

Review of the Theoretical Framework of "Non-Cognitive Ability" (2012-2020)

Xinchen Zhao, Ding Fan

Northwest University of Political Science and Law, Xi'an, Shaanxi, 710062, China

Abstract: *In today's general environment of population aging, economic growth entering the "new normal" and increasingly fierce social competition, the traditional human capital theory urgently needs to be improved, and all sectors of society have increasingly recognized the importance of "non-cognitive ability". By combing and summarizing the relevant research literature of non-cognitive ability at home and abroad, this paper puts forward the prospect of building a theoretical framework of non-cognitive ability based on the concept of non-cognitive ability, importance, formative factors and development mechanism, and measurement method.*

Keywords: *Non-cognitive ability, Student development, New human capital theory*

1. Introduction

In the 1960s, the human capital theory was proposed by Schultz et al. Since its birth, the theory has played a great role in the economic and social development. However, with the development of economy and society, there are many phenomena that traditional human capital theories cannot explain. For example, a large number of studies have found that after controlling the important dimensions of traditional human capital such as education, health and training, there is still 60-80% of the income gap of traditional human capital but still unexplained. [1] It is also impossible to explain that the experts and professors who won the state's highest Science and Technology Award also failed in exams or even scored zero points during their study [2]. It can not explain the residual part that still exists after controlling for variables such as family background, cognitive ability and education level. What are the factors that lead to huge differences in individual achievement even between family and intellectual conditions?

The above problems and troubles forced a number of experts and scholars to begin to improve the traditional human capital theory, and the non-cognitive ability was included in the new human capital theory framework. Although relevant research started late in China, there are also a large number of empirical studies that have proved that non-cognitive ability is also extremely important for individuals to improve their comprehensive quality and achieve success. In some fields, non-cognitive ability is even more important than cognitive ability. Under the circumstances of the aging population, the economic growth entering the "new normal" and the increasingly fierce social competition, it is urgent to vigorously carry out the relevant research on non-cognitive ability, improve the traditional human capital theory, and strengthen the cultivation of non-cognitive ability in students' education.

At present, there are rich research results on various elements of non-cognitive ability, but there is also a phenomenon of "a hundred schools of thought contend" about the concept and connotation of non-cognitive ability. There are overlapping between these different connotations, but there are subtle differences. This paper sorts out the research literature of domestic and foreign scholars on the concept, importance, formation factors and development mechanism, and measurement method, and tries to construct a theoretical framework of non-cognitive ability based on these four parts.

2. The concept of non-cognitive abilities

Many scholars at home and abroad have studied and summarized the concept of non-cognitive ability, and different scholars have different research conclusions. In this regard, Heckman (2012) points out that different scholars are more likely to use different concepts in what they want to express, although different concepts are actually highly close connections and commonalities.[3]

Kyllonen (2005) believes that non-cognitive ability includes three types: (1) personality variables,

including extroversion, emotional stability, affinity, responsibility, etc.; (2) Attitude variables, including self-perception, self-efficacy, motivation, attribution, interest, and social values; (3) Quasina-cognitive variables, including creativity, emotional intelligence, cognitive style, and metacognition. [4] Brunello G (2011) Non-cognitive abilities are divided into communication skills, motivation, cooperation skills, leadership skills and creativity from the field of labor economics and from the perspective of influencing career development. [5] An Shiwei and Luo Chuxin (2014) believe that non-cognitive ability refers to the psychological quality ability such as emotional motivation, attention, willpower, self-evaluation ability and regulation ability related to non-cognitive factors. [6] Duoduo Xu (2017) Thinking that all abilities unrelated to cognition, such as social communication skills, certain specific personality and personality characteristics, motivation and aspirations, or even the so-called "emotional intelligence" and "soft power", etc., can be included in the "non-cognitive abilities". [7] Sheng Weiyan and Hu Qiuyang (2019) believe that non-cognitive ability generally refers to the personality characteristics such as cooperative consciousness, adaptability, communication ability and social ability that cannot be completely measured through education. [8]

Many scholars define the concept of non-cognitive ability, and the common concept lies in that non-cognitive ability is besides cognitive ability, condensed in individuals, which can affect individuals' ability to improve their comprehensive quality and achieve success, mainly including self-confidence, self-discipline, responsibility and other factors. The author summarizes the definition of the concept of non-cognitive ability, believing that the non-cognitive ability is reflected by "psychological capital" relative to the cognitive ability, including the sum total of cooperation, adaptation, communication, social interaction, creation, leadership and self-discipline.

3. The importance of non-cognitive abilities

3.1. The importance of non-cognitive ability for the improvement of traditional human capital theory

The traditional mode of human capital theory needs to be innovated, explored and extended in the real predicament. Zhou Jinyan (2015) believes that under the traditional Vallas model, "ability" is limited to the cognitive ability related to production capacity, which limits the development of human capital theory. The author summarizes the characteristics of human capital from the perspectives of "valuable" and "investable", and explores the economic value and investment characteristics of non-cognitive ability, pointing out that the need to pay more attention to non-cognitive ability in future research. [9] Xiao Yan and CAI Chen (2017) have sorted out the development context of human capital theory, and pointed out that the theory has gone through four stages: germination, modern, contemporary and new human capital. In addition, the research on cognitive ability and non-cognitive ability in China and the West is concluded that they have an important role in the human capital framework. [10]

The biggest difference between the new human capital theory and the traditional human capital theory is whether the "ability" is regarded as the core of human capital. Paying importance to the research and cultivation of non-cognitive ability is an important content of the new human capital theory and is of great significance to the new human capital with ability as the core. Zhu Zhisheng (2019) believes that non-cognitive ability is as plastic as cognitive ability, and can be effectively accumulated through human capital investment. Through the empirical testing of the data from 12,277 samples, the authors found that the improved non-cognitive ability helps to enhance the level of human capital, and thus promote the occurrence of entrepreneurial activities. [11] Heckman et al (2006) proposed a new human capital theoretical framework with competence as the core, distinguishing ability into cognitive ability and non-cognitive ability, and specifically emphasized the important role of non-cognitive ability independent of cognitive ability. [12] Min Wenbin et al. (2019) believe that non-cognitive ability is the necessary core literacy for talents and labor force in the 21st century, and it is of great significance to explore its formation mechanism in the individual life course. [13]

3.2. The importance of non-cognitive ability to students' academic performance

There are gender differences in academic performance, mainly due to differences in non-cognitive ability between men and women. Tinklin (2003) used a multilayer linear model and found that the only factor that can explain gender differences in academic performance is non-cognitive ability. [14] Duckworth and Seligman (2006) found that girls had outperformed boys in primary, middle and high school test subjects, but had not outperformed boys in IQ tests. It is found that self-regulatory factors in non-cognitive ability are at play. [15]

Non-cognitive ability plays a great role in the cultivation and success of college students. Luo Chuxin and Wang Tong (2014) stressed that non-cognitive ability plays an important role in improving the education and teaching of higher learning and the comprehensive quality of college students, and believed that non-cognitive ability accounts for 80% of individuals. The author believes that we should start from the non-cognitive ability, tap the employment potential of college students, stimulate their professional interest, enhance their employment initiative, reasonably plan their academic career, and then cultivate their innovative thinking and entrepreneurial consciousness, which is helpful to promote the smooth employment and growth of college students. [16]

3.3. The importance of non-cognitive abilities for employment and income

The size of non-cognitive ability determines the quality of human capital, or further affects the income and employment of workers, which has great significance to it. Improving the non-cognitive ability of human capital in China is conducive to improving the overall quality of human capital in China and increasing the income of workers. Wang Zihan (2016) used the "five-factor model" and the "non-cognitive ability index" to measure the non-cognitive ability of workers, and then added it to the regression equation to estimate the impact of non-cognitive ability on workers' own income. The study found that non-cognitive ability was not correlated with the educational level of workers, which played a positive effect on worker income, and was significantly higher in men than in women. [17] Li Li, Zhao Wenlong et al. (2017) believe that non-cognitive ability is crucial to a person's socioeconomic status. [18] Becker (1964) proposed that the difference in wage income is closely related to human capital. The increase of human capital can increase income, and education can improve skills to achieve the goal of increasing income. Schoellman (2016) introduced the concept of non-cognitive ability when studying international migration in the United States. The study found that the impact of human capital on the income gap increased by 10% under the influence of non-cognitive ability. [19] Li Xiaoman et al. (2019) believe that the new human capital theory takes ability as the core, and that non-cognitive ability is of great value to improving the employment quality of middle-and low-skilled groups. [20]

4. Forming factors and developmental mechanisms of non-cognitive abilities

4.1. Study on the forming factors of non-cognitive ability

By combing through the research literature of different scholars on non-cognitive ability formation factors, we can see that students' family background and learning experience are two very important factors.

4.1.1. Effect of family background on non-cognitive ability formation

Many scholars have studied the association between non-cognitive ability and individual family background, and the results show that the relationship is close. Li Li, Zhao Wenlong et al. (2017) found that major family background factors such as students' family class, parents' education level and family economic level all significantly affect a person's non-cognitive ability, and cultural capital is also positively correlated with non-cognitive ability. [21] Cao Lianzhe and Fang Chenchen (2019) analyzed the relationship between family background, non-cognitive ability and students' performance, and found that family background had a significant positive effect on students' non-cognitive ability, and the intermediary effect between non-cognitive ability was different between urban and rural areas. [22] Xiangyu Zhao (2019) examined the influence of family factors on the cognitive ability and non-cognitive ability of Chinese students, and found that family socioeconomic status (SES) had significant positive effects on both cognitive and non-cognitive abilities, while family relationships greatly improved students' non-cognitive ability. [23]

Studies in rural or lower income families showed that such a family background is detrimental to student development of non-cognitive abilities. Min Wenbin et al. (2019) found that experiencing poverty in childhood significantly reduced the social emotional and social communication and other non-cognitive abilities of rural adolescents. [24] Dong Zhiqiang and Zhao Jun (2019) found that compared with non-left-behind children, left-behind children are more inclined to avoid competition, and their parents' companionship is of great significance for the formation of children's competitive preferences. [25] The study by Liu Xiuying (2017) showed that non-cognitive abilities such as self-learning and social communication skills developed significantly slower than those of high-income students.

4.1.2. Effect of preschool education and school quality on non-cognitive capacity formation

Preschool education plays an important role in the formation and development of non-cognitive abilities. Wang Huimin et al. (2017) found that students who have received preschool education have better cognitive ability and non-cognitive ability. The author believes that preschool education plays an important role in improving personal ability and alleviating social inequality. [26] Zhang Ding (2018) and others concluded through OLS regression that junior high school students who received preschool education performed better in various non-cognitive skills than their peers who did not receive preschool education. The authors suggest that preschool education has a positive effect on non-cognitive development in adolescents. [27]

The quality of the school also greatly affects the non-cognitive ability of the students. Luo Fang, Guan Jianghua (2017) used the principal component analysis method and OLS method to analyze the factors affecting non-cognitive ability, and found that the education quality of the school of the society had a significant positive impact on non-cognitive ability. [28] Cao Lianzhe, Fang Chenchen (2019) analyzed the relationship between family background, non-cognitive ability and student performance through data from the 2014 China Education Tracking Survey (CEPS). The study found that school quality was positively associated with non-cognitive performance; the authors believe that both schools and governments should value non-cognitive development and include it in student tests to measure their comprehensive abilities. [29]

4.2. Cultivation and development of non-cognitive abilities

There are different ways to cultivate and improve their non-cognitive ability. Many many (2017) believe that college education weakens the impact of family background, provides a fair environment for students, improves the non-cognitive ability of poor children, and the role of human capital should not be underestimated. Fang Chenchen (2018) found that extracurricular tutoring can help improve students' non-cognitive ability, and that interest classes can improve their non-cognitive ability higher than academic cram schools. [30] Yang Cuijuan (2018) can cultivate children's non-cognitive ability and enhance cultural confidence through classical poetry education. [31] Yu Ji, Min Weifang (2018) comparative analysis of regulatory learning space and innovative learning space on the influence of college students' cognitive and non-cognitive ability, found that innovative learning space than regulatory learning space is more helpful to cultivate college students and career preparation related to cognitive and non-cognitive ability, put forward colleges and universities should introduce elastic teaching methods, focus on different levels, the needs of students of different disciplines. [32] It can be seen that in different learning stages and ages, students' non-cognitive ability can be significantly improved and cultivated through university education, extracurricular tutoring, poetry education and learning space transformation.

Parental participation is one of the most important means to develop students' non-cognitive abilities. Li Bo (2018) found that parental participation had a very positive impact on their children's academic performance and non-cognitive ability, and it was mainly mediated by non-cognitive ability to influence their children's academic performance. Parental participation helps to reduce the development inequality between students due to family capital and academic foundation, and the younger the children are, the greater the role of parental participation is [33]. Wang Qilin (2015) found that adversity helps children to accumulate human capital; parents' investment in children's cognitive ability is inversely proportional to the formation of their non-cognitive ability, and parents should strengthen the cultivation of children's optimism, persistence and other non-cognitive ability to form effective human capital accumulation. [34] Huang Chao (2018) examined the current Chinese adolescent parenting distribution, class differences and its influence on youth cognitive ability, that higher social and economic status families tend to choose authoritative and tolerant parenting, low social and economic status families tend to choose autocratic or neglect parenting, and parenting on the development of the cognitive ability has significant influence: the authoritative parenting is most beneficial to cultivate children's cognitive ability, neglect parenting is most conducive to cultivate children's non-cognitive ability. [35] Among the non-cognitive indicators involving interpersonal communication, the authoritative and tolerant parenting methods have obvious advantages over the other two parenting methods. It can be seen that parents play an extremely important role in the cultivation and development of children's non-cognitive abilities, and parental participation largely leads to the formation of specific non-cognitive abilities in adolescents. It can be said that parents' participation is the most important way to cultivate children's non-cognitive ability. Parents should pay attention to the construction and cultivation of children's non-cognitive ability in the process of children's growth, start from character cultivation, parenting mode transformation and other aspects, and actively participate as soon as possible.

5. Measurement mode of non-cognitive ability

Non-cognitive ability is a multi-dimensional ability based on psychological ability. It is difficult to find the way of its measure, the standard is not unified, and the measurement value is difficult to be accurate. Many many (2017) believe that non-cognitive ability contains complex dimensions and measuring it is impossible to use a single indicator.

The "Big Five" personality test is a more common method to measure the non-cognitive ability in the academic circles today, but it also has some shortcomings. Hu Bowen (2017) believes that the "Big Five" model is favored by researchers in different disciplines and is widely used to measure non-cognitive ability, but there are still problems such as inconsistent measurement tools and standards, and insufficient data conditions. Li Tao, Zhang Wentao (2015) pointed out that although there are still many deficiencies and room for improvement in the "Big Five" personality classification method, it is still the most basic measure to measure personality characteristics. [36]

Current academic used to measure the cognitive ability in addition to the most widely used "five" personality scale there are many measures, nan (2018) that measure the cognitive ability in addition to the "five" test, "big", "nine", the control scale (the Rotter Internal-External Locus of Control Scale) and Rosenberg self-esteem scale (Rosenberg Self-Esteem Scale), psychological capital scale, cartel 16PF, etc. [37] Xiao Yan, CAI Chen (2017) pointed out that the main tools of non-cognitive ability measurement include: Rott (Rotter) internal and external point control scale [38]. The Rosenberg (Rosenberg) self-esteem scale (Rosenberg Self-Esteem Scale). [39] According to Wang Chunchao and Zhang Chengsha (2019), the main measurement methods of non-cognitive ability include personality tests, questionnaires and behavioral experiments. [40] Many researchers (2017) believe that researchers recognize the two standard psychological scales of self-efficacy (self-efficacy) and self-esteem (self-esteem) as an objective measure of non-cognitive ability.

You can see the current academic measurement of the cognitive ability has a variety of ways, mainly through the method of questionnaire survey, the personality, self-esteem, psychological capital, such as quantitative assessment, the most widely applied test method for "five" personality scale test, although there are some deficiencies and improvement space, but at present as the cognitive ability to measure is the most common and basic method. There are many methods and models used to measure non-cognitive ability, but they can not be used as a perfect scheme to measure non-cognitive ability. The measure of non-cognitive ability still needs to be studied and explored continuously.

6. Conclusion

The current epidemic causes the global economic downturn, China's economic growth faces great pressure; China's aging degree is deepening year by year, the future labor force will be irrevocably reduced; The CPC Central Committee has called for transforming China's economic development from "fast and good" to "good and fast" and promoting high-quality development. All of these difficult problems have put forward a major test for the improvement and improvement of China's traditional human capital theory, as well as the overall improvement of human capital quality in China. The research and cultivation of non-cognitive ability is an important topic in the present era and the core content of the new human capital management, which must be paid enough attention to.

Through summarizing the concept of non-cognitive ability, the importance, the formation factor and the development mechanism, and the measurement method, the theoretical framework of non-cognitive ability is gradually constructed. However, there are also some unsolved problems, such as how to introduce the cultivation and assessment mechanism of non-knowledge ability in our current student training and education, and make effective quantitative assessment. It is hoped that this paper can provide some reference for the theoretical research and application scheme design of non-cognitive ability.

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