Exploratory Analysis:
Aptitude and Attitude Measures in Early Adulthood and the Relation to Later Life Labor Market Outcomes

Carolyn D. Gorman

Introduction

The labor market is changing. Jobs of the future will be different from the jobs of today. In a 2020 report, the World Economic Forum describes that demand for both analytical skills and interpersonal skills will drive growth in professions of the future, a view aligned with many other researchers.[i] [ii] [iii] Already, the number of workers in occupations requiring average to above-average education, training, and experience increased 68 percent between 1980 and 2015, from 49 million to 83 million, respectively.[iv]

But uncertainty remains as to whom will be affected by this rapidly changing labor market, and in what ways. To the extent that needed skills are not aligned with skills that workers hold today, a labor supply mismatch could result, and disproportionately impact those employed in jobs with declining demand for their given competencies. As just one example, the demand for occupations that require manual skills is declining—and those occupations are increasingly over-represented by a minority demographic: individuals with mental illnesses.[v]

Between 1980 and 2012, jobs requiring substantial social interaction grew by nearly 12 percentage points as a share of the U.S. labor force, while math-intensive but less social jobs shrank by 3.3 percentage points over the same period.[vi] Measures of aptitude can be used to predict educational attainment and analytical abilities needed for the changing labor market, but because jobs of the future will also require individuals to have strong social skills, early life measures that may be related to social skills are worth examining as well.

In this article, I consider specific measures of individuals' attitudes in early adulthood regarding their self-esteem and sense of control over their lives as possible inputs to social skills, and begin to ask, *what are the basic relationships between these measures of aptitude and attitude in early adulthood and later life labor market outcomes?*

In some ways, these measures of attitude may dictate what workforce opportunities are pursued by or become available to individuals. For example, young adults may be self-motivated to build certain skills in order move through the labor market in a particular occupational direction they believe will be relevant and fruitful in the future. Or, they may be reserved to follow whatever path is available to them, given their baseline skills, if their sense of confidence and self-control play a large enough limiting role.

Given the need for a strong, growth-generating labor force—particularly as the world's population ages—understanding the role of early adulthood attitudes on later life labor market outcomes may inform the differential effects of a changing labor market among workers with a range of social and analytical skills. Through exploratory data analysis, I hope to inform a hypothesis for future research: whether and how attitudes, in addition to aptitude, play a role in one's outcomes in the workforce.

Data and Methodology

For this analysis, I draw on data from the National Longitudinal Survey of Youth 1979 (NLSY79). The NLSY79 is a nationally representative sample of 12,686 young men and women born between 1957 and 1964. Survey respondents were ages 14 to 22 and living in the U.S. when first interviewed in 1979, and information is available through their late 40s and early 50s. The NLSY79 is a natural choice to use as a source of data for this research question as the survey includes (1) various specific measures for both aptitude and attitudes, (2) considerable income information (which can be precisely measured for low-income and minority households), and (3) detailed information related to labor market participation and outcomes. In this analysis, I draw on information from 1978 (obtained in the 1979 survey interview) through 2013.

I examine the relationship to later life labor market outcomes between three specific measures of aptitude and attitudes in early adulthood: the Armed Forces Qualifications Test (AFQT), the Rosenberg Self-Esteem Scale, and the Rotter-Locus of Control Scale. The AFQT is part of the Armed Forces Vocational Aptitude Test Battery (ASVAB), a well-known aptitude test meant to measure developed ability and predict future success academically or in a military occupation. The AFQT was administered in 1980 to the NLSY79 respondents, so a vast majority of respondents have these scores available.[vii] Used in many studies examining a wide range of labor market outcomes, the AFQT is considered a valid measure of aptitude and proxy for cognitive proficiency.

The Rosenberg Self-Esteem Scale measures self-reported perceptions of individuals' own self-worth, i.e., individuals' feelings of pride, satisfaction, and positivity towards themselves. This measure has been used in some research as a proxy for competitiveness, finding that high scores on this scale have a strong predictive power for income, occupation, and completed levels of education.[viii] Respondents were asked about their self-esteem using this scale in the 1980 survey.

The Rotter-Locus of Control Scale measures the extent to which individuals believe they have internal control over their lives—for example, through self-motivation or self-determination—versus the extent to which they believe the environment they are in has control over their lives—for example, that external factors like chance, fate, or luck might have external control over their lives. Research on labor market outcomes for white women in the US and the UK have found that this measure is a statistically significant factor in wage determination.[ix] Respondents answered questions for this scale score on the 1979 survey.

In this exploratory analysis, I examine hourly wages as an initial labor market outcome. Future research is intended to examine total income from wages and salary, provide an occupational analysis, and measures other outcomes related to labor force participation, such employer firm characteristics and whether individuals have access to employer-sponsored health insurance. Such measures are outside the scope of this initial article.

In this initial exploratory data analysis, I aim to elucidate the extent to which correlations exists between any of these three aptitude or attitude measures and the aforementioned labor market outcome of hourly wages.

Analysis and Results

In table 1, summary measures are provided for mean scores on aptitude and attitude measures: the AFQT, Rosenberg Scale, and Rotter Scale. These measures are stratified by various socioeconomic and demographic characteristics.

Table 1. Summary measures of mean aptitude and attitude scores (NLSY79)

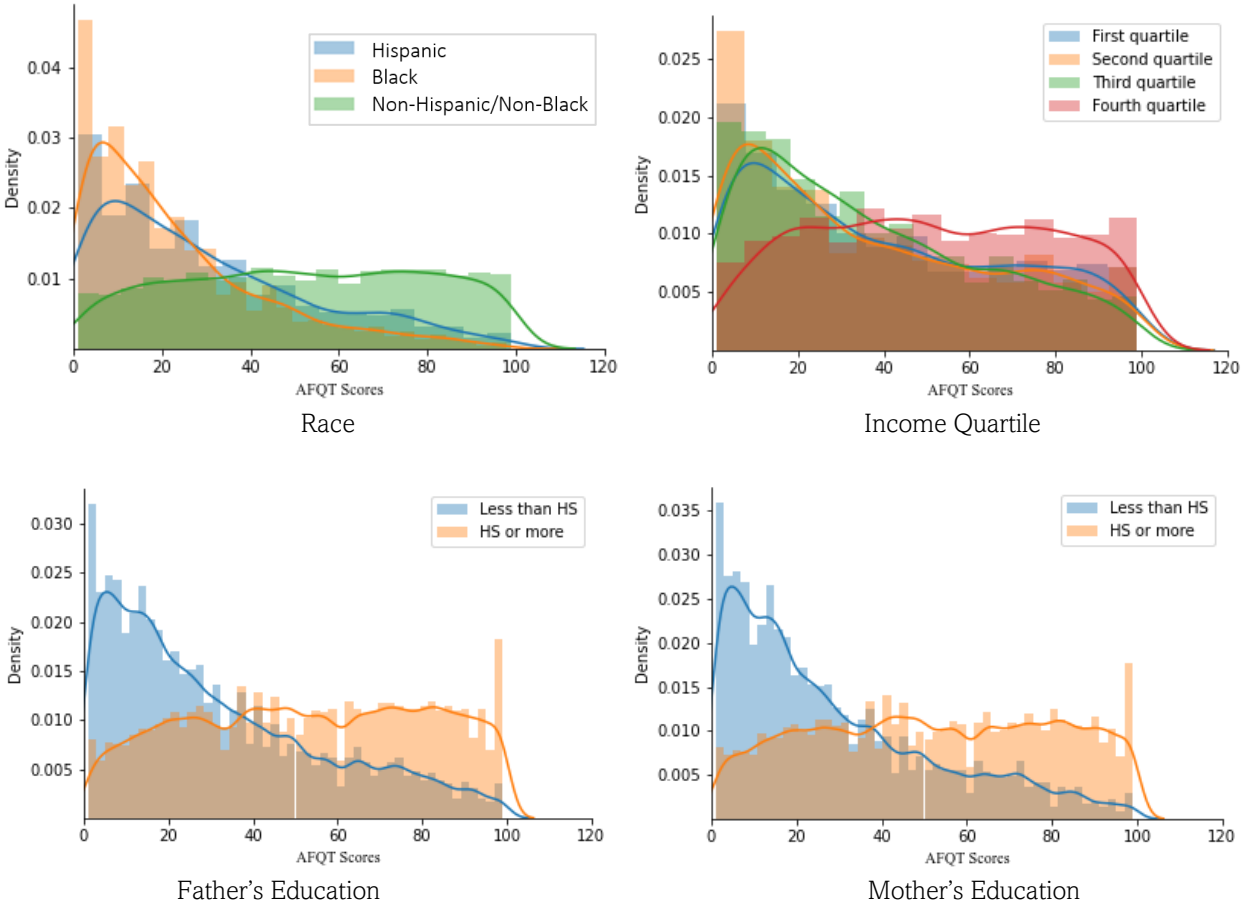
N = 11,424		AFQT Score (Aptitude)	Rosenberg Score (Self-Esteem)	Rotter Score (Internal Control)
Sample, score max-min:		1-99	9-30	4-16
Age in 1978				
13-17	5,501	35.3	21.7	9.0
		(26.5)	(4.0)	(2.3)
18-22	5,923	46.9	23.0	8.3
		(29.7)	(4.1)	(2.5)
Gender				
Male	5,706	41.3	22.5	8.6
		(29.7)	(4.1)	(2.4)
Female	5,718	41.3	22.2	8.7
		(27.9)	(4.2)	(2.4)
Race / Ethnicity				
Hispanic	1,737	30.1	21.6	9.1
		(24.1)	(4.0)	(2.4)
Black	2,894	22.7	22.5	9.0
		(20.2)	(4.1)	(2.3)
Other	6,793	52.1	22.6	8.4
		(27.8)	(4.1)	(2.4)
Net Family Income in 1978				
Quartile 1	2,775	39.6	22.2	8.7
		(29.2)	(4.1)	(2.4)
Quartile 2	2,813	37.19	22.3	8.8
		(29.0)	(4.2)	(2.5)
Quartile 3	2,885	36.9	22.2	8.8
		(26.8)	(4.1)	(2.4)
Quartile 4	2,951	51.2	22.9	8.4
		(27.7)	(3.9)	(2.4)
Mother's Education				
Less than HS	4,543	28.8	21.56	9.0
		(24.1)	(4.1)	(2.4)
More than HS	6,210	52.0	23.1	9.1
		(28.0)	(4.0)	(2.4)
Father's Education				
Less than HS	4,175	31.5	21.7	9.0
		(25.3)	(4.1)	(2.4)
HS or more	5,681	52.8	23.1	8.3
		(27.9)	(4.0)	(2.4)

Notes: Attitude scores are measured in 1980 as survey questions; aptitude score is measured in 1979. One individual aged 23 was dropped. The "Other" racial demographic includes those who do identify not as Hispanic nor Black; this is a construct of NLSY79. Income quartiles are for total net family income in the calendar year 1978, not adjusted to 2020 dollars; quartile 1: $0 - $5,900, quartile 2: $5,900 – $10,700, quartile 3: $10,700 - $20,000, quartile 4: $20,000 - $75,001. Standard deviations are in parenthesis.

As shown above, the greatest baseline differences in scores among various subgroups are in relation to the AFQT aptitude score. Here, older individuals, individuals with higher family income, and individuals whose parents have higher educational attainment on average score higher on the AFQT. For measures of attitude, however—the Rosenberg Scale and Rotter Scale—there is no discernable difference among subgroups' scores on average at baseline.

AFQT score distributions are depicted graphically in Figure 1 to provide further understanding of how these distributions differ by race, income, and parental education. In the top left panel, the score distributions for Hispanic and Black individuals are somewhat similar and skew to the right; for non-Black/non-Hispanic individuals, the distribution is even. By income quartile, scores for individuals in the lowest income quartiles skew to the right, as they do for individuals whose mother's and father's educational attainment is less than a high school degree.

Figure 1. Distribution of aptitude scores (AFQT) by race, income, and parental education



Race

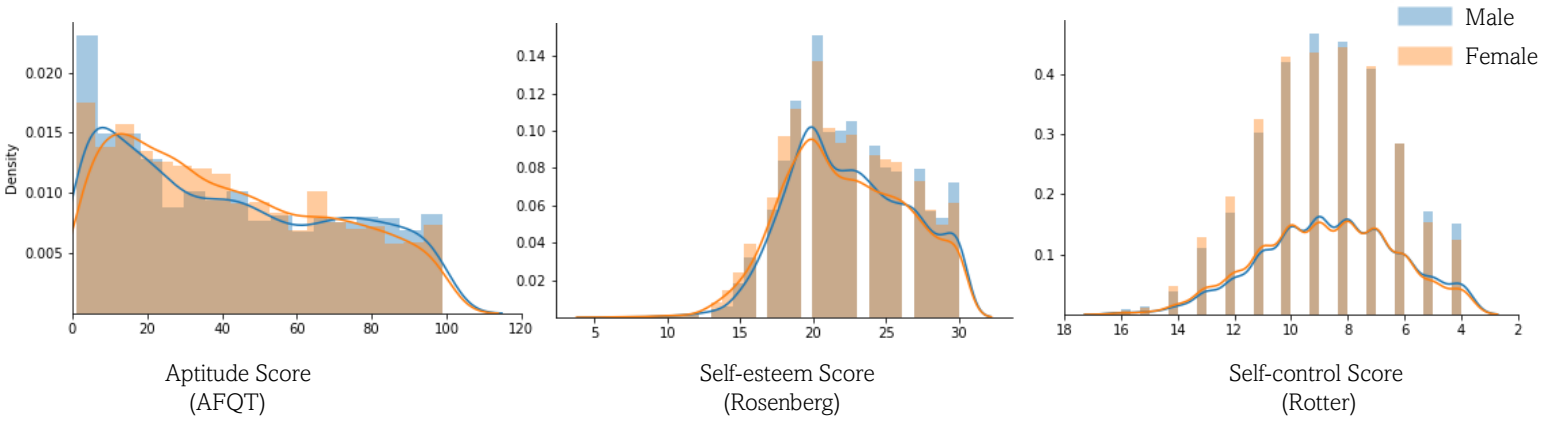
Income Quartile

Father's Education

Mother's Education

To further examine the basic relationship between these aptitude and attitude measures and gender, Figure 2 shows the distribution of scores for the AFQT, Rosenberg Scale, and Rotter Scale. While the mean scores did not differ between males and females significantly, given the differential outcomes between men and women often observed in the labor force—such as by average wages—I report the more detailed score distributions, nonetheless. The story remains the same.

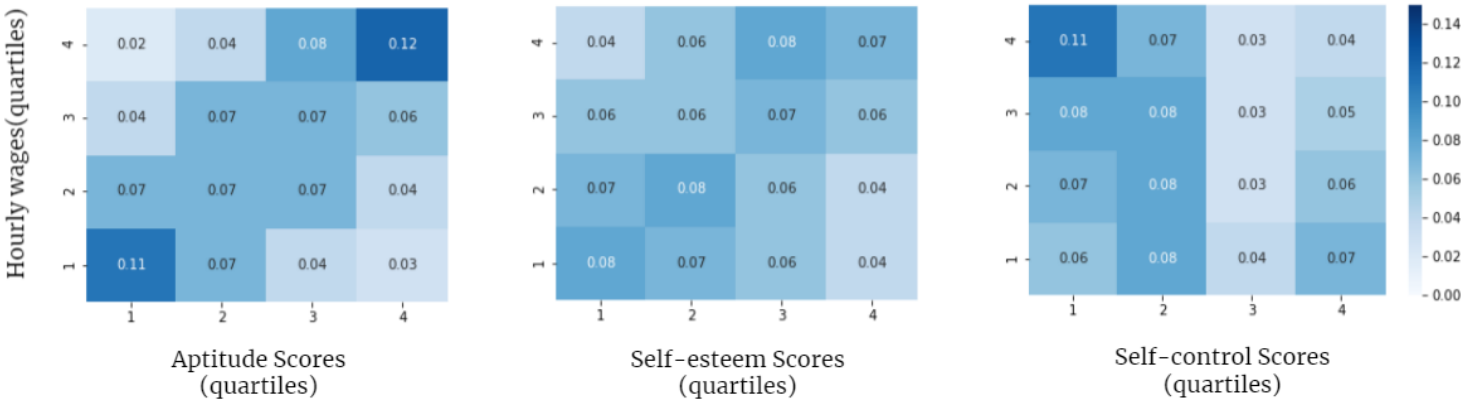
Figure 2. Distribution of aptitude and attitude scores by gender (NLSY79)



To examine the basic relationship between these early adulthood measures of aptitude / attitude and later life labor market outcomes, Figure 3 shows correlations between individuals' aptitude and attitude scores and hourly wages at age 47. In these plots, the full sample is grouped by quartiles for both their aptitude and attitude measure scores and for hourly wages. An indication of a strong correlation would be a deep blue color that begins in the lower left-hand corner of each plot and extends diagonally through to the upper right-hand corner of each plot. The scale of correlation on the far right that indicates a range from which measures are not correlated (light blue) to highly correlated (dark blue) is a measure that normalizes each axis score.

As can be seen in the left-hand plot, the strongest correlation between early life measures and later life hourly wages is for aptitude (AFQT) scores. There is a strong positive correlation between the AFQT score and hourly wages: as aptitude increases, later-life hourly wages increase. This relationship appears to exist for the attitude measure of self-esteem, the Rosenberg Scale, seen in the middle plot, though it is not as strong. No relationship appears to exist at this basic level for the Rotter Score attitude measure of feeling in control over one's own outcomes in life.

Figure 3. Correlation between respondents' hourly wage quartile at age 47 and initial aptitude and attitude measures



Concluding Thoughts and Limitations

This preliminary examination did confirm that attitude in early adulthood—namely, one's self-esteem—may play a role in later life labor market outcomes. While the correlation between a respondent's Rosenberg Scale score and hourly wages did exist, it is not yet possible to say in any sense how one measure may be causally related to the other. An individual's self-esteem may indirectly impact an individual's hourly wages through other channels; for example, parallel to forthcoming research by Wang, Glied, and Frank on early life depression, early life self-esteem may be related to greater or poorer human capital accumulation that has lasting effects on labor market outcomes.

In relation to aptitude scores, parents' educational attainment had a strong relationship to AFQT scores, as did race and income level, making these factors worth controlling for in subsequent analyses. Because AFQT scores differed by more than ten percentage points based on age, it is likely worth grouping separately those who were older when their scores were generated and those who were younger when their scores were generated in order to account for the role that differences in age and experience may have played for those two groups.

While it has already been expressed that this analysis is preliminary, I make the point again that the correlations in this exploratory analysis cannot be taken as causal. A separate limitation that has not yet been accounted for and will need to be in subsequent analyses are for are underlying economic conditions. Because this dataset covers the period of the Great Recession, regional unemployment rates should be added and included when examining labor market outcomes.

A final consideration for subsequent analyses would be to compare the returns to aptitude and attitude measures to the NLSY97 survey. Deming (2017) tests directly for the growing importance of social skills by comparing the returns to skills in the NLSY79 and NLSY97 surveys and finds that social skills are a significantly more important predictor of full-time employment and wages in the NLSY97 cohort.[x] Because I have not linked to the NLSY97 survey, this analysis would be unable to make those same comparisons as currently stands.

[i] "The Future of Jobs Report 2020." The World Economic Forum. October 2020. Available here: http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf

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[iii] Autor David, and Anna Salomons. (2018). "Is Automation Labor-Displacing: Productivity Growth, Employment and the Labor Share" Brookings Papers on Economic Activity, Spring, pp. 1-63

[iv] "The State of American Jobs." Pew Research Center. October 6, 2016. Accessed July 22, 2021. Available here: https://www.pewresearch.org/social-trends/2016/10/06/the-state-of-american-jobs/

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[vi] David J. Deming, (2017). The Growing Importance of Social Skills in the Labor Market, *The Quarterly Journal of Economics*, 132:4, pgs. 1593–1640. https://doi.org/10.1093/qje/qjx022

[vii] Aptitude, Achievement, and Intelligence Scores. National Longitudinal Surveys. Bureau of Labor Statistics. Accessed on July 22, 2021. Available here: https://www.nlsinfo.org/content/cohorts/nlsy79/topical-guide/education/aptitude-achievement-intelligence-scores

[viii] Buser Thomas, Niederle Muriel, and Oosterbeek Hessel. "Can Competitiveness predict Education and Labor Market Outcomes? Evidence from Incentivized Choice and Survey Measures." June 2021. NBER Working Paper No. 28916. https://www.nber.org/system/files/working_papers/w28916/w28916.pdf

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[x] David J. Deming, The Growing Importance of Social Skills in the Labor Market, The Quarterly Journal of Economics, Volume 132, Issue 4, November 2017, Pages 1593–1640, https://doi.org/10.1093/qje/qjx022