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I Z A
World of Labor
Evidence-based policy making

The role of cognitive and socio-emotional skills in labor markets

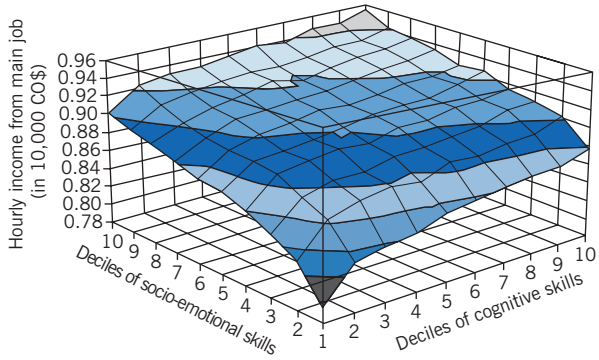
Cognitive skills are more relevant in explaining earnings, socio-emotional skills in determining labor supply and schooling

Keywords: returns to skills, cognitive skills, socio-emotional skills, personality traits, labor market outcomes

ELEVATOR PITCH

Common proxies, such as years of education, have been shown to be ineffective at capturing cross-country differences in skills acquisition, as well as the role they play in the labor market. A large body of research shows that direct measures of skills, in particular cognitive and socio-emotional ones, provide more adequate estimations of individuals' differences in potential productive capacity than the quantity of education they receive. Evidence shows that cognitive skills in particular are quite relevant to explain wages, while socio-emotional skills are more associated with labor force and education participation decisions.

Correlation between working, looking for a job, or studying and cognitive and socio-emotional skills, Colombia (2012)



Source: Acosta, P., N. Muller, and M. Sarzosa. *Beyond Qualifications: Returns to Cognitive and Socio-Emotional Skills in Colombia*. IZA Discussion Paper No. 9403, October 2015.

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KEY FINDINGS

Pros

- Both cognitive and socio-emotional skills (in particular, conscientiousness and emotional stability) affect labor earnings, although with relatively larger effects for cognitive skills.
- Skills, especially socio-emotional ones, influence individuals' participation in the labor market and probability of holding a job.
- Cognitive and socio-emotional skills influence schooling decisions and a range of educational outcomes.

Cons

- Surveys may not reflect the full range of an individual's abilities, and survey instruments are subject to measurement errors.
- Schooling, cognitive skills, and socio-emotional skills are highly interrelated; distinguishing their respective effects is challenging and can lead to severe estimation bias.
- Most causal evidence comes from high-income countries; there is a lack of data on the topic in low- and middle-income countries, especially panel data.

AUTHOR'S MAIN MESSAGE

Cognitive and socio-emotional skills play important but different roles in explaining labor market productivity and success. Despite some limitations in the data and measurements used, policymakers would be well advised to include cognitive and socio-emotional skills development in school curricula. Promoting each skill set could lead to improvements in job quality or higher labor market participation and tertiary educational attainment. Given the influence of family environments on skill formation, parenting and extra-curricular activities can be very important in fostering cognitive and socio-emotional skills.

MOTIVATION

Economists have long considered educational levels to be the main indicator of skills. However, it is now well recognized that common proxies such as years of education do not appropriately reflect cross-country differences in skills acquisition, or how they impact the labor market [1]. International assessments (such as the OECD's Programme for International Student Assessment (PISA) and Programme for the International Assessment of Adult Competencies (PIACC) tests) of students' and adults' skills show great disparities across similar educational levels, suggesting that years of education attained only partially reflects people's abilities.

Instead, people should be distinguished by the broad sets of abilities, accumulated over one's lifetime, that shape their decisions and success in the labor market [2]. In that sense, a large body of evidence has documented that direct measures of skills provide more adequate estimations of the differences in individuals' potential productive capacity than is provided by the quantity of education they receive. Around the world, employers place high value on skills needed for emerging jobs (i.e. those associated with high use of technology, or involving substantial human interaction), which typically involve non-routine analytical tasks.

One noteworthy fact from the economic and psychology literature discussing skills is the plethora of definitions and taxonomies surrounding this concept. These days, the term "skills" is used broadly to include competencies, attitudes, beliefs, and behaviors that are malleable (modifiable) across an individual's development and can be learned and improved through specific programs and policies. These broad sets of skills can be broadly divided into two main categories: (i) cognitive skills—aptitudes to perform mental tasks such as comprehension or reasoning; and (ii) socio-emotional skills—personality traits, behaviors, attitudes, and beliefs. Technical skills, associated with the specific knowledge needed to carry out one's occupation, can be thought of as a subset of cognitive skills [2].

Cognitive skills are generally defined as intelligence or mental abilities. Two levels can be distinguished: (i) lower-order (basic) cognitive skills, which are foundational skills or basic academic knowledge such as literacy or numeracy; and (ii) higher-order (advanced) cognitive skills that involve more complex thinking, such as critical thinking or problem solving.

The term "socio-emotional skills" refers to a distinct set of skills that enable individuals to navigate interpersonal and social situations effectively. These skills encompass behaviors and attitudes that are consistent patterns of thoughts, feelings, and conduct (such as commitment, discipline, or the ability to work in a team) and personality traits (such as self-confidence, perseverance, and emotional stability), which are broad facets that are relatively stable over time [2]. The concept of socio-emotional skills was developed in the literature on educational psychology. In the economic literature, the term "socio-emotional skills" is often used interchangeably with terms such as "behavioral skills," "life skills," "non-cognitive skills," or "soft skills." Nonetheless, these terms differ slightly and therefore merit clarification. "Non-cognitive skills" refers to a broad range of behaviors, abilities, and traits that are not induced by intelligence or achievement. "Soft skills" and "life skills" usually include more technical skills such as language fluency and computer literacy. Psychologists argue that many of the abilities and traits that economists intend to capture with the term "non-cognitive skills" are in fact a result of cognition.

Whereas literacy, numeracy, and various forms of cognitive skills have traditionally been associated with gains in worker productivity, attention is now also focusing on the role of socio-emotional skills. This is due to a burgeoning demand for jobs that require skills related to dealing with personal and social situations, which is being created by new technologies and economic transformation across the globe. Indeed, the high value that surveys show is placed on socio-emotional and advanced cognitive skills by employers may reflect a decline in the relative number of jobs that require manual labor, and an increase in those that require non-routine analysis and independent reasoning.

DISCUSSION OF PROS AND CONS

The role of skills and traits in labor earnings

Since the mid-1990s, studies have shown that both cognitive skills and socio-emotional skills affect the labor earnings of the overall population, although cognitive skills are shown to have relatively larger effects.

In the US, cognitive abilities have long been the dominant factor determining labor earnings. A large number of studies have shown that higher levels of cognitive skills (as measured by IQ or standardized tests of mathematics, reading, and vocabulary) predict higher wages, even when taking into account other factors that might also influence earnings [1]. Similar results were found in 20 other high-income countries of the OECD.

In response to more recent findings from program experiments and employer surveys, studies have begun to account for measures of socio-emotional skills, in addition to cognitive ones, in order to investigate their influence on labor earnings. This burgeoning literature reveals that socio-emotional skills are at least as important as cognitive skills in determining labor earnings in many high-income countries, such as the US, Germany, the Netherlands, Sweden, Canada, and the UK. Despite these findings, many other recent studies continue to suggest that raising cognitive skills outweighs raising socio-emotional skills in terms of increasing income in most countries, and especially in Nordic countries and Switzerland. Among the so-called "big five personality traits" used in the majority of empirical studies (openness to experience, conscientiousness, extraversion, agreeableness, and emotional stability), conscientiousness and traits related to emotional stability (locus of control, i.e. the extent to which individuals believe they have control over their lives, and self-esteem) are the most associated with job performance and wages in the US and countries in Western Europe [3], [4]. Using measures of socio-emotional skills based on school evaluations, positive and significant associations between discipline (as evaluated by teachers) in childhood and adult wages were found in the UK and the US [5].

The economic returns to higher levels of cognitive and socio-emotional abilities differ across population subgroups and job types. There are often sizable differences across gender in terms of which personality traits carry the highest rewards, although it is difficult to draw common patterns from multiple studies. For example, a study finds that locus of control, aggression, and withdrawal are strong predictors of wages for white women in the US and the UK [6]. However, only slight variations in the effect of locus of control and self-esteem on earnings were found when comparing across gender in developed countries [4]. Additionally, differences in the big five personality traits and

locus of control between men and women only modestly explain the gender wage gap in Australia, Germany, the Netherlands, Russia, and the US [7].

Evidence suggests that skills that apply to a broader array of occupations are more greatly rewarded when considering the whole population. For example, personality traits such as conscientiousness and grit (perseverance and passion for long-term goals) seem to matter for a wide spectrum of job complexity [3], [8]. Additionally, more complex jobs—those that are more demanding in terms of information processing, such as scientists and senior managers—require advanced cognitive skills that could not be used in less demanding occupations. Using data for siblings in the US, research has found that extraversion shows a large and robust association with earnings that could reflect the recent change in the composition of occupations in the US—namely, the increase in service jobs and the requirement for social interactions in the workplace [9]. This is in line with findings on the importance of people skills in the US, German, and UK labor markets. Higher levels of socio-emotional skills appear even more important for occupations requiring cognitive skills, especially in the services sector.

The returns to skills differ across type of work as well—namely, between salaried workers and the self-employed. Individuals with high-order cognitive skills (e.g. learning aptitudes and success as a salaried worker), a tendency to break the rules, and high self-esteem in adolescence are more likely to become successful long-term entrepreneurs in the US [10]. Moreover, entrepreneurs with a balance in abilities across different fields—so-called "jacks-of-all-trades"—have higher incomes than salaried workers.

The role of skills and traits in labor supply outcomes

Skills, especially socio-emotional ones, influence individuals' participation in the labor market and probability of holding a job. As with earnings, conscientiousness has a large positive effect on labor participation in the US and Germany, as do extraversion and locus of control [3]. By contrast, neuroticism and openness to experience have negative effects in Germany, whereas agreeableness has a negative effect only on the labor force participation decisions of married women (and no effect on other population subgroups). In the US, a man who moves from the 25th to the 75th percentile of the distribution of locus of control and self-esteem would increase his probability of being employed at age 30 by 15% [4]. Behaviors of children in the UK significantly affect the probability of having work as an adult. Although hostility toward adults in childhood has a negative impact on the probability of being employed later in life, anxiety related to acceptance by adults has a positive and significant impact on employment status. A potential explanation is that children who are maladjusted on this latter dimension are judged by their teachers to be overzealous, which may be better rewarded in the labor market.

Personality traits also drive occupational choices. Individuals partly select occupations that correspond to their orientations, such as being a caring or a direct person in adolescence. Studies have found that personality traits have a substantial effect on the probability of employment in many occupations, with gender specificities [7]. The combination of skills and traits rather than single attributes also determines occupational outcomes. Studies have found that disagreeable intelligent individuals achieve higher occupational status, whereas disagreeable low-intelligent men are more likely to be

unemployed or to work at a lower-status job when compared with more agreeable individuals [11].

The role of skills in schooling decisions

Measures of cognitive and socio-emotional skills influence schooling decisions and a range of educational outcomes [2]. Using longitudinal surveys of children in the UK, the US, and Canada, it has been shown that cognitive skills (such as proficiency in mathematics and reading) and attention skills were strong predictors of later academic achievements [12]. By contrast, measures of socio-emotional skills at school entry had limited power in predicting educational success. This could be explained by the fact that those measures of socio-emotional skills influence measures of cognitive skills, and the former's effect is therefore underestimated. Meanwhile, technical abilities, a subset of cognitive skills, influence the probability of going to college.

Among personality traits, conscientiousness is the main determinant of overall attainment and achievement, such as college grades [2]. Self-discipline and grit are better predictors of academic performance in the US than IQ [8]. Openness to experience affects educational attainment, while also predicting attendance and the difficulty of courses selected. Emotional stability—as captured by self-esteem and locus of control—also influences educational attainment such as graduating from a four-year college [4]. On the other end of the spectrum, misbehavior (in terms of self-control and interpersonal skills) at a young age drives lower probabilities of staying longer in school in both the UK and the US [13].

Finally, there are substantial differences between young boys and girls in their acquisition of skills from kindergarten to fifth grade. Boys and girls have roughly the same academic return to socio-emotional skills (approach to learning, self-control, interpersonal skills), but girls begin school with more advanced social and behavioral skills, so their skill advantage grows over time [13].

LIMITATIONS AND GAPS

A few caveats related to methodological shortcomings and data limitation must be highlighted in this context. First, studies may not offer the full picture of the effect of an individual's true skills; results are conditional on the dimensions of the skill set measured in surveys, which may not reflect the full range of an individual's abilities. Moreover, survey instruments are subject to measurement error of the skill construct [2]. For instance, test scores are sensitive to the amount of schooling completed at the time of the test and family background. Furthermore, the measures of ability are known to be very noisy. Thus, using test scores as an independent variable in regression model analysis could lead to measurement error bias.

Second, causal analyses of the impact of skills and traits on employment often suffer from endogeneity bias when including education in the analysis, casting doubt on the reliability of the estimations [4]. Schooling, cognitive skills, and socio-emotional skills are interrelated and influence each other. On the other hand, not controlling for schooling in linear estimations can lead to overestimations of the net effects of measures of skills

on wages, capturing instead the whole effect of skills, independently of where they were formed (at school or elsewhere) [4]. Distinguishing, their respective effects is technically challenging and can lead to severe estimation bias when considered simultaneously in a standard regression model—an issue not addressed in the literature of the early 2000s.

Overall, the studies referred to in this article vary greatly in the reported magnitude of skills effects, samples, research questions, and statistical methodologies, which may challenge meaningful comparisons between them. In the general absence of randomized control-trial experiments, some authors have resorted to clever estimation techniques, such as involving non-parametric structural estimation to simulate distributions of unobserved heterogeneity in explaining test scores [4]. This method can mitigate measurement error concerns because it acknowledges the fact that skills are latent rather than observable, not depending on a single (and potentially poor) measure of skills.

Thus, the optimal approach to determine the association between a person's skills (both cognitive and socio-emotional) and schooling or labor market outcomes would be based on longitudinal data. This data could allow researchers to link cognitive test scores and personality constructs from individuals' youth with their outcomes as adults. Unfortunately, such data are rare, especially in low- and middle-income countries, and even fewer data sets provide direct assessments of skills. Thus, most of the robust evidence still comes from the US and other high-income countries, which limits generalizability to other countries.

SUMMARY AND POLICY ADVICE

Overall, the literature seems to suggest that both cognitive and socio-emotional skills are relevant to predict labor market success (in particular earnings and employment), with differences across population groups, industries, and occupations. In general, cognitive skills prove relevant to explain earnings, while socio-emotional skills seem particularly relevant to explain labor supply and schooling decisions. This implies school and vocational training programs should consider promoting both cognitive and socio-emotional skills to help improve a range of labor outcomes, such as improving job quality, or fostering higher labor market participation or tertiary education.

In that sense, it has long been established that early childhood development programs have the highest rate of return in shaping skills, and they often yield better outcomes than similar interventions later in life. These interventions lay the foundations for children that should be completed by later investments. Primary school is also an ideal context for shaping both cognitive and socio-emotional skills, as at this stage in life children possess both the neuro-biological capacity and psychosocial maturity to effectively practice and learn both types of skills. However, the elementary education curriculum in the majority of countries devotes rather limited resources to influencing character and traits. Schools continue to be judged solely by students' performance in cognitive achievement tests; socio-emotional skills are often neglected, and teachers are not appropriately trained to foster the development of them.

Given the well-documented influence of family environments on skill formation, parenting and extra-curricular activities can play a significant role in fostering cognitive and socio-emotional skills. Finally, interventions targeting workers entering the labor force can

effectively bolster their socio-emotional skills, thereby complementing the effects of improved labor market information and vocational counseling.

Unfortunately, the current evaluations used to determine which interventions are most effective at fostering both cognitive and socio-emotional skills mostly consider short-term program impacts. The few that do allow measurement of long-term impacts find mixed results; and some have been found to have no effect after a few years.

In sum, better measuring of skills profiles and better understanding of the interventions that permanently affect cognitive and socio-emotional skills would allow for more efficient policy design. In any case, further research is needed on the optimal combination of packages for different demographic and socio-economic population groups, particularly in low- and middle-income countries, for which the evidence is still scant.

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Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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Further reading

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