Intelligence and Success

25

Tarmo Strenze

This chapter is about the relationship between intelligence and success. The central message of the chapter is simple: intelligent people are more successful than less intelligent people. The chapter will review the scientific evidence for that message and discuss some theoretical problems, in an attempt to show that the message is really not that simple. But at first we should probably ask: What is success?

Success can be defined as doing or achieving something that is generally considered desirable in the society. Naturally, there are many ways to be successful, and some of these ways may be in conflict with one another, so that achieving success in one field may restrict you from having success in another field. Some readers may be tempted to say that success is a purely subjective phenomenon, which each individual defines for oneself. That is certainly true, but it seems that there is usually a high degree of consensus in society as to what is desirable and what is not. Even if there are individuals who reject some form of success (for instance, claim that they do not care about money), that form of success still remains socially important and worthy of research.

T. Strenze, Ph.D. (✉)
Institute of Social Studies, University of Tartu, Estonia, Lossi 36-405, Tartu 51003, Estonia
e-mail: tarmo.strenze@ut.ee

Intelligence and Success: An Overview

So what is the evidence for the relationship between intelligence and success? Many readers would probably be convinced by specific examples of people who are known to be highly intelligent and who have achieved great success in some field. For instance, Bill Gates is rumored to have received an extremely high score on his college SAT,[1] which would mean that he also must have a very high IQ score. One can guess that Bill Gates' rise to one of the richest and most powerful men on earth must have something to do with his IQ. However, such cases never prove anything conclusively because we can always find some contrary examples. For instance, a legendary punk groupie Nancy Spungen had an IQ of 134, and still she became a drug addict and was expelled from school and, ultimately, from her own home by her own parents (Spungen 1983).

Instead of well-selected examples, we should look at the statistical relationships between intelligence and various forms of success. Such relationships have been examined in numerous studies, and it is not possible to review all of them here. This review will concentrate on meta-analyses because results from meta-analyses are

[1]The Biography Channel website. Retrieved Sep 01, 2013, from http://www.biography.com/people/bill-gates-9307520

S. Goldstein et al. (eds.), *Handbook of Intelligence: Evolutionary Theory, Historical Perspective, and Current Concepts*, DOI 10.1007/978-1-4939-1562-0_25,

Table 25.1 Relationship between intelligence and measures of success (Results from meta-analyses)

Measure of success	r	k	N	Source
Academic performance in primary education	.58	4	1,791	Poropat (2009)
Educational attainment	.56	59	84,828	Strenze (2007)
Job performance (supervisory rating)	.53	425	32,124	Hunter and Hunter (1984)
Occupational attainment	.43	45	72,290	Strenze (2007)
Job performance (work sample)	.38	36	16,480	Roth et al. (2005)
Skill acquisition in work training	.38	17	6,713	Colquitt et al. (2000)
Degree attainment speed in graduate school	.35	5	1,700	Kuncel et al. (2004)
Group leadership success (group productivity)	.33	14		Judge et al. (2004)
Promotions at work	.28	9	21,290	Schmitt et al. (1984)
Interview success (interviewer rating of applicant)	.27	40	11,317	Berry et al. (2007)
Reading performance among problem children	.26	8	944	Nelson et al. (2003)
Becoming a leader in group	.25	65		Judge et al. (2004)
Academic performance in secondary education	.24	17	12,606	Poropat (2009)
Academic performance in tertiary education	.23	26	17,588	Poropat (2009)
Income	.20	31	58,758	Strenze (2007)
Having anorexia nervosa	.20	16	484	Lopez et al. (2010)
Research productivity in graduate school	.19	4	314	Kuncel et al. (2004)
Participation in group activities	.18	36		Mann (1959)
Group leadership success (group member rating)	.17	64		Judge et al. (2004)
Creativity	.17	447		Kim (2005)
Popularity among group members	.10	38		Mann (1959)
Happiness	.05	19	2,546	DeNeve & Cooper (1998)
Procrastination (needless delay of action)	.03	14	2,151	Steel (2007)
Changing jobs	.01	7	6,062	Griffeth et al. (2000)
Physical attractiveness	−.04	31	3,497	Feingold (1992)
Recidivism (repeated criminal behavior)	−.07	32	21,369	Gendreau et al. (1996)
Number of children	−.11	3		Lynn (1996)
Traffic accident involvement	−.12	10	1,020	Arthur et al. (1991)
Conformity to persuasion	−.12	7		Rhodes and Wood (1992)
Communication anxiety	−.13	8	2,548	Bourhis and Allen (1992)
Having schizophrenia	−.26	18		Woodberry et al. (2008)

r correlation between intelligence and the measure of success, *k* number of studies included in the meta-analysis, *N* number of individuals included in the meta-analysis

more reliable than results from single studies. Table 25.1 presents a list of meta-analytic correlations between IQ scores and a number of outcomes that can reasonably be designated as "success" (or lack of success). Of course, several important forms of success have never been subjected to meta-analysis and are, consequently, absent from Table 25.1; on the other hand, some forms of success have been meta-analyzed more than once, in which case I used the largest meta-analysis.

Overall, it is evident from Table 25.1 that intelligence tends to be positively correlated with desirable outcomes and negatively correlated with undesirable outcomes. Let us take a closer look at some of the outcomes in Table 25.1. One of the most classical outcomes of intelligence is academic performance, typically measured by grade point average or a specific academic test. It is classical because IQ testing was originally invented to predict academic success of students, so it is no surprise that its correlation with intelligence is positive. However, the correlation is perhaps not as strong as one might have expected. Only among elementary school students is the correlation really noteworthy (.58); among high

school and college students, it is much lower (0.24 and 0.23). This result goes against the claim of some critics (e.g., McClelland 1973) that IQ test is nothing else but a test of school learning. But why is the correlation weaker on higher educational levels? The answer probably has to do with decreasing variance: as people move from elementary education to secondary and tertiary education, less intelligent students are excluded with each transition, reducing the variance of intelligence and thereby also its correlation with academic performance.

A highly desirable form of success in the modern world is career success (or socioeconomic success). In Table 25.1, it is represented by education, occupation, income, and promotions. All these things are positively correlated with intelligence – correlation with educational attainment is among the strongest correlations in Table 25.1 (0.56), correlation with occupational attainment is also strong (0.43), and income and promotions have somewhat weaker correlations (0.20 and 0.28). These results mean that intelligent people generally occupy higher positions in society. A society with such IQ-based stratification is called meritocracy (Young 1958) and is often considered to be a fair and efficient form of society, because people are allowed to achieve positions that correspond to their talents, as opposed to being allocated to positions according to their social origin (position of parents), race, or gender. There has been quite a lot of dispute on how meritocratic contemporary western society really is. In 1994, Herrnstein and Murray published a book called *The Bell Curve* that became notorious for claiming that, in the United States, intelligence has a considerably stronger effect on various forms of success than social origin and that American society is moving toward IQ-based class system. Saunders (1997) found that the same might be true for Great Britain. Such results imply that society is rather meritocratic. However, critics have argued that these studies overestimated the effect of intelligence and underestimated the effect of social origin (Breen and Goldthorpe 1999; Fischer et al. 1996).

Another important form of success is job performance, a measure of how well a worker performs his or her work tasks. That is obviously of great relevance to organizations, and much research has been devoted to finding good predictors of job performance. Positive correlations with supervisory ratings of job performance (0.53) and work sample tests (0.38) in Table 25.1 demonstrate that intelligent people are good workers, and IQ tests are, therefore, good personnel selection devices. Indeed, some researchers believe that IQ tests are the best personnel selection devices available (Schmidt and Hunter 1998). An interesting finding is that IQ tests are better predictors of performance among cognitively complex jobs, compared to less complex jobs (Ones et al. 2005). This means that IQ tests are very useful in selecting good engineers, architects, or dentists (cognitively complex jobs according to Roos and Treiman 1980); IQ tests are less useful for selecting good dishwashers, weavers, or garbage collectors, although, even among dishwashers, it is obvious that an intelligent worker is better than a less intelligent one.

Some correlations in Table 25.1 are not quite as expected. For instance, the correlation with happiness is only 0.05. One might wonder, if intelligent people are so successful in achieving desirable goals, then how come they are not significantly happier than less intelligent people? The answer to this is simple. According to some prominent theories of happiness (see Diener et al. 1999), the personal level of subjective well-being is actually rather stable and not much dependent on life events. Happiness is like a personality trait; you either have it or not, and things you achieve in life (or fail to achieve) will not affect it very strongly.

Another surprising result in Table 25.1 is the positive correlation with anorexia nervosa (0.20). Most studies have found that intelligent people are healthier and live longer than less intelligent people (Calvin et al. 2010), so why are they more likely to contract a serious disorder like anorexia nervosa? To offer a speculative answer, we can use the evolutionary theory of intelligence developed by Kanazawa (2004). According to this theory, general intelligence is a brain function that has evolved in human evolution to deal with evolutionarily novel tasks. Take, for instance,

activities like finding food, having children, and collaborating with other humans – these are all tasks that our ancestors have been solving for millions of years, and for these tasks, it is likely that specific hereditary brain mechanisms have developed that promote the successful performance of that task. But activities like getting good grades at school, making a lot of money, or being thin have just recently been invented by our society, and they do not (yet) have their own brain mechanisms. For these novel tasks, people use intelligence, which is a generic ability to solve any type of (unexpected) problems. Kanazawa notes that intelligence correlates positively with evolutionarily novel activities, but the correlation with ancient activities is zero or even negative. That is also evident in Table 25.1, which mostly lists novel school- or job-related forms of success that have the expected positive correlation with intelligence, but one of the most ancient forms of success, number of children, has a negative correlation (–0.11). As for anorexia nervosa, the desire for thinness (the basis for anorexia) is clearly a novel goal that probably takes some intelligence to achieve it.

Overall, the results in Table 25.1 present a kind of a portrait of an intelligent person with positive correlations depicting the characteristics that an intelligent person is likely to have and negative correlations depicting the characteristics he or she is not likely to have. To make sense of these correlations, it is good to have theories like the one by Kanazawa (described above) that do not concentrate on just one specific form of success, but strive to explain the whole pattern of correlations.

Genes, Intelligence, and Success

It is difficult to discuss intelligence without going into discussion about genes. Intelligence certainly would not be such a controversial subject if there was no reason to believe that IQ differences between people are, to a considerable degree, caused by genetic differences. Some researchers have suggested that the heritability of intelligence could be as high as 0.80 (Jensen 1969), but most have come up with lower estimates, somewhere around 0.50 (Devlin et al. 1997), which is still quite high. Given the substantial genetic basis of intelligence and the robust relationship between intelligence and social success, one can conclude that the difference between successful and less successful people is also genetic, to some degree. This was indeed the conclusion made by Herrnstein and Murray (1994). They argued that contemporary western society allows people to fulfill their genetic potential, which means that people can achieve as much success as their genetic IQ enables them to achieve; the social position of each individual is, thus, ultimately determined by genes, and western society evolves toward genetic hierarchy where people with "good genes" live in luxury and people with "bad genes" struggle to survive. That system is further solidified by assortative mating, the tendency for people to marry and have children with partners of similar IQ. Children of intelligent and rich parents have, thus, a double advantage – they inherit their parents' IQ as well as their resources – children of less intelligent poor parents, however, are handicapped on both accounts (Herrnstein and Murray 1994).

Is there any reason to believe that contemporary society could be such a genetic caste society? Behavioral genetic research has found that almost all human characteristics and behaviors have some genetic basis. In addition to intelligence, it has been found that criminality, alcoholism, and smoking also have a genetic component (Malouff et al. 2008). The same is true about the main social status indicators – education, occupation, and income. The heritability coefficient of education is about 0.50 (Rowe et al. 1999; Silventoinen et al. 2000), heritability of occupation is about 0.40 (Tambs et al. 1989; Plomin and Bergeman 1991), and heritability of income is about 0.30 (Taubman 1976; Rowe et al. 1999). This means that the similarity of parents and children in terms of social status is partly due to the genetic transmission of characteristics that foster (or hinder) status attainment. These numbers are interesting, but it should be noted that the heritability values of status characteristics are still much lower than the heritability values of physical

characteristics. The heritability of height, for instance, is about 0.75 (Silventoinen et al. 2000; Benyamin et al. 2005). So, the diagnosis of "genetic caste society" must be an overstatement. There is probably some correspondence between the genetic structure of human population and the social structure of human society, but not any genetic IQ castes with impenetrable borders.

And what is the role of intelligence in the genetic transmission of social status? Given that intelligence is heritable, Herrnstein and Murray made an automatic conclusion that intelligence must be the characteristic that plays the central role in the intergenerational transmission of genetic advantages. But that conclusion may have been premature. Bowles and Gintis (2002) have calculated that the role of "IQ genes" in the parent–child similarity of social status is actually quite small. They do not deny that social status is heritable, but they claim that it is so mostly due to other genetic characteristics, like race, health, or personality. This conclusion by Bowles and Gintis rests on sophisticated calculations, which I have never seen anybody else make. I would treat their conclusion with some caution until their method has found more acceptance.

History, Intelligence, and Success

The evidence discussed so far has come exclusively from contemporary western societies. But what about earlier historical periods and less developed societies? Do these societies also have intelligent people on top? There is, of course, no direct evidence on the intelligence of people from earlier than the twentieth century. But the general opinion seems to be that earlier historical periods mostly did not allow intelligent people to get ahead in society. These societies had a rigid class system, and a person born to lower ranks had no opportunity to raise to upper ranks, no matter how intelligent he or she was. According to *The Bell Curve*, western societies really started to become more meritocratic only in the middle of the twentieth century. Around that time, the educational system became more democratic, and colleges were opened up to intelligent youth, irrespective of their social background. At the same time, the occupational system became more complex with a lot of new cognitively demanding jobs requiring intelligent workers. These two historical developments – increasing openness and complexity – are the main social factors that created the positive correlation between intelligence and career success, according to Herrnstein and Murray (1994).

This scenario sounds convincing, but it has been criticized on several grounds. Some authors have presented evidence showing that intelligent people were, in fact, able to be successful in earlier historical periods. Weiss describes the towns of the sixteenth- to seventeenth-century Germany where a lot of young men from modest social background were able to work themselves into higher positions (Weiss 1995). Weiss speculates that these men probably had higher than average IQ, given that they had no other advantage that would explain their rise. Botton describes how Napoleon changed the nineteenth-century French army so that new officers were recruited and promoted on the basis of their talent, rather than social background (Botton 2004). Again, we can speculate that this new system increased the correlation between intelligence and rank in the army (and perhaps in society, more generally). Adkins and Guo go much further back in time to claim that the positive effect of genetic characteristics (such as intelligence) on success was probably the strongest in the archaic society of hunter-gatherers, before the emergence of private property and desire to pass it on to children (Adkins and Guo 2008). Of course, "success" had a completely different meaning back then, but it depended entirely on individual ability.

Another line of criticism against *The Bell Curve* concerns the claim of increasing meritocracy during the twentieth century. A number of studies have tried to test this claim, and most have failed to find the strengthening of the IQ–success correlation, predicted by *The Bell Curve* (Hauser and Huang 1997; Bowles et al. 2001; Strenze 2007). All these studies have used data collected over several decades (mostly starting with the 1960s), and they have not found any signs of the IQ–success relationship getting

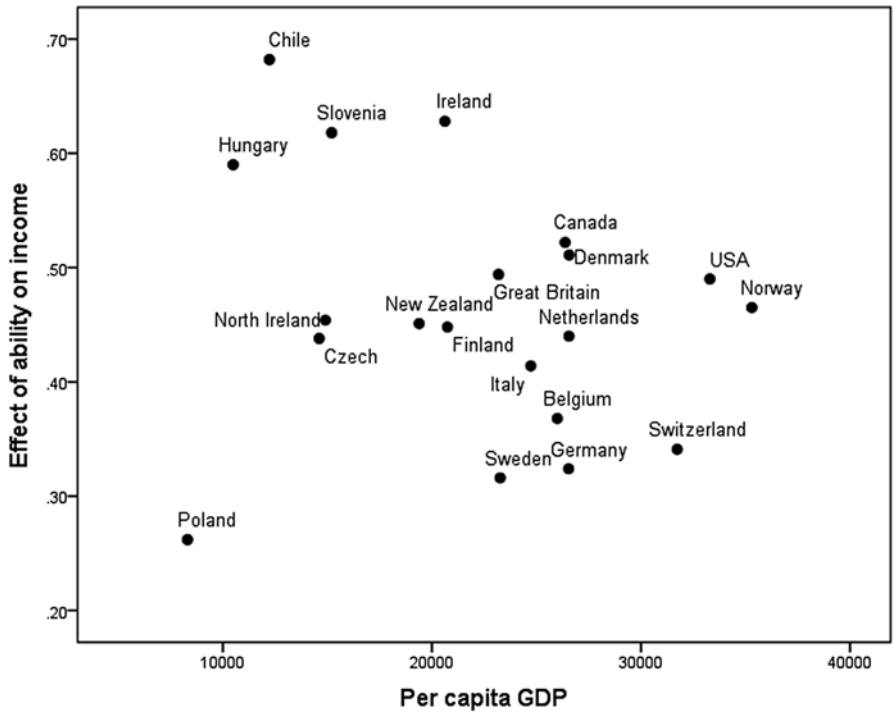

Fig. 25.1 The relationship between IQ–success relationship in a country (vertical axis) and economic development of a country (horizontal axis)

stronger during that time. Does it mean that the thesis of increasing meritocracy is wrong? Perhaps, but it must be said that these studies have almost exclusively relied on data from the second half of the twentieth century, beginning with the 1960s; there is little usable data from the first half of the century. According to *The Bell Curve*, however, the most radical change took place somewhere in the middle of the century (at least in the Unites States) – so it is possible that the available data are simply too late for the change we are looking for. But at least it seems relatively safe to say that after 1960–1970 there has been little change in the correlation between IQ and success.

An alternative way to address the same issue is to compare data from different countries to see if more developed countries have a stronger relationship between intelligence and success – that would support the idea that societies become more meritocratic as they evolve from traditional into industrial and postindustrial. A sophisticated cross-national analysis of that kind has not yet been conducted because of lack of data. But as a preliminary gauge, take a look at Fig. 25.1 that presents a simple scatterplot based on data from the International Adult Literacy Survey (IALS). IALS is a cross-national survey, conducted in 1994–1998, that measured the literacy ability of adults in 20 countries; it also included data on the career success of these adults. I calculated for each country the effect (regression coefficient) of literacy ability on income (see Strenze 2013, for details) – that effect is presented on the vertical axis of Fig. 25.1. The horizontal axis of Fig. 25.1 is the 1995 per capita gross national product (GDP), a measure of societal development. Based on the reasoning offered above, one would expect to find a positive relationship between GDP and ability–income correlation, but in fact the relationship in Fig. 25.1 is negative. The more developed countries with higher GDP, like Norway or Switzerland, tend to exhibit lower correlations between people's ability and income than the less

developed countries like Chile or Hungary. Of course, the data used in Fig. 25.1 is far from perfect, and the number of countries is too small to draw any ironclad conclusions. However, a similar result was obtained by Psacharopoulos and Patrinos (2004) as they compared the relationship between education and income in nearly 100 countries and found that the relationship is stronger in less developed countries. That supports the impression that, among the societies that exist today, less developed societies are the ones where people with higher ability (and education) get better financial rewards.

Based on these results, we can piece together a speculative scenario of the history of the IQ–success relationship. The primitive society of our ancestors was presumably rather meritocratic as each person had to earn one's place in the tribe using one's own abilities and nobody got any help from their "rich daddy." As human society grew more complex, large inequalities between social groups emerged (think of slaves and citizens in ancient Rome or peasants and aristocrats in medieval Europe), and most people were destined to live in the social class of their parents – intelligence probably had little effect on people's life in these societies. These rigid class boundaries started to break down with the advent of industrial society, as democratic values became prevalent and there was increased demand for able workers – that created an opportunity for intelligent people to move up in the social ladder. This process apparently reached its apex in the middle of the twentieth century (in western societies) when the final push toward liberalization of educational and occupational market took place. But after that, it seems, the relationship between intelligence and career success has stayed the same or even declined, possibly due to the tendencies in postindustrial welfare society to reduce inequality and competition.

Conclusion

This short chapter was about the social consequences of intelligence. We saw that high IQ generally helps people to achieve numerous desirable outcomes and to keep away from undesirable ones (but there are also some interesting exceptions to that). The relationship between intelligence and success is partly based on genetics, as intelligence is itself partly genetic characteristic. But on the other hand, the relationship is partly based on societal context, as only certain social conditions allow intelligent people to fulfill their potential.

As we think about intelligence and success, we must remember that the scientific question about the relationship between intelligence and success is closely connected to other scientific questions about intelligence and, most importantly, to the following question: What is it that IQ tests really measure? This chapter was based on the implicit assumption that IQ tests are reasonably good measures of general cognitive ability, but not all social scientists would agree with that. To make sense of the correlations between intelligence and success, one must have a view on IQ testing and on the nature of intelligence, in general, which is why I now direct the reader to other chapters of this book where these related topics are discussed.

References

Adkins, D. E., & Guo, G. (2008). Societal development and the shifting influence of the genome on status attainment. *Research in Social Stratification and Mobility, 26*, 235–255.

Arthur, W., Barret, G. V., & Alexander, R. A. (1991). Prediction of vehicular accident involvement: A meta-analysis. *Human Performance, 4*, 89–105.

Benyamin, B., Wilson, V., Whalley, L. J., Visscher, P. M., & Deary, I. J. (2005). Large, consistent estimates of the heritability of cognitive ability in two entire populations of 11-year-old twins from Scottish mental surveys of 1932 and 1947. *Behavior Genetics, 35*, 525–534.

Berry, C. M., Sackett, P. R., & Landers, R. N. (2007). Revisiting interview-cognitive ability relationships: Attending to specific range restriction mechanisms in meta-analysis. *Personnel Psychology, 60*, 837–874.

Botton, A. (2004). *Status anxiety*. Hamish Hamilton: Penguin.

Bourhis, J., & Allen, M. (1992). Meta-analysis of the relationship between communication apprehension and cognitive performance. *Communication Education, 41*, 68–76.

Bowles, S., & Gintis, H. (2002). The inheritance of inequality. *Journal of Economic Perspectives, 16*, 3–30.

Bowles, S., Gintis, H., & Osborne, M. (2001). The determinants of earnings: A behavioral approach. *Journal of Economic Literature, 39*, 1137–1176.

Breen, R., & Goldthorpe, J. H. (1999). Class inequality and meritocracy: A critique of Saunders and an alternative analysis. *British Journal of Sociology, 50*, 1–27.

Calvin, C. M., Deary, I. J., Fenton, C., Roberts, B. A., Der, G., Leckenby, N., & Batty, G. D. (2010). Intelligence in youth and all-cause-mortality: Systematic review with meta-analysis. *International Journal of Epidemiology*, 1–19.

Colquitt, J. A., LePine, J. A., & Noe, R. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*, 678–707.

Devlin, B., Daniels, M., & Roeder, K. (1997). The heritability of IQ. *Nature, 388*, 468–471.

Diener, E., Suh, E. M., Lucas, R. E., & Smith, H. L. (1999). Subjective well being: Three decades of progress. *Psychological Bulletin, 125*, 276–302.

DeNeve, K. M. & Cooper, H. (1998). The happy personality: A meta-analysis of 137 personality traits and subjective well-being. Psychological Bulletin, 124, 197–229.

Feingold, A. (1992). Good-looking people are not what we think. *Psychological Bulletin, 111*, 304–341.

Fischer, C. S., Hout, M., Jankowski, M. S., Lucas, S. R., Swidler, A., & Voss, K. (1996). *Inequality by design. Cracking the Bell Curve myth*. Princeton, NJ: Princeton University Press.

Gendreau, P., Little, T., & Goggin, C. (1996). A meta-analysis of the predictors of adult offender recidivism: What works! *Criminology, 34*, 575–607.

Griffeth, R. W., Hom, P. W., & Gaertner, S. (2000). A meta-analysis of antecedents and correlates of employee turnover: Update, moderator tests, and research implications for the next millennium. *Journal of Management, 26*, 463–488.

Hauser, R. M., & Huang, M.-H. (1997). Verbal ability and socioeconomic success: A trend analysis. *Social Science Research, 26*, 331–376.

Herrnstein, R. J., & Murray, C. (1994). *The bell curve. Intelligence and class structure in American life*. New York: Free Press.

Hunter, J. E., & Hunter, R. F. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin, 96*, 72–98.

Jensen, A. R. (1969). How much can we boost IQ and scholastic achievement? *Harvard Educational Review, 39*, 1–123.

Judge, T. A., Colbert, A. E., & Ilies, R. (2004). Intelligence and leadership: A quantitative review and test of theoretical propositions. *Journal of Applied Psychology, 89*, 542–552.

Kanazawa, S. (2004). General intelligence as a domain-specific adaptation. *Psychological Review, 111*, 512–523.

Kim, K. H. (2005). Can only intelligent people be creative? *Journal of Secondary Gifted Education, 16*, 57–66.

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.

Lopez, C., Stahl, D., & Tchanturia, K. (2010). Estimated intelligence quotient in anorexia nervosa: A systematic review and meta-analysis of the literature. *Annals of General Psychiatry, 9*, 40.

Lynn, R. (1996). *Dysgenics. Genetic deterioration in modern populations*. London: Praeger.

Malouff, J. M., Rooke, S., & Schutte, N. S. (2008). The heritability of human behavior: Results of aggregating meta-analyses. *Current Psychology, 27*, 153–161.

Mann, R. D. (1959). A review of the relationships between personality and performance in small groups. *Psychological Bulletin, 56*, 241–270.

McClelland, D. C. (1973). Testing for competence rather than for intelligence. *American Psychologist, 28*, 1–14.

Nelson, J. R., Benner, G. J., & Gonzalez, J. (2003). Learner characteristics that influence the treatment effectiveness of early literacy interventions: A meta-analytic review. *Learning Disabilities Research & Practice, 18*, 255–267.

Ones, D. S., Viswesvaran, C., & Dilchert, S. (2005). Cognitive ability in personnel selection decisions. In A. Evers, N. Anderson, & O. Voskuijl (Eds.), *The Blackwell handbook of personnel selection* (pp. 143–173). Malden, MA: Blackwell.

Plomin, R., & Bergeman, C. S. (1991). The nature of nurture: Genetic influence on environmental measures. *Behavioral and Brain Sciences, 14*, 373–427.

Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic performance. *Psychological Bulletin, 135*, 322–338.

Psacharopoulos, G., & Patrinos, H. A. (2004). Returns to investment in education: A further update. *Education Economics, 12*, 111–134.

Rhodes, N., & Wood, W. (1992). Self-esteem and intelligence affect influenceability: The mediating role of message reception. *Psychological Bulletin, 111*, 156–171.

Roos, P. A., & Treiman, D. J. (1980). DOT scales for the 1970 census classification. In A. R. Miller, D. J. Treiman, P. S. Cain, & P. A. Roos (Eds.), *Work, jobs, and occupations: A critical review of the "Dictionary of Occupational Titles"* (pp. 336–389). Washington, D.C.: National Academy Press.

Roth, P. L., Bobko, P., & Farland, L. A. (2005). A Meta-analysis of work sample test validity: Updating and integrating some classic literature. *Personnel Psychology, 58*, 1009–1037.

Rowe, D. C., Vesterdal, W. J., & Rodgers, J. L. (1999). Herrnstein's syllogism: Genetic and shared environmental influences on IQ, education, and income. *Intelligence, 26*, 405–423.

Saunders, P. (1997). Social mobility in Britain: An empirical evaluation of two competing explanations. *Sociology, 31*, 261–288.

Schmidt, F. L., & Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: Practical and theoretical findings of 85 years of

research findings. *Psychological Bulletin, 124*, 262–274.

Schmitt, N., Gooding, R. Z., Noe, R. A., & Kirsch, M. (1984). Meta-analyses of validity studies published between 1964 and 1982 and the investigation of study characteristics. *Personnel Psychology, 37*, 407–422.

Silventoinen, K., Kaprio, J., & Lahelma, E. (2000). Genetic and environmental contributions to the association between body height and educational attainment: A study of adult Finnish twins. *Behavior Genetics, 30*, 477–485.

Spungen, D. (1983). *And I don't want to live this life*. New York: Fawcett Crest.

Steel, P. (2007). The nature of procrastination: A meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological Bulletin, 133*, 65–94.

Strenze, T. (2007). Intelligence and socioeconomic success: A meta-analytic review of longitudinal research. *Intelligence, 35*, 401–426.

Strenze, T. (2013). Allocation of talent in society and its effect on economic development. *Intelligence, 41*, 193–202.

Tambs, K., Sundet, J. M., Magnus, P., & Berg, K. (1989). Genetic and environmental contributions to the covariance between occupational status, educational attainment, and IQ: A study of twins. *Behavior Genetics, 19*, 209–222.

Taubman, P. (1976). Earnings, education, genetics, and environment. *Journal of Human Resources, 11*, 447–461.

Weiss, V. (1995). The emergence of a cognitive elite. Comment on The Bell Curve. *Mankind Quarterly, 35*, 373–390.

Woodberry, K. A., Giuliano, A. J., & Seidman, L. J. (2008). Premorbid IQ in schizophrenia: A meta-analytic review. *The American Journal of Psychiatry, 165*, 579–587.

Young, M. (1958). *The rise of meritocracy 1870–2033*. London: Penguin.