Social Skills and Promotion: A Study of Racial and Gender Gaps

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Abstract

This study tests for racial and gender gaps in the effects of social skills on promotion likelihoods and wages. The findings suggest that workers with higher social skills are more likely to be promoted. These findings are significant across races and genders. There is no evidence for gender or racial gaps in the marginal effects of social skills on the likelihood of promotion. There is evidence for substantial racial and gender gaps in the wage returns to social skills. The empirical conclusions are consistent with a standard model of statistical discrimination.

I. Introduction

The massive technological improvements in the last three decades have caused a decline in middle skilled jobs. The literature in economics refers to this phenomenon as job polarization (Goos, Manning and Salomons 2014; Michaels and Van Reen 2014; Bárány and Siegel 2018; Jaimovich and Siu. 2020). The decline in middle skilled jobs is mostly explained by the vanishing routine jobs (Autor, Levy, and Murnane 2003; Cortes, et al. 2020), and an increase in the substitution between robots and labor in certain industries (Graetz and Guy 2018; Acemoglu and Pascual 2020; de Vries, et al. 2020). As a result, the economic inequality has grown in the last three decades (Armour, Burkhauser and Larrimore 2013; Duca and Saving 2016).

Other literature in economics shows a complementary relationship between high skilled labor and technology (Acemoglu and Autor 2011; Autor, et al., 2008; Acemoglu 1998). But the increase in the inequality cannot be explained by the returns to cognitive

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skills. That is because literature in economics has reported evidence that the effects of cognitive skills on wages have declined in the last two decades (Beaudry, Green, and Sand 2016; Castex and Dechter 2014). Deming (2017) shows that in the last two decades, employment in high skilled STEM occupations has declined, while employment in high skilled occupations that require substantial interpersonal interactions has increased. Deming also shows that there is an increase in the demand for social skill-intensive occupations. Deming and Kahn (2018) show that within occupations, the demand for social skills greatly varies and that social skills positively correlated with pay and firm performance. Weinberger (2014) also finds an increasing demand for social skills that is complemented by cognitive skills. Given the growing importance of social skills and the broad racial and gender wage inequalities, this study tests for racial and gender gaps in the effects of social skills on promotion likelihoods and wages.

Using data from the National Longitudinal Survey of Youths 1979 (NLSY79), I show that workers with high social skills are more likely to be promoted. The estimates are highly significant for male and female workers, as well as black and white workers. I do not find evidence for racial-gap or gender-gap in the marginal effects of social skills on the likelihood of promotion. However, on average in the sample, white workers score significantly higher than black workers on the social skills measurements. Therefore, even though there is no evidence for differences in the marginal effects of social skills on the likelihood of promotion, there is a racial gap in the absolute effect of social skills on the likelihood of promotion. For example, the data shows that, on average, a white male worker has a greater social skill score than a black worker. In addition, social skills are strongly associated with an increase in the likelihood of promotion, but there is no evidence of racial differences in the marginal effect of social skill on promotion. Therefore, the white male worker is more likely to be promoted just because he poses more social skills, on average.

The study also reports estimates of the effects of social skills on wages. These estimates suggest a significant marginal effect of social skills on wages. As expected, there is strong evidence for a wage return to promotion. But the returns to promotion do not vary with the worker's social skill level. That is, there is no evidence that a worker with a high social skill who is promoted receives a greater increase to their wage than a

worker with a low social skill who is promoted. However, there is strong evidence for gender and racial gaps in the wage returns to social skills. The estimates indicate a 41 percent gender-gap for white workers, and a 62 percent racial gap for male workers, in the wage returns to social skills. Therefore, social skills explain some of the racial and gender wage gaps, but these gaps are not driven by the marginal effect of social skills on the likelihood of promotion. In section V, I argue that the empirical conclusions are consistent with theoretical predictions from a standard statistical discrimination model.

Other related work to this paper is the study by Fan, Xiangdong and Junsen (2017) who show that the racial wage gap is smaller for hard skilled jobs than for soft skilled jobs. In their analysis, social skills are a part of the soft skills. In addition, Borghans, Ter Weel, and Weinberg (2014) also report evidence from Britain, Germany, and the United States that "people skills" are important factors of occupational choices and wages. In addition, they show that trends in gender and racial gaps of employment and wages closely mirror trends in the importance of people skills in the labor market. I use a different empirical approach and specifically test for racial and gender gaps in the effects of social skills, independent of soft skills and cognitive skills, on promotion and wages.

The remainder of the article proceeds as follows. Section II describes the data. Section III outlines the empirical models used to estimate the effects of social skills on the likelihood of promotion and the wage returns from social skills. The section also explains how I test for race and gender gaps in the effects of social skills on promotion and wages. Section IV presents the main results. Section V discusses potential empirical biases, and outlines a theoretical explanation for the empirical results. Section VI concludes.

II. **Data**

The data is taken from the National Longitudinal Survey of Youths 1979 (NLSY79). This is a representative and longitudinal sample of the United States population. The sample interviewed 12,686 responders ages 14 to 22 in 1979. Starting 1979 until 1993 the responders were interviewed annually, and from 1994 biennially. Starting in 1996 until

2016, the NLSY79 includes information about job promotion. Therefore, the sample used in this study is from these years.[2]

There are two dependent variables: *promoted* and *ln(wage)*. The variable *promoted* is a dummy variable equal to one since the worker was promoted and zero otherwise. The real hourly wage is indexed to 2016 dollars using the Consumer Price Index (CPI) from the Bureau of Labor Statistics (BLS). Following Altonji, Bharadwaj, and Lange (2012) and Deming (2017), I trim values of the real hourly wage that are below 3 and above 200. In this study I compare white workers to black workers, and so the sample includes these two races only. I include only workers that work at least 30 hours per week. Therefore, the sample focuses on workers that are fully engaged in the labor market. In addition, I exclude self-employed workers since the promotion process for these workers is much less likely to be related to the worker's social skills level. The final sample size is 52,611 observations from 7,566 workers.

The three main independent variables are social skills, soft skills, and cognitive skills. The measurements for social and soft skills are taken from Deming (2017). The social skills variable is based on premarket self-reported sociability, the number of clubs in high school, and participation in sports in high school. The soft skills variable is the average between the Rotter Locus of Control and the Rosenberg Self-Esteem Scale. Both measurements are normalized with mean 0 and standard deviation of 1. The measurement for cognitive skills is the Armed Forces Qualification Test (AFQT) scores from Altonji, Bharadwaj, and Lange (2012). The cognitive skills measurement (AFQT) has been used extensively in the literature to capture premarket cognitive skills (Neal and Johnson 1996; Kreisman and Rangel 2015). The AFQT is normalized with mean 0 and standard deviation of 1.

Table 1 reports the summary statistics by race and gender. There are about 45 percent promotion in the entire sample. There is a small and statistically insignificant variation in the average level of promotion across genders with the average varying between 46 percent for white female workers to 47 percent for white male workers. The average promotion rate for white workers is statistically greater than for black workers.

[2] The survey in 1996 until 2016 is biennial, so there are 11 years of observation overall.

For black workers, the promotion rate is about 41 percent. Just like for white workers, the gender gap in the promotion rate for black workers is statistically insignificant. The average real wage in the entire sample is $23.4. As expected, the average real wage is much greater for white male workers at $29.4 compared to black male workers at $20.0. The average real wage for female white workers is $21.3 compared to black female workers at $17.6.

The proxy variable for social skills is normalized at the entire sample that is used in this study. Therefore, in the entire sample, the average social skills level is zero with a standard deviation of one. The greatest average social skills level is in the white male workers' subsample at 0.07 SDs followed by white female workers at 0.03 SDs, black male workers at -0.02 SDs, and black female workers at -0.20 SDs. The gaps in the average social skills suggest that even if the marginal return to social skill is uniform across genders and race, white male workers receive the highest absolute return from social skills because they possess the most of it, on average. This, of course, might suggest that the proxy variable for social skills undervaluing the social skills levels of black workers. In Section V, I discuss that possibility and provide arguments for the robustness of the proxy variable.

The average level of soft skills also fluctuates across the subsamples. The order of averages in the subsamples is the same as for the social skill measurement. The average soft skills for white male workers is 0.07 SDs compared to -0.02 SDs for white female workers. The average soft skills for black male workers is -0.04 SDs compared to -0.10 SDs for black female workers. The averages AFQT in the white male and female subsamples are significantly greater than the averages AFQT in the black male and female subsamples. The AFQT was used extensively in the literature to capture workers' pre-market cognitive skills. The gender and racial gaps in the average AFQT levels are consistent with the previous literature (see for example Neal and William, 1996).

The average age in the sample is 44 years and it varies between 31 and 60 years. The average education in the entire sample is 13.6 years. On average, white workers are more educated than black workers and female workers are more educated than male workers. About 18 percent of the workers are union members.

Table 1: Summary Statistics

		White Workers		Black Workers	
VARIABLES	All	Male	Female	Male	Female
Promoted	0.450	0.469	0.464	0.415	0.412
	(0.497)	(0.499)	(0.499)	(0.493)	(0.492)
Real Wage (in 2016 $)	23.44	29.39	21.32	19.96	17.63
	(17.70)	(22.61)	(14.13)	(12.82)	(10.06)
Social Skills	0	0.0717	0.0300	-0.0185	-0.202
	(1.000)	(0.955)	(1.056)	(0.961)	(0.993)
Soft Skills	0	0.0738	-0.0185	-0.0375	-0.0978
	(1.000)	(1.019)	(1.013)	(0.967)	(0.947)
Cognitive (AFQT)	0	0.207	0.209	-0.495	-0.384
	(1.000)	(1.011)	(0.944)	(0.911)	(0.871)
Union	0.179	0.184	0.147	0.203	0.202
	(0.383)	(0.388)	(0.355)	(0.402)	(0.402)
Education	13.57	13.58	13.84	12.97	13.65
	(2.483)	(2.644)	(2.531)	(2.108)	(2.244)
Age	44.05	43.92	44.35	43.67	44.15
	(6.799)	(6.841)	(6.786)	(6.762)	(6.742)
Black	0.322				
	(0.467)				
Female	0.477				
	(0.499)				
Region	0.146	0.160	0.147	0.139	0.121
Northeast	(0.353)	(0.366)	(0.354)	(0.346)	(0.326)
	0.241	0.280	0.267	0.160	0.180
North Central	(0.428)	(0.449)	(0.442)	(0.367)	(0.384)
	0.441	0.333	0.370	0.623	0.641
South	(0.496)	(0.471)	(0.483)	(0.485)	(0.480)
	0.172	0.227	0.216	0.0780	0.0587
West	(0.378)	(0.419)	(0.412)	(0.268)	(0.235)
Observations	52,611	19,153	16,540	8,349	8,569
Number of responders	7,566	2,585	2,515	1,225	1,241

Notes - The data source is the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Cognitive skills are measured by each NLSY79 respondent's score on the Armed Forces Qualifying Test (AFQT), and are normalized to have a mean of zero and a standard deviation of one. The social skills measurement is taken from Deming (2017) and is a standardized composite of four variables - 1) sociability in childhood; 2) sociability in adulthood; 3) participation in high school clubs; and 4) participation in team sports - see the text for details on construction of the social skills measure. Non-cognitive skills measurement is the normalized average of the Rotter and Rosenberg scores in the NLSY (taken from Deming, 2017). Standard deviations are in parentheses and clustered at the individual level.

III. **Methodology**

The first analysis of this study tests whether social skills can explain the likelihood of promotion, and that social skills contain explanatory information independent of the information in soft skills and cognitive skills. The sample is divided into four subsamples: white male, white female, black male, black female. For each of the four relevant groups, I estimate the following equation

$$Promoted_{it} = \alpha + \beta_1 Social_i + \beta_2 Soft_i + \beta_3 AFQT_i + \gamma X_{it} + \varepsilon_{it}, \quad (1)$$

where *Promoted* is a binary variable equal to one if the worker was promoted at time *t* or before, *Social* is a normalized measurement of social skills, *Soft* is a normalized measure of soft skills, and *AFQT* is a normalized measure of cognitive skills. I keep the regression parsimoniously to avoid heterogeneity biases. Therefore, the vector of other controls (***X***) includes variables that are clearly exogenous -- age in quadratic form, year fixed effects, three regional dummies, and trend in quadratic form. The coefficient of interest is β_1, which captures the effect of social skills on the likelihood of promotion.

The second analysis tests whether there are racial gaps and gender gaps in the effect of social skills on the likelihood of promotion. The sample is divided into four subsamples: male, female, black, and white workers. For each of the four subsamples, I regress the following equation

$$Promoted_{it} = \alpha + \sum_{s=1}^{3} [\beta_s Skill_i + \delta_s Skill_i \times G_i] + \gamma X_{it} + \varepsilon_{it}, \quad (2)$$

where the ***Skill*** vector includes social, cognitive, and soft skills. The indicator variable G_i is a black indicator in the male and female subsamples, and G_i is a female indicator in the black and white subsamples. The coefficient of interest is the δ on the interaction between social skills and G_i. If δ is different from zero in the male or female subsamples, it indicates a racial gap in the effect of social skill on the likelihood of promotion. If δ is different from zero in the black or white subsamples, it indicates a gender gap in the effect of social skill on the likelihood of promotion.

The next analysis tests whether the wage returns to promotion varies with the social skills level. That is, do high socially skilled workers who are promoted are compensated more than low socially skilled workers. I divide the sample into four subsamples: white, black, female, and male workers. For each one of the four subsamples, I regress the following equation:

$$ln\ (wage)_{it} = \alpha + \sum_{s=1}^{3} \quad [\beta_s Skill_i + \delta_s Skill_i \times Promoted_{it}] + \gamma X_{it} + \varepsilon_{it}. \quad (3)$$

The coefficient of interest is the δ on the interaction between social skills and *Promoted*. If δ is different from zero, it indicates that the wage returns to promotion varies with the social skill level.

The final analysis of this study tests whether there are gender gaps and racial gaps in the wage returns to social skills. I divide the sample into four subsamples, white, black, male, and female workers. For each of the four subsamples, I regress the following equation:

$$ln\ (wage)_{it} = \alpha + \sum_{s=1}^{3} \quad [\beta_s Skill_i + \delta_s Skill_i \times G_i] + \gamma X_{it} + \varepsilon_{it}, \quad (4)$$

where G_i is a black indicator in the male subsample and the female subsample, and G_i is a female indicator in the black subsample and white subsample. The coefficient of interest the δ on the interaction between social skills and G_i. If δ is different from zero in the male or female subsamples, it indicates a racial gap in the wage returns to social skill. If δ is different from zero in the black or white subsamples, it indicates a gender gap in the wage returns to social skill.

IV. Results

This section presents direct evidence of the importance of social skills for the likelihood of promotion, wages, and the racial and gender gaps. In all the regressions, the standard errors are robust and clustered at the individual level. Table 2 reports the estimates of the effect of social, soft, and cognitive skills on the likelihood of being promoted from

equation (1). In all subsamples the effect of social skills on the likelihood a worker is promoted are statistically and economically significant.

In the entire sample, a one standard deviation increase in social skill increases the likelihood of promotion by an absolute 4 percent change. The average promotion rate in the entire sample is 45 percent. Therefore, an increase of one standard deviation in the social skills is associated with a relative increase in the likelihood of promotion by 8.8 percent. White male workers enjoy a slightly bigger effect of social skills on the likelihood of promotion. Specifically, a one standard deviation increase in social skills is associated with an absolute 4.3 percent or a relative 9.2 percent increase in the likelihood of promotion. For white female workers, the effect of social skill is statistically significant, but economically smaller than for white male workers. For female white workers, a one standard deviation increase in social skills is associated with an absolute 2.6 percent or a relative 5.7 percent increase in the likelihood of promotion.

For black male workers, a one standard deviation increase in social skills is associated with an absolute 6.5 percent or a relative 15.7 percent increase in the likelihood of promotion. For black female workers, social skills are also statistically and economically significant. Specifically, a one standard deviation increase in social skills is associated with an absolute 4.1 percent or a relative 10 percent increase in the likelihood of promotion. That is, the effect of social skills on the likelihood of promotion is statistically and economically significant across all races and genders.

Cognitive skills have a positive and economically significant effect on the likelihood of being promoted. The effect is statistically significant in all groups except for white male workers. In the entire sample, a one standard deviation increase in cognitive skills is associated with an absolute 2 percent or a relative 4.5 percent increase in the likelihood of promotion. By comparison with social skill, soft skill has a slightly smaller effect on the likelihood of promotion. Specifically, soft skill has a statistically significant effect on the likelihood of promotion for male workers only. For white male workers, a one standard deviation increase in soft skill is associated with an absolute 3.4 percent or a relative 7.2 percent increase in the likelihood of promotion. For black male workers, a one standard deviation increase in soft skill is associated with an absolute 2.7 percent or a relative 6.4 percent increase in the likelihood of promotion. For female

workers, the effect of soft skills on the likelihood of promotion is positive, but statistically insignificant.

Table 2: The Effect of Skills on the Likelihood of Being Promoted

		White Workers		Black Workers	
VARIABLES	All	Male	Female	Male	Female
Social skills (standardized)	0.0398***	0.0433***	0.0264***	0.0651***	0.0413***
	(0.00555)	(0.00985)	(0.00921)	(0.0140)	(0.0139)
Cognitive (AFQT, standardized)	0.0203***	0.0113	0.0177*	0.0333**	0.0329**
	(0.00576)	(0.00919)	(0.0100)	(0.0154)	(0.0156)
Soft skills (standardized)	0.0213***	0.0338***	0.0103	0.0280*	0.00695
	(0.00576)	(0.00973)	(0.00988)	(0.0144)	(0.0147)
Observations	52,611	19,153	16,540	8,349	8,569

Notes: Each column reports the estimates from equation (1) in the paper. The dependent variable is binary and equals to one if promoted and 0 otherwise. The data source is the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Cognitive skills are measured by each NLSY79 respondent's score on the Armed Forces Qualifying Test (AFQT), and are normalized to have a mean of zero and a standard deviation of one. The social skills measurement is taken from Deming (2017) and is a standardized composite of four variables - 1) sociability in childhood; 2) sociability in adulthood; 3) participation in high school clubs; and 4) participation in team sports - see the text for details on construction of the social skills measure. The non-cognitive skills variable is the normalized average of the Rotter and Rosenberg scores in the NLSY (taken from Deming, 2017). The estimates are from Pooled OLS regressions. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

To summarize, across genders and races, the effects of social skill on the likelihood of being promoted is statistically and economically significant. The soft skills variable has a positive effect on the likelihood of promotion, but is statistically significant only in the male samples. The cognitive skills variable has a positive effect on the likelihood of promotion and it is statistically significant in the black samples, and the white female sample.

Next, I test whether the returns to social skills vary by race and gender. Table 3 reports the estimates from equation (2). The qualitative conclusions derived from Table 2 do not change. That is, social skills play an important role in determining wages for male and female workers, as well as black and white workers. In both male and female workers samples, the estimated coefficients on the interaction variable between black and social skill is positive, but statistically insignificant. Therefore, I conclude that there is no statistical evidence for a racial gap in the marginal effect of social skill on the likelihood of promotion. The estimated coefficients on the interaction variables *Black*Cognitive Skills* and *Black*Soft Skills* are statistically insignificant as well. Therefore, I conclude that there is no evidence for a racial gap in the marginal effects of cognitive and soft skills on the likelihood of promotion.

The last two columns in Table 3 report the estimates for the gender gap in the effect of social skills on the likelihood of promotion. In both white and black samples, the estimated coefficients on the interaction variable *Female*Social Skills* are negative, but statistically insignificant. Therefore, I conclude that there is no evidence for a gender gap in the marginal effect of social skill on the likelihood a worker is promoted. Finally, there is some statistical evidence for a gender gap in the effect of soft skills on the likelihood of promotion in the white sample. This result is consistent with the estimates in Table 2. Specifically, we cannot reject the assumption that the effect of soft skill on the likelihood of promotion for female white workers is statistically equal to zero.

Table 3: Gender and Racial Differences in the Likelihood of Being Promoted

	All	Male Workers	Female Workers	Black Workers	White Workers
Social skills (standardized)	0.0446***	0.0442***	0.0257***	0.0636***	0.0433***
	(0.00895)	(0.00983)	(0.00923)	(0.0139)	(0.00985)
Cognitive (AFQT, standardized)	0.0126	0.0124	0.0179*	0.0320**	0.0109
	(0.00844)	(0.00918)	(0.0100)	(0.0154)	(0.00916)
Soft skills (standardized)	0.0328***	0.0335***	0.0103	0.0268*	0.0337***
	(0.00886)	(0.00969)	(0.00983)	(0.0143)	(0.00964)
Black	-0.0161	-0.0231	-0.00819		
	(0.0131)	(0.0186)	(0.0185)		
Female	-0.00781			-0.00480	-0.0112
	(0.0109)			(0.0216)	(0.0135)
Black*Social	0.0172	0.0200	0.0156		
	(0.0118)	(0.0170)	(0.0166)		
Black*Cognitive	0.0188	0.0202	0.0163		
	(0.0128)	(0.0179)	(0.0185)		
Black*Soft	-0.00414	-0.00644	-0.00205		
	(0.0122)	(0.0172)	(0.0174)		
Female*Social	-0.0194*			-0.0233	-0.0172
	(0.0111)			(0.0196)	(0.0135)
Female*Cognitive	0.00424			0.00163	0.00689
	(0.0110)			(0.0219)	(0.0136)
Female*Soft	-0.0217*			-0.0172	-0.0234*
	(0.0113)			(0.0203)	(0.0136)
Observations	52,611	27,502	25,109	16,918	35,693

Notes: Each column reports the estimates from equation (1) in the paper. The dependent variable is binary and equals to one if promoted and 0 otherwise. The data source is the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Cognitive skills are measured by each NLSY79 respondent's score on the Armed Forces Qualifying Test (AFQT), and are normalized to have a mean of zero and a standard deviation of one. The social skills measurement is taken from Deming (2017) and is a standardized composite of four variables - 1) sociability in childhood; 2) sociability in adulthood; 3) participation in high school clubs; and 4) participation in team sports - see the text for details on construction of the social skills measure. The non-cognitive skills variable is the normalized average of the Rotter and Rosenberg scores in the NLSY (taken from Deming, 2017). The estimates are from Pooled OLS regressions. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

Next, I report the estimates for the wage return to promotion. Table 4 presents the estimates for the log real wage regressions by the workers' race and gender from equation (3). In the entire sample, all three measures of skills are positive and statistically significant. A one standard deviation increase in social skills is associated with about 5.7 percent increase in real hourly wage. For white male workers, social skill has a much greater economic effect on wages than for female and black workers. Specifically, a one standard deviation increase in social skill is associated with an increase of 8.4 percent in real wages. For white female workers, a one standard deviation increase in social skills is associated with 4.8 percent increase in real hourly wage. For black workers, the wage return to social skill varies between 3.5 percent for male workers and 6.2 percent for female workers. Note that white male workers have a much greater social skill level than the other groups, on average. That is, the average effect of social skills is greater than for the other groups. Nevertheless, the return to social skill is an important component that can explain some of the racial and gender wage gaps.

The estimates on soft and cognitive skills are also statistically and economically significant across genders and race. For cognitive skill, a one standard deviation increase in AFQT score increases wages by 9 to 11.6 percent. This is consistent with the vast literature documenting a strong causal effect of AFQT on wages (Neal and Johnson, 1997, Kreisman and Marcos, 2015). A one standard deviation increase in soft skill increases wages by 7 and 11 percent. Balcar (2016) and Fan, Xiangdong, and Junsen (2017) also report similar qualitative estimates about the effects of soft skills on wages.

Finally, Table 4 reports the estimates from the interactions between the three skill measurements and the *promoted* variable. The estimates are statistically insignificant in all the samples. Therefore, I conclude that there is no evidence that the wage returns to promotion change with the level of social skill. Specifically, there is no evidence that a highly socially skilled worker who is promoted, enjoys a greater wage increase than a low socially skilled worker who is promoted.

Table 4: The Effect of Skills Interacted with Promotion on Ln(Wage)

		White Workers		Black Workers	
VARIABLES	All	Male	Female	Male	Female
Social Skills	0.0571***	0.0840***	0.0475***	0.0349**	0.0621***
	(0.00715)	(0.0138)	(0.0117)	(0.0154)	(0.0158)
Cognitive (AFQT)	0.102***	0.101***	0.0898***	0.116***	0.103***
	(0.00728)	(0.0127)	(0.0127)	(0.0170)	(0.0175)
Soft Skills	0.0956***	0.102***	0.0925***	0.0706***	0.110***
	(0.00744)	(0.0138)	(0.0129)	(0.0154)	(0.0164)
Promoted	0.180***	0.155***	0.210***	0.193***	0.152***
	(0.0107)	(0.0192)	(0.0187)	(0.0289)	(0.0266)
Promoted*Social Skills	0.0129	0.0262	0.0174	0.00389	-0.0373
	(0.0106)	(0.0199)	(0.0171)	(0.0243)	(0.0232)
Promoted*Cognitive Skills	0.0124	0.00177	-0.00103	0.0424	0.0212
	(0.0110)	(0.0194)	(0.0197)	(0.0284)	(0.0263)
Promoted*Soft Skills	0.0150	0.0110	0.0218	0.0276	-0.0141
	(0.0108)	(0.0187)	(0.0185)	(0.0278)	(0.0237)
Observations	52,611	19,153	16,540	8,349	8,569
R-squared	0.237	0.184	0.159	0.218	0.203

Notes: Each column reports the estimates from equation (3) in the paper. The dependent variable is log of real hourly wage (in 2016 $). The data source is the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Cognitive skills are measured by each NLSY79 respondent's score on the Armed Forces Qualifying Test (AFQT), and are normalized to have a mean of zero and a standard deviation of one. The social skills variable is taken from Deming (2017) and is a standardized composite of four variables - 1) sociability in childhood; 2) sociability in adulthood; 3) participation in high school clubs; and 4) participation in team sports - see the text for details on construction of the social skills measure. The non-cognitive skills variable is the normalized average of the Rotter and Rosenberg scores in the NLSY (taken from Deming, 2017). The estimates are from Pooled OLS regressions. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

In the last analysis, I test whether there are gender and racial gaps in the wage returns to social skills. Table 5 reports the estimates from equation (4). In the entire sample, there is strong evidence for racial and gender gaps in the wage returns to social skills. In the male workers sample, black male workers receive a much smaller return to their social skills compared to white male workers. Specifically, the racial gap in the wage returns to social skills for male workers is 62 percent. In the female sample, there is no statistical evidence for a racial gap in the return to social skills. Furthermore, in the black workers sample, there is no evidence for a gender gap in the returns to social skills. Finally in the white workers sample, there is evidence for a gender gap in the wage return to social skills. Specifically, white female workers receive 41 percent smaller wage returns to their social skills compared to white male workers.

Consistent with previous studies, promotion has a statistically and economically significant effect on real wages (Tripp and Fadlon 2020; Gibbons and Waldman 1999). In the entire sample, promotion increases real hourly wage by 17.8 percent. This translates to a $4.17 increase in real hourly wages, on average.

Putting together the results in Tables 2-5, I find strong evidence that social skills are positively associated with the likelihood of promotion. In addition, promotion is associated with higher wages, but the returns to promotion do not change with the level of social skills. That is, workers with high social skills are likely to be promoted, and be compensated for the promotion. But there is no evidence that the wage increases from the promotion changes with the level of social skill. Finally, there is evidence to indicate a substantial racial gap in the returns to social skills for male workers and a substantial gender gap in the returns to social skills for white workers.

Table 5: Gender and Racial Gaps in the returns to Social, Cognitive, and Soft Skills

	All	Male	Female	White	Black
Social Skills	0.0890***	0.0981***	0.0568***	0.0955***	0.0367***
	(0.00987)	(0.0111)	(0.00963)	(0.0111)	(0.0135)
Cognitive (AFQT)	0.105***	0.104***	0.0891***	0.103***	0.132***
	(0.00968)	(0.0106)	(0.0105)	(0.0105)	(0.0152)
Soft Skills	0.103***	0.107***	0.0995***	0.109***	0.0776***
	(0.00963)	(0.0107)	(0.0103)	(0.0106)	(0.0139)
Black*Social Skills	-0.0352***	-0.0605***	-0.0127		
	(0.0118)	(0.0175)	(0.0158)		
Black*Cognitive Skills	0.0240*	0.0280	0.0207		
	(0.0128)	(0.0186)	(0.0174)		
Black*Soft Skills	-0.0104	-0.0288	0.00876		
	(0.0121)	(0.0175)	(0.0165)		
Female*Social Skills	-0.0250**			-0.0394***	0.00810
	(0.0116)			(0.0146)	(0.0185)
Female*Cognitive Skills	-0.0171			-0.0156	-0.0197
	(0.0121)			(0.0148)	(0.0206)
Female*Soft Skills	0.00185			-0.00890	0.0302
	(0.0118)			(0.0147)	(0.0190)
Promoted	0.178***	0.166***	0.190***	0.182***	0.166***
	(0.0106)	(0.0153)	(0.0145)	(0.0134)	(0.0167)
Black	-0.264***	-0.0728***	0.0476		
	(0.0208)	(0.0275)	(0.0332)		
Female	-0.267***			-0.266***	-0.0867***
	(0.0156)			(0.0156)	(0.0236)
Observations	52,611	27,502	25,109	35,693	16,918
R-squared	0.246	0.244	0.183	0.216	0.212

Notes: Each column reports the estimates from equation (3) in the paper. The dependent variable is log of real hourly wage (in 2016 $). The data source is the National Longitudinal Survey of Youth 1979 cohort (NLSY79). Cognitive skills are measured by each NLSY79 respondent's score on the Armed Forces Qualifying Test (AFQT), and are normalized to have a mean of zero and a standard deviation of one. The social skills variable is taken from Deming (2017) and is a standardized composite of four variables - 1) sociability in childhood; 2) sociability in adulthood; 3) participation in high school clubs; and 4) participation in team sports - see the text for details on construction of the social skills measure. The non-cognitive skills variable is the normalized average of the Rotter and Rosenberg scores in the NLSY (taken from Deming, 2017). The estimates are from Pooled OLS regressions. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level. All regressions control for years fixed effects, age in a quadratic form, three regional dummies, and time trend in a quadratic form. In column 2 (the entire sample), the regression controls for black and female dummies. Standard errors are robust and clustered at the individual level.

*** Significant at the 1 percent level.

** Significant at the 5 percent level.

* Significant at the 10 percent level.

V. Discussion

This section discusses some potential biases in the estimations and also provides a potential theoretical explanation to the empirical outcomes.

The average social skills level of black workers is statistically smaller than that for white workers. Specifically, the average social skills measurement used in this study for black male workers is about 9 percent less than white male workers, and black female workers score about 23 percent less than white female workers. This in turn might cause two potential biases in the estimations. First, it could be that the social skills' proxy variable used in this study does not capture the social skills for black workers in any manner. But if this argument is true, then the estimates of the coefficient on social skills in all the regressions in the blacks' samples should have been statistically insignificant. Second, it could be that the social skills' proxy variable used in this study underestimates the social skills of black workers. If this argument is true, then the estimates of the effects of social skills on promotion for black workers would have been smaller. However, in the estimations, there is no evidence for a racial gap in the marginal effects of social skills on the likelihood of promotion. In addition, the racial gap in the wage returns to social skills would have been even bigger.

Another potential problem in the estimation is the potential that two of the skills measurements are highly correlated to each other. That is, two of the skills measurements capture similar skills. This correlation might cause a multicollinearity in the estimations. But the correlations between the skills measurements in the sample are positive and at most 23 percent.

A third potential bias in the estimations is that the effects of social skills are correlated with unmeasured ability differences. In an online Appendix file, I controlled for a college indicator variable and re-estimated all of the regressions in this study. In addition, I added a control between the product between cognitive skills and social skills, as was suggested in Weinberger (2014). All of the qualitative conclusions from these additional regressions are unchanged when I add these two controls to the regressions. Namely, social skills explain much of the likelihood of promotion and wages. There is no evidence for gender or racial gaps in the marginal effect of social skills on the

likelihood of promotion. There is no evidence that the wage return to promotion varies with the worker's social skills level. Finally, there is strong evidence for substantial gender and racial gaps in the wage returns to social skills.

Could the theory of statistical discrimination explain the conclusions?

In a standard statistical discrimination model of Aigner and Cain (1977), employers base hiring decisions on an indicator of skill *y* (such as cognitive ability or social ability) that measures a true worker's productivity *q*. The measurement equation is then

$$y=q+u.$$

The standard assumptions made in Aigner and Cain (1977) are that q is independent of u, $q \sim N(\alpha, \sigma_q^2)$, and $u \sim N(0, \sigma_u^2)$. Employers observe *y* but not *q*, and use *y* to obtain information about *q*. Let $\hat{q} = E[q|y]$ be the employer's predicted value of true skill q given the observed indicator of skill *y*.

Aigner and Cain (1997) show that you can express the predicted value of skill-- $\hat{q}$ as follow:

$$\hat{q} = (1-\theta)\alpha + \theta y,$$

where $\theta = \frac{var(q)}{var(q)+var(u)}$. That is, if the observed indicator of skill (*y*) is less informative (higher value of $var(u)$) then employers would put a greater weight on the group average productivity (α). Now assume two different groups: white and black. The two groups might have different mean ability (α^B, α^W) and different variances of *u* and *q*. Then the predicted values of q depend on the information employers have. That is,

$$\hat{q}^W = (1-\theta^W)\alpha^W + \theta^W y$$
$$\hat{q}^B = (1-\theta^B)\alpha^B + \theta^B y.$$

There is strong evidence that there are significantly fewer black and female supervisors compared to white male supervisors (Fadlon 2015). Therefore, $var(u)$ is likely to be greater for black and female workers. That is, employers make more "mistakes" when they try to predict a black worker's ability and white female ability at hiring. Consequently, employers would put a smaller weight on the black worker's individual social skill and a bigger weight on the group average social skill. That is, $\theta^W > \theta^B$ and $\theta^M > \theta^F$, where M=male workers and F=female workers.

White workers have significantly greater social skills than black workers, on average ($\alpha^W > \alpha^B$). The statistical gender gap in the average of social skill cannot be rejected from being zero ($\alpha^M = \alpha^F$). Then the predicted values of skill are:

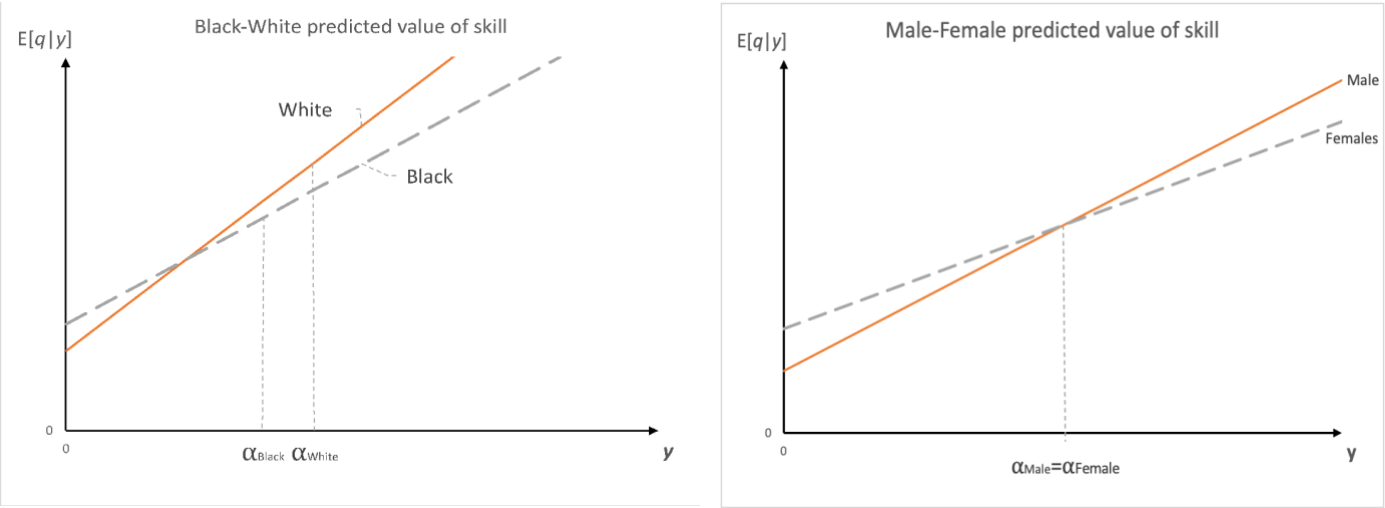

Figure 1: The Impact of Statistical Discrimination on Predicted Skill

From both graphs in Figure 1, we can see that a highly skilled white male worker gets a greater predicted social skill level compared to a black worker and a female white worker with equivalent skill level. Therefore, the first prediction from the model is that the marginal effect (slope) of social skill for white male workers is greater than the marginal effect of social skill for black workers and female white workers.

The theory of statistical discrimination assumes that the employer does not observe the worker's true skill level at hiring. However, promotion decisions are made after the employer gets to know the worker. Therefore, the second prediction is that there should not be racial differences in the marginal effects of social skills on the likelihood of promotion. The two predictions are confirmed in the empirical analysis. Therefore, I conclude that the empirical estimates are consistent with the predictions from a standard statistical discrimination model.

VI. Conclusions

This study tests the effect of social skill on the likelihood of promotion and whether there are racial or gender gaps in that effect. In addition, the study tests whether the wage return to a promotion varies by the level of social skill. Finally, the study tests whether there are racial or gender gaps in the return to social skill. The estimates provide strong evidence that social skills increase the likelihood of promotion. There is no evidence for racial or gender gaps in the marginal effects of social skills on promotion, and the wage return to promotion does not change with the social skill level. Therefore, even though a highly socially skilled worker is more likely to be promoted, there is no evidence that this worker will be compensated for being promoted differently than a worker with a lower social skill level. The final conclusions suggest that there are substantial gender gaps, for white workers, and racial gaps, for male workers, in the wage return to social skills.

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