Scientific Research Publishing

Psychology, 2025, 16(10), 1105-1114
https://www.scirp.org/journal/psych
ISSN Online: 2152-7199
ISSN Print: 2152-7180

A Brief Analysis of the Relationship between Intelligence and Achievement

Kevin Patrick Barman

Drug Studies, Human Services Rio Hondo College, Whittier, CA, USA
Email: kbarman@riohondo.edu

How to cite this paper: Barman, K. P. (2025). A Brief Analysis of the Relationship between Intelligence and Achievement. *Psychology, 16,* 1105-1114.
https://doi.org/10.4236/psych.2025.1610063

Received: September 4, 2025
Accepted: October 6, 2025
Published: October 9, 2025

Abstract

For over a hundred years, social scientists have been measuring intelligence in human beings in order to predict academic achievement and occupational success. Indeed, intelligence is the best single predictor of major socioeconomic outcomes, both favorable (good education, occupation, income) and unfavorable (adult poverty, incarceration, chronic welfare use) (Gottfredson, 2002). This literature review examines the relationship between intelligence and key life outcomes, including academic achievement and occupational success. The paper discusses concepts such as general cognitive ability (g), general mental ability (GMA), the influence of genetics and environment via the bioecological model, and the role of confounding factors like socioeconomic status (SES), years of education, and delinquency. It concludes that intelligence is a strong predictor of success, while also acknowledging the ongoing debate about the influence of SES on educational testing and outcomes.

Keywords

Intelligence, Cognitive Ability, General Mental Ability, Psychometrics

1. Introduction

Overall, it appears that there are strong indicators that suggest that achieving significant academic and occupational success is largely determined by multiple and complex factors that contribute to the development of an individual's intelligence.

Many social scientists believe that the abilities required for occupational success differ from what is necessary to achieve success in school. So far, this belief has not been supported by any empirical evidence. Over 100 years ago, research demonstrated that general cognitive ability, or *g*, predicts a wide range of important life outcomes, behaviors, and performances. A particularly powerful demonstration of the influence of *g* comes from Jencks et al. (1979), who showed that even

with background and socioeconomic status (SES) controlled, cognitive ability measured at adolescence predicted occupational attainment. Cognitive ability "is to psychology as carbon is to chemistry" (Brand, 1987) because it truly impacts virtually all aspects of our lives. Whereas general mental ability (GMA) plays a central role in human cognition and learning and refers to specific aptitudes, and abilities, personality traits, interests, values, and other traits showing important differences between individuals and groups (Spearman, 1904). It has also been found that GMA predicts occupational level attained, and job performance within jobs and occupations (Schmidt & Hunter, 2004).

2. Cognitive Ability

A study was conducted to evaluate whether a single test Miller Analogies Test (MAT) (Miller, 1960) of cognitive ability that was developed for use in educational settings is predictive of behaviors, performances, and outcomes in both educational and occupational settings Kuncel et al. (2004). The validity of the MAT for predicting 18 academic and work-related criteria was examined. MAT correlations with other cognitive tests (e.g., Raven's Matrices (Raven, 1965)); Graduate Record Examination was meta-analyzed to assess cognitive ability. They then reported meta-analyses examining the validity of the MAT for predicting multiple criteria in academic and work settings, including evaluations of career potential and creativity.

The results of this study revealed that MAT is a valid predictor of several aspects of graduate school performance as well as measures of job performance. The validity was at least as high for work criteria as for school criteria. The MAT was a valid predictor of seven of the eight measures of graduate student performance (average p = .32), five of the six school to work transition performance criteria (average p = .29) and all four of the work performance criteria (average p = .37). Therefore, these findings, along with strong correlations between the MAT and other cognitive ability tests from educational and work settings, provide evidence that *g* is related to both success in school and job performance.

General Mental Ability

Over 100 years ago Charles Spearman (1904), introduced the psychological construct of general mental ability (GMA) and suggested it is involved as a complex part of human reason and understanding. General mental abilities describe particular aptitudes, abilities, personality traits, interests, values, and other traits displaying essential variations among individuals and groups.

In research conducted by Schmidt & Hunter (2004), they first present evidence indicating that GMA predicts occupational level attained. They then reviewed research evidence showing that GMA predicts job performance within jobs and occupations for both military and civilian occupations. Third, they examined other variables (e.g. personality traits, specific aptitudes, and job experience) that affect job performance and show that these factors exert weaker effects on both occupational level and job performance than GMA. Lastly, they describe a theory of job

performance that explains these findings.

The authors of this study examined both cross-sectional and longitudinal studies that yielded significant results. First, cross-sectional findings of the U.S. Department Employment Service database on the General Aptitude Test Battery (GATB), (Hunter, 1980) and samples of draftees from the two world wars showed an individual correlation between the GMA measure derived from that test battery and occupational level was .65. While data from the military demonstrated an increase in mean GMA scores as occupational level increases. Second, longitudinal studies demonstrated that GMA measured earlier in life predicts later occupational attainment (Wilk, Desmaris, & Sackett, 1995), using the 3,887 young adults in the National Longitudinal Survey-Youth Cohort (NLSY) (Center for Human Resource Research, 1989) where the following information was obtained, it revealed that throughout the 5-year duration of study between 1982 to 1987, GMA analyzed in 1980 projected upward mobility in job advancement. Therefore, the data from this scientific research propose a theory that GMA predicts both the occupational level attained by individuals and their performance within their occupation.

3. Psychometrics

At present, psychometrics studies the patterns of correlations between cognitive measures and biological measures and how these measures relate to outcomes of success in college or job performance. It is psychometric researchers who propose that adequate measures of *g*, or general intelligence, are the best predictors of educational attainment, success in job training, job performance, occupational attainment, and social outcomes ranging from the likelihood of criminality to scoring high on the middle-class values index (Herrnstein & Murray, 1994; Jensen, 1998). Even when a cognitive test only modestly correlates with a criterion like job performance (a typical correlation is only around. 3), the use of the tests by employers for screening potential job applicants can save employers significant amounts of money.

Many tests used by psychometricians such as the General Aptitude Test and Employment Screening Battery, and the Scholastic Assessment Test are not referred to as IQ tests. These tests were specifically developed to serve as IQ tests for certain populations. Their factor structures, though, are similar to IQ tests, and they also strongly correlate with standard IQ tests.

4. Genetic Influence

It is also important to discuss that the strong genetic foundation for IQ comes from the large number of behavioral genetic studies that have found IQ to be highly heritable, with estimates ranging from .4 to .8 depending on the sampling method used for heritability (Herrnstein & Murray, 1994).

A variety of biological processes have also been found to correlate with measures of *g*. It has been suggested that *g* is strongly a reflection of individual differences

in the efficiency, capacity, and power of the nervous system with respect to its information processing functions (Jensen, 1998). It has been proposed that individual differences in *g* are related to genetically based aspects of brain physiology that influence the effectiveness of neural information processes (Jensen, 1997). Jensen (1998) also reported that brain size (within each gender), metabolic rate, nerve conduction velocity, and the latency and amplitude of evoked electrical potentials are all modestly correlated with *g*. Jensen (1998) also suggests that racial differences in *g* are largely due to genetic differences between groups, but interestingly enough, the relative roles of genes and environment can never be fully determined.

5. Bioecological Model

According to the bioecological view of intelligence, there is not simply one genetically determined intellectual force like the *g* factor underlying all intelligent performance (Ceci, 1996). Rather, it is argued that (a) there are multiple cognitive potentialities that are, for all practical purposes, independent of each other; (b) contexts are essential crystallizers and elicitors of those cognitive potentials; and (c) motivation plays an integral role in the acquisition and later elicitation of these cognitive potentials (Ceci, Nightingale, & Baker, 1993).

The bioecological model does not deny that genetics plays a role in the development of cognitive potentials, although heritability is regarded as a measure of the proportion of individual differences attributable to actualized genetic potential, with the proportion of unactualized genetic potential being both unknown and unknowable (Bronfenbrenner & Ceci, 1994). From this model, it has been suggested that through proximal processes, or the progressive and complex interaction between a developing person and other people, objects, or symbols in his environment, are the mechanisms by which human genetic potential, including cognitive potential, is actualized. It is only in good environments with good proximal processes that genetic differences between people will increase because a larger proportion of individual differences can be attributed to actualized genetic potential. Therefore, heritability estimates in environments favorable to development will be larger. This has been shown in studies that have compared heritability coefficients in different environments, larger heritability coefficients have been observed in enriched environments than in deprived ones (Bronfenbrenner & Ceci, 1994).

There is evidence that adopted children have IQ scores higher than would have been expected if they had been raised by their low-IQ biological mothers. A study found that lower (SES) African-American children who had been adopted into Caucasian, middle-class (SES) households did not perform as well as the biological offspring of their adoptive parents, but they performed well above the mean for African-American and interracial children who had been reared in the African-American community (Weinberg, Scarr, & Waldman, 1992). The authors concluded that these results contributed to \"additional support for the beneficial ef-

fects of being reared in the culture of tests and schools \" (Scarr, Weinberg, & Waldman, 1993). As a result, adoptees benefited from their adoptive environment even though genetics affected the rank ordering of their gains, resulting in heritability estimates that \"clustered around 0.5\" (Scarr, Weinberg, & Waldman, 1993). Therefore, estimates of heritability that are dispersed around 0.5 for traits like intelligence may demonstrate that 50% of the variation in IQ among the studied adoptees may be assigned to genetic variations, while the remaining 50% is attributed to environmental influences. It is also essential to note that heritability appraisals apply to a population, not an individual, and can differ based on the particular group or environment being investigated.

In the *Bell Curve*, Herrnstein & Murray (1994) asked the rhetorical question \"Is it better to be born rich than smart?\" and replied that the answer is smart. In their analyses of the National Longitudinal Survey of Youth 1979 Cohort (NLSY), the Armed Forces Qualifications Test (AFQT) was a stronger predictor of a wide variety of social outcomes, from chances of being in poverty to having a high score on a middle-class values index, then was parental socioeconomic status (SES) as measured by an index of the parents' income, occupational status, and educational attainment.

The bioecological perspective suggests that education also plays an important causal role in determining both IQ scores and later life outcomes. Ceci (1991, 1996) reviewed a substantial body of evidence revealing that schooling accounts for an important part of the variance in children's IQ and suggested that IQ tests may be looked upon primarily as an index of academic achievement. According to Ceci (1991, 1996), it is schooling that permits the acquisition of a knowledge base that is tested by IQ tests. This has been shown in a number of studies that have discovered that the quantity of education a person receives can have a direct influence on IQ (reviewed in Ceci, 1991).

There appears to be a correlation between years of schooling and *g* that was also demonstrated by the bioecological approach to intelligence. It has been shown that simply staying in school is associated with lower rates of teen pregnancy, welfare dependency, and criminality, as well as higher earnings over the course of a lifetime for each year of schooling completed (Bronfenbrenner & Ceci, 1994). These findings simply suggest that people who get more schooling tend, on average, to be smarter than those who drop out of the educational system. It suggests that IQ and schooling are strongly correlated. A review of 16 studies also found strong correlations between measures of *g* and years of completed education that fall between .5 and .9 (Ceci, 1991). Therefore, we can identify a strong linear relationship between years of schooling and *g.*

6. Longitudinal Studies of Intelligence

In a separate study, the authors used data acquired on (WISC-R) from children aged 8 - 9 years and a range of educational and social adjustment measures over the course of a 25-year longitudinal study of a birth cohort of 1265 children. This

study revealed that intelligence measured in middle childhood had pervasive associations with later educational achievements university entrance, degree attainment, employment, and income (Caspi et al., 1998). Overall, increasing IQ was associated with increasing educational success at school, higher rates of post-school educational vocational attainment, degree success, lower rates of unemployment, and higher income at age 25. While statistical analysis controlled for factors including early conduct problems, family, social, and childhood circumstances failed to explain these associations, supporting the view that intelligence had a direct relationship to later educational, occupational, and related outcomes independently of other childhood traits and family environment.

7. Delinquency and Intelligence

A number of studies have demonstrated a negative relationship between IQ and delinquency. A review of multiple studies identified the correlation between IQs of juvenile delinquents, which were found to be significantly lower than the IQs of comparison groups (Hirschi & Hindelang, 1997). An additional study identified that delinquents have also been found to be lower in IQ than nondelinquents in prospective longitudinal studies (Kirkegaard-Sorenson & Mednick, 1977).

Two Danish longitudinal studies (Shulsinger et al., 1981) were analyzed and revealed that low IQ is related to delinquent involvement independently of the effects of SES. They both proposed that there is a correlation between low IQ children who may be more likely to engage in delinquent behavior because their poor abilities limit their opportunities to obtain rewards in the school environment. The negative correlation with the amount of delinquent involvement was found with WISC Verbal IQ and WISC Full Scale IQ, but not with WISC Performance IQ. Most studies have found a correlation between delinquents who scored average in nonverbal IQ and below average in verbal IQ. Verbal abilities in school are probably the most effective means of obtaining reinforcement. Therefore, children who possess a low verbal IQ may lack the abilities to acquire the rewards in school. Thereby, there is a correlation between children who have a low verbal IQ, who are more likely to be frustrated and fail at a higher rate than other children. This may contribute to delinquency by creating a negative attitude towards authority, by encouraging a child to seek rewards in less socially desirable settings, or make a child more sensitive to delinquent peer pressure when peers provide an important source of self-esteem.

8. Social Status and Intelligence

Neisser et al. (1996), proposed the question "How well do IQ scores predict such outcome measures as the social status or income of adults?" As expected, this question is a complex one and in order to adequately respond to it, another variable must be explored. The variable in question is the socioeconomic (SES) status of an individual's parents that can also predict the social status or income of an adult.

Accordingly, it appears that children of privileged families are more likely to attain higher status than those whose parents are poor and less educated. These two predictors (IQ and parental SES) are by no means independent of one another; the result was a moderate correlation between them of .33 (White, 1982).

9. Educational Testing

Some critics of educational testing, as reported by Sackett et al. (2009), suggest that tests measure nothing more than socioeconomic status (SES) and their validity is a result of socioeconomic status. Another assertion among test critics is that test scores used for college admissions measure nothing more than socioeconomic status (SES). An example of this claim is drawn from Zwick (2002), including the claim that \"in the interest of the truth of advertising, the SAT should simply be called a wealth test \" (Zwick, 2002), that the SAT merely measures the size of students' houses (Kohn, 2001), and that the only thing the SAT predicts well now is socioeconomic status. What is implied from these critics is that socioeconomic status (SES) has an artificial effect on test scores, where high SES leads to higher test scores but not to higher standing on the characteristic that the test is intended to measure. Critics further maintain that it is only the developed abilities that are relative to academic performance that are measured in educational tests such as the SAT. According to Sackett et al. (2009), grading is biased in favor of high-SES students, since SES inflates both test scores and grades of high-SES students and deflates both test scores and grades of low-SES students, then a test that is, in fact, completely invalid as a predictor of academic performance will appear valid as a result of the common effects of SES on both test scores and grades.

Therefore, according to critics' educational tests like the SAT, only measure the academic ability of those who benefit most from learning how to perform most effectively on those educational tests, which are those students who come from privileged backgrounds and have enjoyed high socioeconomic status (SES). According to the data, it is whether an individual comes from high-SES or low-SES that predicts academic ability based on an educational test such as the SAT, rather than the SAT predicting academic success of those who come from either low-SES or high-SES. Therefore, academic success has a low to moderate relationship in shaping one's socioeconomic status (SES) (Sackett et al., 2009). Primarily because their validity is the product of (SES) (Sackett et al., 2009).

10. Conclusion

In summary, it appears that there is empirical evidence based on correlational data that supports the relationship among intelligence and academic achievement and occupational success. For over a hundred years, social scientists have been measuring intelligence in human beings in order to predict academic achievement and occupational success. It has been shown that tests that measure cognitive and general mental abilities, such as the Miller Analogies Test (MAT) and General Aptitude Test Battery (GATB), are strong predictors of academic

and occupational success. Further studies have been conducted by psychometric researchers who propose that adequate measures of *g*, or general intelligence, are the best predictors of educational attainment, success in job training, job performance, occupational attainment, and social outcomes ranging from likelihood of criminality to scoring high on middle-class values index (Herrnstein & Murray, 1994; Jensen, 1998). It is also important to consider the bioecological model of intelligence which suggests that, only in good environments with good proximal processes, genetic differences between people will increase because a larger proportion of individual differences can be attributed to actualized genetic potential. The bioecological perspective also proposes that education plays an important causal role in determining both IQ scores and later life outcomes. Another suggestion for future studies is to acknowledge how the g-factor model of intelligence emphasizes the interior, physiological foundation of general cognitive ability, whereas the bioecological approach focuses on the external multidimensional environmental influences that shape human development. Therefore, it would be prudent to combine the two perspectives and analyze how an individual's innate cognitive ability interrelates with their proximate environment throughout their lifetime to create more promising developmental results. It is also important to acknowledge the challenges of distinguishing between the influence of genetics and environment when evaluating the effects genetics and environment have on individual variables, along with the reliance on correlational data that demonstrate the relationship between the different variables but do not show causation. Lastly, many critics of measures of educational testing maintain that researchers do not account for the tremendous influence of socioeconomic status (SES). In many studies reviewed in this paper, it has been observed that researchers have controlled for the effect of socioeconomic status (SES) and its influence on predicting academic and occupational success. Overall, many critics believe that socioeconomic status (SES) does not predict academic success because of the biases of the American class system. According to the data, it is whether an individual comes from high-SES or low-SES that predicts academic ability based on an educational test such as the SAT, rather than the SAT predicting the academic success of those who come from either low-SES or high-SES. Even though it may be a predictor, academic success has only a low to moderate correlation with determining a person's socioeconomic status (SES) over a lifespan. Due to the fact that their validity is the result of (SES) (Sackett et al., 2009). It appears that intelligence is a strong predictor of success, it is also important to continue to examine the effect of SES on educational testing and outcomes. In order to design more effective educational tests that may lead to more productive outcomes for an individual's potential for academic success.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Brand, C. (1987). The Importance of General Intelligence. In S. Modgil, & C. Modgil (Eds.), *Arthur Jensen: Consensus and Controversy* (pp. 251-265). Palmer.

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-Nurture Reconceptualized in Developmental Perspective: A Bioecological Model. *Psychological Review, 101,* 568-586. https://doi.org/10.1037/0033-295x.101.4.568

Caspi, A., Wright, B. R. E., Moffitt, T. E., & Silva, P. A. (1998). Early Failure in the Labor Market: Childhood and Adolescent Predictors of Unemployment in the Transition to Adulthood. *American Sociological Review, 63,* 424-451. https://doi.org/10.2307/2657557

Ceci, S. J. (1991). How Much Does Schooling Influence General Intelligence and Its Cognitive Components? A Reassessment of the Evidence. *Developmental Psychology, 27,* 703-722. https://doi.org/10.1037/0012-1649.27.5.703

Ceci, S. J. (1996). *On Intelligence: A Bio-Ecological Treatise on Intellectual Development*. Harvard University Press.

Ceci, S. J., Nightingale, N. N., & Baker, J. G. (1993). The Ecologies of Intelligence: Challenges in Traditional Views. In D. K. Detterman (Ed.), *Current Topics in Human Intelligence: Vol. 2. Is Mind Molecular or Unitary?* (pp. 61-82). Ablex.

Center for Human Resource Research (1989). *The Future of NLS Research.* The Ohio State University.

Gottfredson, L. S. (2002). Intelligence: Is It the Epidemiologists' Elusive "Fundamental Cause" of Social Class Inequalities in Health? *Journal of Personality and Social Psychology, 86,* 174-199.

Herrnstein, R. J., & Murray, C. (1994). *The Bell Curve*. The Free Press.

Hirschi, T., & Hindelang, M. J. (1977). Intelligence and Delinquency: A Revisionist Review. *American Sociological Review, 42,* 571-587. https://doi.org/10.2307/2094556

Hunter, J. E. (1980). *Test Validation for 12,000 Jobs: An Application of Synthetic Validity and Validity Generalization to the General Aptitude Test Battery (GATE).* U.S. Department of Labor.

Jencks, C., Baiilett, S., Coreoran, M., Crouse, J., Eaglesfield, D., Jackson, G., et al. (1979). *Who Gets Ahead? The Determinants of Economic Success in America*. Basic Books, Inc.

Jensen, A. R. (1997). The Neurophysiology of G. In C. Cooper, & V. Varma (Eds.), *Processes and Individual Differences* (pp. 108-125). Routledge.

Jensen, A. R. (1998). *The G Factor: The Science of Mental Ability*. Praeger Publishers/Greenwood Publishing Group.

Kirkegaard-Sorenson, L. D., & Mednick, S. A. (1977). A Prospective Study of Predictors of Criminality: 2. A Description of Registered Criminality in the High-Risk and Low-Risk Families. In S. A. Mednick & K. O. Christiansen (Eds.), *Biosocial Basis of Criminal Behavior* (229-245). Gardner Press.

Kohn, A. (2001). *Two Cheers for the End of the SAT* (p. B-12). Chronicle of Higher Education.

Kuncel, N. R., Hezlett, S. A., & Ones, D. S. (2004). Academic Performance, Career Potential, Creativity, and Job Performance: Can One Construct Predict Them All? *Journal of Personality and Social Psychology, 86,* 148-161. https://doi.org/10.1037/0022-3514.86.1.148

Miller, W. S. (1960). *Technical Manual/or the Miller Analogies Test.* The Psychological Corporation.

Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, A. W., Brody, N., Ceci, S. J., et al. (1996). Intelligence: Knowns and Unknowns. *American Psychologist, 51,* 77-101.

https://doi.org/10.1037//0003-066x.51.2.77

Raven, J. C. (1965). *Progressive Matrices*. The Psychological Corporation.

Sackett, P. R., Kuncel, N. R., Arneson, J. J., Cooper, S. R., & Waters, S. D. (2009). Does Socioeconomic Status Explain the Relationship between Admissions Tests and Post-Secondary Academic Performance? *Psychological Bulletin, 135,* 1-22. https://doi.org/10.1037/a0013978

Scarr, S., Weinberg, R. A., & Waldman, I. D. (1993). IQ Correlations in Transracial Adoptive Families. *Intelligence, 17,* 541-555. https://doi.org/10.1016/0160-2896(93)90018-z

Schmidt, F. L., & Hunter, J. (2004). General Mental Ability in the World of Work: Occupational Attainment and Job Performance. *Journal of Personality and Social Psychology, 86,* 162-173. https://doi.org/10.1037/0022-3514.86.1.162

Shulsinger, F., Moffitt, T., Gabrielli, W., & Mednick, S. (1981). Socioeconomic Status, IQ, and Delinquency. *Journal of Abnormal Psychology, 90,* 152-156. https://doi.org/10.1037//0021-843x.90.2.152

Spearman, C. (1904). "General Intelligence", Objectively Determined and Measured. *The American Journal of Psychology, 15,* 201-293. https://doi.org/10.2307/1412107

Weinberg, R. A., Scarr, S., & Waldman, I. D. (1992). The Minnesota Transracial Adoption Study: A Follow-Up of IQ Test Performance at Adolescence. *Intelligence, 16,* 117-135. https://doi.org/10.1016/0160-2896(92)90028-p

White, K. R. (1982). The Relation between Socioeconomic Status and Academic Achievement. *Psychological Bulletin, 91,* 461-481. https://doi.org/10.1037/0033-2909.91.3.461

Wilk, S. L., Desmarais, L. B., & Sackett, P. R. (1995). Gravitation to Jobs Commensurate with Ability: Longitudinal and Cross-Sectional Tests. *Journal of Applied Psychology, 80,* 79-85. https://doi.org/10.1037/0021-9010.80.1.79

Zwick, R. (2002). Is the SAT a "Wealth Test"? *Phi Delta Kappan, 84,* 307-311. https://doi.org/10.1177/003172170208400411