
Religious attendance			+	+											
Physical activity			+	+			–								
Adventurousness				+									+		
Exraversion				+									+		
Risk tolerance				+	+		–		+						
Openness				+											
Narcissism				–											
Loneliness	–														
Delay discounting	–	–	–	–									–		
ADHD			–	–											
Number ever born (men)			–												
Left out of social activity								–		+					
Neuroticism										–		–			

Note: + indicates a significant positive association, – indicates a significant negative association. Polygenic scores are displayed in rows, and phenotypes are shown in columns. Nonsignificant polygenic associations are listed in the outermost right column. ADHD, attention-deficit/hyperactivity disorder.

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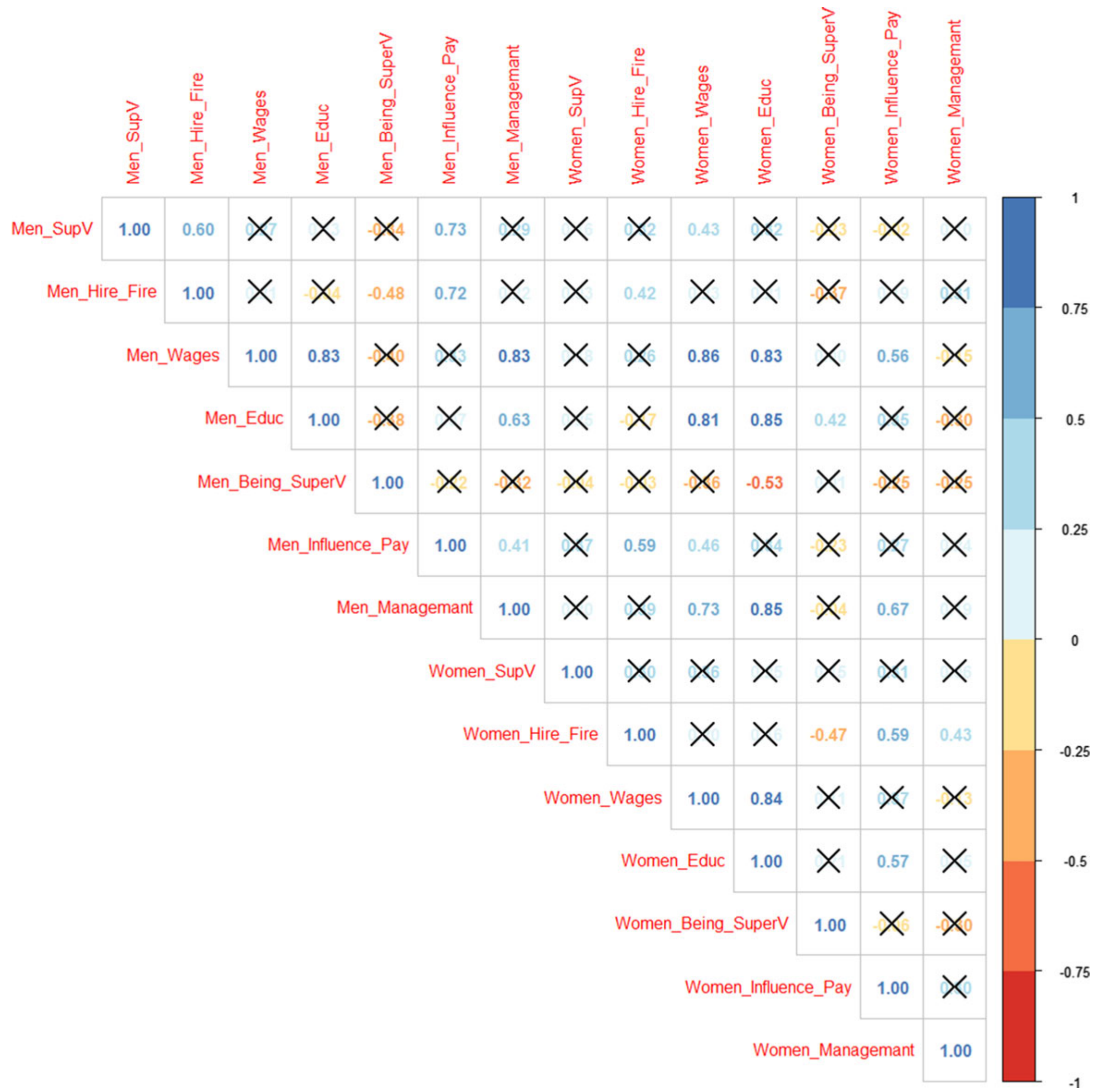

Figure 3. Correlations of the outcomes of polygenic score regressions among social status (SocStat) variables in men and women, and between men and women. X indicates a nonsignificant result.

income, education, health and wellbeing. Negative associations with wages were found for the PGS of delayed discounting in both men and women, indicating that individuals with these genetic predispositions tend to earn less.

Additional to the positive associations with PGSs indicating cognitive ability, age at first birth, and self-rated health, in both men and women, education (i.e., actual educational attainment) is significantly positively associated with the PGSs of religious attendance and physical activity. The positive association with the PGS of age at first birth indicates that higher education is not only associated with actual later age at first birth (M. Mills et al., 2011) but also with a genetic predisposition for later age at first birth, whereas the positive association between the PGS of religious attendance and education supports the view that cognition and religiosity are to some extent associated (Norenzayan et al., 2016).

Only in women is actual education further significantly positively associated with the PGSs of adventurousness, extraversion, risk tolerance and openness, and negatively associated with the score of narcissism, whereas in men but not in women, education is significantly negatively associated with the PGSs of number of children. The negative association between education and the genetic predisposition of number of children in men supports the view that higher educated individuals tend to have fewer children, in part because of an association of a genetic predisposition for both higher education and lower number of children (Beauchamp, 2016; Fieder & Huber, 2022; Kong et al., 2017). However, this holds true only for men but not for women in our sample. Furthermore, in both men and women, the PGSs of ADHD and delay discounting are significantly negatively associated with actual education.

Compared to the associations found with wages and education, in both men and women, fewer and different PGSs are associated with status indicators of position in the hierarchy, such as supervision/being supervised, being in a position to hire and fire, and influence the pay of others. An exception is being in a management position in men, showing some of the positive associations found for wages and education, specifically the scores for educational attainment and math ability, in addition to the

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scores for adventurousness and extraversion, as well as a negative association with the score for delayed discounting. In women, there is no significant association between being in a management position and any of the analyzed PGSs.

The associations of the PGSs with the other status indicators of position in the hierarchy show only sporadic overlap with those of education and wages. In addition, these associations differ between men and women. In men, only the PGS for age at first birth and risk tolerance are significantly positively associated with supervision, whereas no significant association is found in women. As expected, being supervised shows an inverse association with the PGS for risk tolerance in men. Being supervised in men is further inversely associated with the PGS for physical activity. These findings indicate that for men, a predisposition for risk tolerance as well as for being fit seems to foster obtaining a supervisory position. In women, being supervised is significantly negatively associated with the PGS to cope with being left out of social activity, indicating that it may predispose women to not being supervised.

Being in a position to hire and fire is in men only associated with the PGS for risk tolerance. In women, it is positively associated with the PGSs for being left out of social activity and inversely associated with the PGS for neuroticism. Again, in women, a predisposition to cope with being left out of social activity seems to be important for the position in the hierarchy.

In women, the PGS for neuroticisms is also significantly negatively associated with being in a position to influence the pay of others. This negative association with neuroticism is consistent with previous research (Judge et al., 2002; Seibert & Kraimer, 2001; Sutin et al., 2009) and also with our findings for hire and fire.

The associations found between the different status indicators of position in the hierarchy and the associated PGSs are at least to some extent in line with findings of Song et al. (2022) who among others found positive genetic correlations between leadership position and health indicators, low levels of anxiety and depression, extraversion, and intelligence. Other positive genetic correlations were found for height, risk-taking and alcohol consumption, as well as negative genetic correlations with some types of wellbeing measures and neuroticism (Song et al., 2022).

Correlations of Outcomes of Polygenic Score Regressions

The correlation matrix of the PGSs for men and women (only significant associations are considered) also shows both similarities and differences. Overall, we find a significant positive correlation between male and female genetic predisposition for wages and education, suggesting a similar genetic predisposition. In addition to the positive associations between the scores for wages and education, common to both men and women are also the positive association between the scores for hiring and firing and influencing wages, and a negative association between the scores for hiring and firing and being supervised. There are also positive associations between male and female scores for wages, education and hiring and firing, respectively. In addition, there are reciprocal positive associations between male and female scores for the scores for wages and education (i.e., the male score for wages is positively associated with the female score for education and the female score for wages is positively associated with the male score for education) and for the scores for wages and influencing pay.

Again, differences are found in the scores for supervision and management. The score for supervision for men is positively associated with the male scores for hiring and firing and influencing pay and the female score for wages, whereas no significant association is found for the score for supervision for women. Similarly, the score for management in men is positively associated with both the male and female scores for wages, education and influence pay, while the score for management in women only shows a positive association with the female score for hiring and firing. Finally, and unexpectedly, the male score for education is positively associated with the female score for being supervised and, conversely, the male score for being supervised is negatively associated with the female score for education. We do not yet have an interpretation for this.

Based on the results of these correlations, we conclude that the genetic basis for wages and education is quite similar for men and women, as has been shown many times (GWA studies), and that the most important underlying cause of both education and wages is general cognitive ability. This similarity in the genetic predisposition between men and women applies only partly to other status indicators, differences particularly found in the genetic predispositions of supervision and management position.

Our results for different genetic predispositions for education and wages on the one hand, and the other status indicators of position in the hierarchy on the other hand, are in line with proposals to divide social status into dominance and skill. In our case, position in a hierarchy may indicate dominance, while wages and education may indicate skill. Our data further indicate that at least in men, being in a managerial position may be somewhere in between, or a combination of both, as we are not able to characterize a managerial position in one or the other category. According to Cheng et al. (2010), dominance represents status by producing feelings of fear and avoidance and thus subordination, whereas skill produces feelings of respect and admiration. Thus, skill increases social influence through voluntary deference, imitation, persuasion and mutual cooperation, while dominance relies mainly on force and avoidance of the costs that dominant individuals can inflict (Cheng et al., 2010; Cheng et al., 2013; Chen Zeng et al., 2022). In addition, it is known that substantial sex differences in the expression of dominance emerge early in life and persist across ages and societies (reviewed in Chen Zeng et al., 2022), which may also be indicated by the sex differences we found through the PGS associations.

Yet, while in small-scale societies, physical strength and stature, such as height, may have been important indicators of dominance and status, in modern societies, income turns out to be the most important status indicator in terms of mating and reproduction (Fieder & Huber, 2022; Hopcroft, 2015). We therefore suggest that the genetic predisposition for traits indicating skill, such as education and income, may have gained in importance as a selective trait compared to the predisposition for traits indicating dominance. This holds true particularly for males, as we have recently shown for US men, that the importance of income for ever being selected into marriage has been increasing dramatically throughout the 20th century (Fieder & Huber, 2023).

We conclude that the genetic predisposition for status differs between different status indicators and shows both similarities and differences between men and women. We further find that the genetic predisposition for different status indicators are in part intercorrelated. In both men and women, the genetic predispositions for education and wages are correlated. In addition, in men more than in women, genetic predisposition seems to cluster into two groups of status indicators: wages and education on the one hand and status indicators of position in the hierarchy on the other hand, with being in a managerial position somewhere in between. These findings are consistent with an assumption of two different forms of selection pressure on either cognitive skills or dominance, which holds true particularly in men.

Social status is certainly a cultural trait that seems to have always led to an increase in fitness, particularly for men. As the more recent traits of education and income suggest, however, what *is* social status can change according to ecological, cultural and social conditions, so genomic selection for social status may also change. Hence, different genetic predispositions may have been favored and selected for in different times and circumstances. But even if the genetic predisposition to higher social status may have changed, the importance of the cultural trait of social status has always been constant. Thus, social status may be an example of a social trait of constant importance, but with a changing genetic predisposition.

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