

# Motivations for Chinese Students Choosing a college Major

Youning Zhao \*

School of Journalism and Communication, Shanghai International Studies University, Shanghai, China

\* Corresponding Author Email: 0191148067@shisu.edu.cn

**Abstract.** This study aimed at exploring the main determinants of college major choice in China, and how factors stemming from the rational choice framework contribute to the final decision. Based on China's *Gaokao* policy, this paper evaluated the fitness of rational choice theory for Chinese students choosing college majors and analyzed the decision mechanisms adopting primary and secondary effects, Coleman's model, and the thin and thick models. Specifically, the choice of a college major is a result generated by the balance of risks, costs, and benefits, influenced by preferences and values, and shaped by certain macro-level conditions. Certain social influences have been emphasized in Chinese society.

**Keywords:** College Major, Rational Choice Theory, Chinese Higher Education.

## 1. Introduction

Deciding whether one should go to college and which major to choose are crucial decisions. Students' major choices directly determine the environment where they interact with professors and peers, influence their differential behaviors in school such as satisfaction and persistence, and affect future occupational opportunities and rewards [1]. Since the expansion of higher education in 1999, Chinese students have had more access to colleges and universities and thus face more education choices. Unlike students in the United States, who select their specific majors after entering school and experiencing a period of college life, Chinese students are required to follow the major-application admissions rules -- they must choose college majors according to their scores voluntarily after the college entrance examination. Several universities in China have adopted the "enrollment in general category", allowing students to decide their major among a few subjects in the category in the second year [2]. Albeit enjoying more freedom when deciding on a major, students have little chance to change their major after enrollment, generally, only the top 10% of students succeed to change their major [3]. For those who fail in changing majors and are unsatisfied with the present, optional remediations are taking a minor subject, choosing a dual degree, taking courses in other majors, applying for a master's degree, etc., which require extra time and effort. Under circumstances above, the choice of major is pivotal to Chinese students, and exploring factors influencing major choice has become a topic of interest. To what degree college major is related to future occupational opportunities? What are the economic and social influences of students' major choices? Understanding mechanisms behind students' college major choices also shed light on major-related issues.

Acknowledging the importance of major choice, many researchers and practitioners endeavor to explore the elements influencing the process of picking a major. The findings revealed that the choice of major is a result of comprehensive factors. When deciding on a major, one may consider the expected rate of return on educational investment -- the economic costs of the major, the possibility of completing a certain college program, and the long-term returns, which have different degrees of influence on students from different family SES [4-5]. Personality, innate ability, personal preference, and academic preparation are key factors deciding students' confidence and the valuation of risks [1, 2, 6]. Important others, social environment, and stereotypical impressions of majors also play a decisive role in students deciding on a major [6].

However, previously published studies were mostly empirical studies limited to one or two factors and failed to conclude a comprehensive perspective suiting the Chinese context. Moreover, college

students nowadays are primarily Generation Z, who may manifest new features when making decisions, hence factors or the degree of influence on their major choice has changed for these students. Often labeled Digital Natives and the Net Generation, Generation Z refers to those born from 1995 through 2010, who regard education as “the foundation for individual success and societal prosperity”, and as Seemiller and Grace’s study [7] revealed, parents’ thoughts and advice were more important, compared with money, contrary to the previous study. Focusing on Chinese Generation Z students, this study attempts to summarize the main factors of major choice, that contribute to students' behavior under certain policies and cultural environments.

## 2. Enrollment Policy in China

Education has long occupied a crucial role in Chinese culture. In China, the national college entrance examination, or *Gaokao*, is the prerequisite for entering higher education. The national examination, first established in 1952, is conducted with nationally unified subjects, questions, scoring standards, and requirements for registration which are decided by the National Higher Education Admissions Committee established by the central government [8-9]. Students afterward fill out aspiration forms to choose schools and majors, usually according to their *Gaokao* score. Although the exam mechanism has become routine in China, the enrollment system for higher education in China has witnessed three historical stages: the centralized planned mechanism, the market-like mechanism, and the quasi-market mechanism, which marked the trend of decentralization of authority in setting majors and deciding enrollment policies and enabled students to confront more major choices [8]. One of the landmarks in this process is the Interim Provisions on Higher Education Management Responsibilities by the State Council, in 1986, which empowered colleges and universities to implement contractual programs, self-supporting students, and directed enrollment by the ratio stipulated by the state, leading to the fact that more students have the access to higher education [9].

China’s current policy has guaranteed students enjoy more freedom when choosing a college major. Since the implementation of the policy of “enrollment in general category” and “major shunt” in 2002, first on a relatively small scale, students have a second chance to choose a major after entering school [9-10]. Students under this system are facing two decision periods: first, freshmen after entering college by selecting a general category can choose between several general courses, and different combinations of courses will be the prerequisite for a certain major; second, after the major shunt, which consider students’ willingness, taken courses, and GPA together, students will study a specific major at the second year. Tan researched 113 “211 Project” colleges and universities and found that 73 colleges and universities implemented the policy above, with a ratio of 64.6%, and the proportion of major shunts in each region in China is over 50% [10]. Further, the attempt at general education blurred boundaries among majors, helped students develop a strong academic foundation, satisfied students’ needs for developing personality, and improved students’ initiative and enthusiasm.

The link between academic preparation and college major has been intensified in China, especially since the reform of *Gaokao* and the “3+X” policy in 2014, which listed required subjects for applying to specific majors in higher education. According to MOE, students who plan to study these majors in college and university need to choose the corresponding subjects in high school. For example, most engineering majors require physics, and most medical majors demand physics and chemistry. Based on the data from MOE, in 2021, 10.78 million students applied for the national college entrance examination, and 10,013,200 were enrolled, contributing to the overall acceptance rate reaching 92.89% [11].

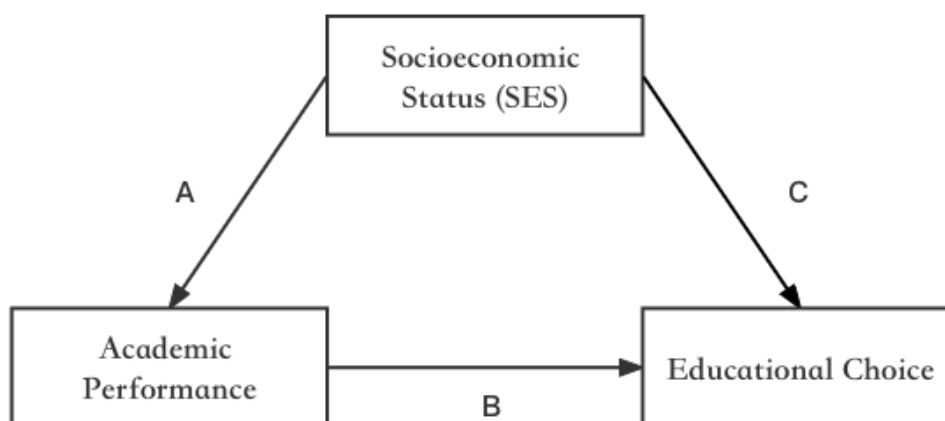
### 3. Rational Choice Theory Model

#### 3.1. Overview of RCT

Rational choice theory (RCT) holds that an individual is a rational man with purposes, whose action is purposive, has a particular utility for the actor, and is resulting from logical thinking [12]. Green [13] explained Coleman’s conception of “rational choice” as a decision based somehow on reason, “the faculty or process of drawing logical inferences”. Motivated by their wants expressing their “preferences”, and the possibility of making profits, people act within given constraints and based on information they have about certain situations, to achieve a profitable balance of rewards over costs. Economics initially was the dominant discipline for RCT research, assuming that people are driven by money and their desire to make profits, leading to models of human behaviors [14]. George Homan devised the exchange theory, believing that approval, a “generalized reinforcer”, is a general means of exchange in social interaction, which became a stepping stone for establishing RCT in sociologies [15]. Blau and Coleman further extended the RCT based on this framework [12,16].

#### 3.2. RCT in education: primary and secondary effects

RCT was first adopted in the education field by Boudon, who hypothesized primary and secondary effects of social stratification to understand social inequality in higher education. In other words, Socioeconomic Status (SES) represents genetic, financial, and cultural impacts and differential SES leads children to different educational paths [17].



A and B = Primary effects of SES

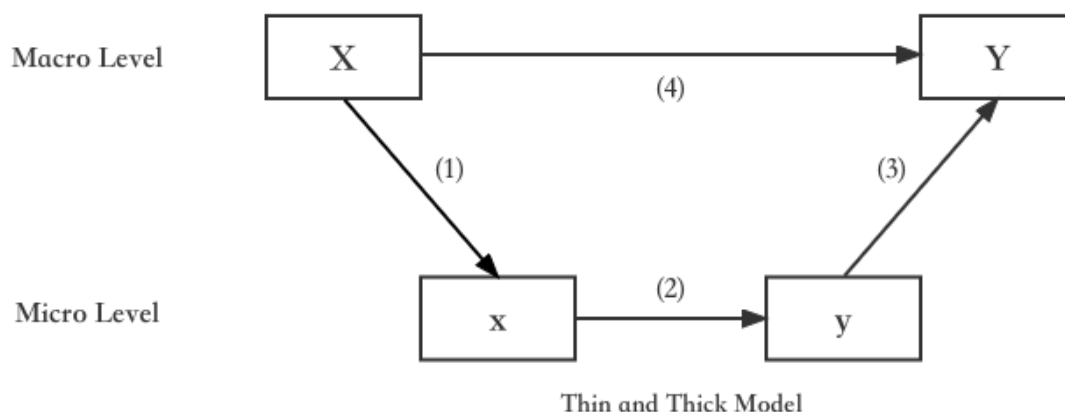
C (exclude student's academic performance) = Secondary effects of SES

**Figure 1.** The primary and secondary effects of socioeconomic status (SES)

As Figure 1 shows, the primary effects indicate the influence of SES on Academic Performance (arrow A), subsequently extending to Educational Choice (arrow B). For example, financially speaking, higher SES families can easily bear various educational costs, offering a range of training courses, educational opportunities, and experience, thus their children turn out to be more prone to excel academically and achieve higher educational qualifications. The secondary effects refer to differences in educational choice or success as a result of differential SES, excluding academic performance factors (arrow C). Families with different SES, for instance, hold differential values, create distinct family cultures, and place varying levels of priority on short-term benefits, long-term returns, monetary rewards, and spiritual assets, which contribute to different educational choices. Primary and secondary effects assist RCT in further demonstrating educational choices with regard to SES.

### 3.3. Coleman’s RCT model

When making a decision, one will consider both individual and structural elements. As shown in Figure 2, Coleman built a macro-and micro-level proposition to reflect the “logic” of “purposive action explanations” [12].



**Figure 2.** The multilevel structure of RCT explanations

In Coleman’s diagram, *Macro level* refers to social structures, both large systems such as a society or a city, and small systems like a family and a study group. *Micro level* refers to individuals. Accordingly, the macro-level encompasses macro-conditions (X), which are social and material contexts influencing or constraining one’s choice, and macro-outcome (Y), referring to new structures created by individuals’ actions. The micro-level contains micro-conditions (x), which are individuals’ properties including previous experiences, preferences, values, beliefs, etc., and micro-outcomes (y), referring to the final choice one made rationally. Based on Figure 2, type 1 relations (X to x) mirror how social conditions influence one’s available alternatives, information, values, and eventually choice-making mechanism. Under the educational context, especially for major-related choices, Type 1 relations strongly pertain to primary and secondary effects. Type 2 relations (x to y) represent how an individual under certain social structures and constraints behaves, based on certain principles of action, and this will be further explained in the next paragraph. Type 3 relations (y to Y) illustrate how actors’ behavior generates macro-outcome, and this occurs in various forms, usually, through the interdependence of actions – actions combine to generate a macro-level outcome, such as making collective decisions, the establishment of social rules, etc. [12] Type 4 relations (X to Y) display “an empirical regularity” at the macro-level [18], whereas in this article, individuals’ choice of major remains to be the emphasis, thus arrows 3 and 4 will not be covered in detail.

### 3.4. Thin and thick rational models

At the micro-level, thin and thick models can be adopted to explain individual actions. Thin rationality, regarded as “assumptions” by Ferejohn, assumes that individuals “efficiently employ the means available to pursue their ends”. Individuals are self-interested and instrumentally rational and they efficiently utilize available means to pursue their ends according to preference orderings, which are stable and transitive [19-20]. Unlike the thick model, thin rationality analyzes individuals’ preferences by avoiding “psychology and thought”, simply to maximize available resources, and achieve optimal results [21].

The thick rational model contemplates intentionality and specifies the individuals’ preferences, values, and beliefs. Individuals, though in different situations, value the same sort of things like wealth, income, power, status [19]. Under the thick rational model, individuals pursue not only exchangeable goods such as wealth and status but also nonexchangeable goods such as a passion for a hobby. Individuals’ actions, interpreted by either thin or thick models, make sense to themselves, representing the appropriate, and even the best actions they could choose.

### **3.5. RCT and college major choice**

The process of choosing a major can be explained by RCT. Consistent with RCT, when making educational decisions, individuals intend to balance expected costs and benefits and choose the best available options, with the purpose of maximizing their utility.

Taylor concluded conditions for rational choice, the more of which are satisfied, the more effective a rational choice would be, and four conditions are as follow: (1) actors are facing limited available options; (2) actors are facing clear, substantial, and well-defined costs and benefits attached to each option; (3) actors' decisions and actions are of tremendous importance; (4) many similar or same situations occurred before [22].

Education decisions, especially major choosing mechanisms in China, meet the conditions above: (1) students facing limited educational choices: whether attend higher education or not; which college to attend; which major to choose within limited categories, etc. (2) each decision lead to, directly or indirectly, expected cost and returns, both monetary and non-monetary; (3) educational choice, especially in terms of higher education and college major, is of tremendous significance for students and their family, as demonstrated in the introduction; (4) educational choices take place globally, serving as a solid reference. Consequently, RCT is ideally suited to the research of decision-making in the field of education.

## **4. Determinants of Choosing a college Major**

RCT implies that the choice of college major can be explained through a decision-making process that aims to minimize the risk and maximize the benefits, which is affected by the personal criteria for assessing costs and returns, individual values, and social factors. The following section will introduce the decision mechanism of risks, costs, and benefits (i.e. individual-level choices), and the mechanism of personal values and social influence (i.e. social conditions). Both mechanism are complementary, the results that joint the primary and secondary effects, thin and thick models, and macro-micro transition. For instance, students with different SES value risk-benefit differently, and their preferences resulting in the final decision may also be shaped by society.

### **4.1. Decision mechanism of risks, costs, benefits**

At the individual level, the choice of a college major, in accordance with the thin model, is generated by one's assumptions of maximizing benefits by avoiding the probability of risk and balancing expected costs and rewards according to current situations (type 2 relation in Figure 2).

#### **4.1.1. Risk aversion**

Mitigating risks plays a significant role in the major-choosing process. Rochat and Demeulemeester highlighted that college concentration was influenced by at least two aspects of risks: the possibility of graduating successfully, and the likeliness of gaining better returns after graduation [23]. Students will consider their fitness for certain majors and their perceived success, thus avoiding ones they are not confident in, as discussed above in the thin rational model.

Personality and innate abilities are the main considerations for the probability of completing a certain major, and contributors to the risk-return trade-off [24]. Scholars ascertained that personality differences existed preceded students' enrollment, served as a predictor of university faculty and that person-environment fitness was linked to academic satisfaction and performance. To name a few, natural-science students are mainly characterized by introversion, while applied-science students are industrious with tough minds [1, 25]. Innate abilities in students' early life shape the feasibility of a particular education program and students with inadequate capability preferred less-demanding majors to pursue higher chances of success in college [23-24]. The genetic factor and early childhood experiences, based on primary effects, may also contribute to ability or performance differences between high-status students and their low-status peers [26].

Academic preparation has been described as a critical “filter” when discussing the college major choice. The choice of a college major is influenced by early academic preparation, that is the accumulation of knowledge and skills. Specifically, courses offered by high school and requirements for college major applications will affect students’ major choices [1, 24]. Previous research revealed that mathematics and reading test scores, SAT scores, high school GPA, and efforts in school assignments contributed to academic confidence and directly influenced the decision process for college majors [1, 6]. Differential academic preparation and performance are generated by primary effects, given that students from higher SES have greater opportunities to acquire resources not only economically, but also culturally and socially, and hence have more chances to improve academic performance and certain scores. For example, parents with higher SES are more capable of guiding students’ academic behavior, providing extra training programs, and offering educational opportunities in high-quality institutions with extra tuition [26]. Additionally, sophomore choice of subjects served as a fork in the road, assisting students to sharpen required skills and abilities to better prepare for a college major, the significance of which has been intensified in China’s context. In China, especially with the implementation of the “3+X” policy for the college entrance examination, which means that high school students choose three subjects among politics, history, geography, physics, chemistry, and biology, and the chosen subjects directly decide the range of majors they can choose in colleges and universities [2].

Social demotion is also one domain of risks to be averted, and education is regarded as a paramount way to move up socially and economically, notably for those born and brought up in lower socioeconomic backgrounds [26]. To avoid downward mobility, students are expected to achieve a social status at least equivalent to that of their parents, and in accordance with Boudon’s secondary effects [17], students from differential SES hold distinct ambitions, expected educational returns, and varying degrees of motivation. Scholars indicated that students from different social classes are all motivated by the maintenance of class positions, nevertheless, different SES leads to disparate thresholds for the optional education levels and fields, guaranteeing students minimize the risk of downward social mobility [26]. Reinforcing the risk aversion mechanism, previous studies revealed that students with lower SES were more risk-averse, considered more about the risk component, and consequently chose a less risky major requiring less difficulty or time; whereas high SES students were prone to choose more ambitious educational paths despite higher risks [23, 26].

#### **4.1.2. Expected Costs and Benefits**

The expected rate of return on educational investment, with regard to the expectations of the costs and benefits, is one of the factors influencing students’ choice of college majors, stemming from the thin model’s maximizing utility, and influenced by secondary effect [4, 5, 17].

Expected costs include tuition fees, materials, opportunity costs of education, etc., and students with higher SES are more likely to bear these direct and indirect costs, whereas those with lower SES may value more current or short-term yield when deciding on a college major [26, 27].

Short-and long-term benefits include the strength of the school, instrument environment, major satisfaction, occupational opportunities, future rewards, etc. [3, 24] Tong [28] researched 1050 students in China, showing that students will consider the overall strength and popularity, the employment situation of graduates, and the school’s location when choosing a major. Future earnings stream and employment expectations are also imperative [24]. Wiswall and Zafar [29] surveyed 501 undergraduate students at New York University and emphasized the role of heterogeneous beliefs about expected future earnings. Scholars indicated that Science, Technology, Engineering, and Mathematics (STEM) graduates are prone to gain advantages in the labor market, both in China and abroad; majors related to business and law are also rewarding [6, 29]. Students from different SES, however, have different levels of emphasis on the importance of expected income, in which secondary effects play a role. Students with higher SES are more inclined to access relatively well-paid jobs through their family social networks and are less concerned about cost-benefit factors, thus considering more about their interests and may prefer non-popular majors with a higher probability of admission [30]. Tu and Xia [27], based on a survey of 2774 Chinese college students, revealed that

students from poor SES overly focused on the employment rewards, and ignored their fitness and the long-term development, leading to the choice of majors not matching their abilities, personalities, and preference. Yang and Sun [31] further discussed how secondary effects worked in the Chinese context. Parents and students from higher SES have more access to information, more open-mindedness, and a more comprehensive understanding of majors and the corresponding development prospects, which contributes to the rationality of major choice. When calculating the cost-benefit effect, students will assess the likelihood of success and try to avoid the risk of downward mobility, as a result, in China, better SES will lead to applied majors with higher income returns such as finance and economics, engineering, and management, whereas students with lower SES tend to choose theoretical majors with lower tuition fees and admission risks like science and humanities and social sciences [31].

## **4.2. Decision mechanism of personal values and social influence**

In this mechanism, the major choice is influenced by an individual's own interests and values, as illustrated in the thick rational model; a choice of college major is likewise the outcome of social influence since one's values are more or less influenced by the family and shaped by the society, shown as the secondary effect (Figure 1), macro-micro transition (Figure 2), and the thick rational model.

### **4.2.1. Preferences and values**

In the process of maximizing available resources to make the ideal major choice, students also take preferences and values into consideration instead of solely measuring costs and returns, demonstrating the effects of the thick rational model, and these factors can be shaped by important others, especially parents.

In general, students, regardless of gender, appeared to be influenced by their interests in the major, both for incoming freshmen and later changes of major [32]. Pecuniary factors have been discussed above as an aspect of balancing costs and benefits. Non-pecuniary factors, such as satisfaction, parental approval, social status, non-pecuniary aspects of a future job, etc. have also played significant roles in deciding on a college major [29, 33]. Students' preferences can be guided by early education, as an example of the primary and secondary effects. In China, students from higher SES, who are cultivated in humanities and arts from an early age, are expected to be more motivated in studying humanities and social sciences in colleges [30]. Gender differences have been discovered in personal preferences and values. Zafar outlined palpable gender differences in preference for college majors and argued that this contributed to the gender segregation in college, for example, females preferred nonpecuniary outcomes in the workplace to males [33]. Previous scholars also proved Zafar's findings that although the gender parity point in higher education has nearly been achieved, horizontal segregation among fields of study is still evident: men are more probable to obtain a degree in natural sciences, mathematics, and engineering, while women are more prone to graduate from education, law, humanities, social sciences, and arts [34].

Gen Z students present new traits in the measurement of a particular college major. Seemiller and Grace revealed that for Generation Z students, money-related factors did not account for as much of the consideration as previous studies have suggested, instead, more than 70% of Gen Z students interviewed rated highly relational factors such as the notion of not disappointing others, the opportunity for advancement, the belief in benefiting others, etc. [7].

### **4.2.2. Important Others**

Interpersonal influence, significant other's influence, and role model influence are crucial determinants in college major selection. Among these, parents more thoroughly infiltrate into students' educational decisions, thorough occupations, education levels, and involvement.

Parents' occupations have an overwhelming hold on their children's major choices, influencing their early career perceptions as a reference, for example, STEM majors were more probable to be chosen by students whose parents have STEM-related experiences [6, 35]. Parents with high social

prestige occupations tended to continue their children in the same or similar occupations as themselves, while parents in the reverse situation do not [31].

The educational level of parents affects the path and quality of children's education and their major choices. Well-educated parents possess the advantages of literacy, knowledge structure, professional experience, and social resources, hold more authority in the relationship with their children, and are more capable of guiding major choices, helping their children to choose majors that meet social trends and needs, and with a broader range of employment in the society. Whereas students with less-educated parents tend to follow other people's advice such as teachers and seniors [29-30].

By intentionally nurturing or punishing certain behaviors, the family can encourage or deter specific interests or abilities. Specifically, parental involvement like monitoring children's courses, setting educational standards and goals, and giving suggestions for majors, will directly influence the attitude and choices of a student [36]. The importance of parental influence has been amplified for Gen Z students, who regard their parents as role models and "copilots", and are accustomed to seeking parents' perspectives and suggestions when making important decisions [7].

#### 4.2.3. Social Context

Individual characteristics, values, and behaviors are socially conditioned through social positions, relations, and culture, serving as an aspect of the macro-micro transition in Figure 2.

Differential expectations for males and females affect their major and career choices, result in higher acceptability of sex-typical educational choices, and end up as sex segregation. Males are expected to have masculinity, that is dispositions like independence, competitiveness, risk-taking, logical thinking, etc. While femininity for females includes traits like gentleness, dependence, sentimentality, romantic, and easily influenced [37]. Males and females, as a result of social values, prefer differential characteristics of certain majors and hold different plans for future life, career, and family; when people make choices that are inconsistent with social expectations of a certain gender, they will face pressure and the possibility of being marginalized and may eventually give up this choice [38]. Bradley developed this and argued that males and females internalized different values, preferences, and gender roles during the socialization process, leading them to choose different fields of study [34]. In particular, women's "nurturing roles" motivated them to choose majors and careers allowing them to take care of their families in the future, despite the lower rewards they may receive. In China, females are influenced by traditional social norms of "family-oriented" values, thus choosing less risky and more stable majors like education, language, etc. [37] Recent research about Generation Z college students, however, indicated that social recognition, public acceptance, are no longer the prominent motivations for over a quarter of the interviewees [7]. The applicability of this finding to Chinese culture and society requires further research.

Additionally, the effects of parents are reinforced in certain cultures, for example, in many Asian cultures and traditions, especially in China, self-worth is defined by obedience to parents and their behaviors bringing honor and respect to the whole family, thus children's career-related choices, to some extent, are also choices decided by the whole family given that children are anticipated to contribute to their parents' wellbeing and contentment during their senior years [39]. As a result, Chinese students tend to select a college major allowing them to achieve the ideal goal of benefiting themselves and providing the avenue to support their siblings and parents in old age. Tu and Xia's research indicated that in China, women may be more likely to seek the advice of family members in choosing their majors and neglect to express their own beliefs, resulting in choosing majors that do not align with their characteristics [27].

When deciding on a college major, students also consider social parameters. In Tong's study of 1050 Chinese students, individuals were subject to various social constraints in choosing majors, including society's demand for talents, current and future economic situation, relevant policies, and the trend of public opinion, among which social need was the most dominant, accounting for 61.3% of the total [28].

## 5. Conclusion

This study sets out to expound on how a set of indicators derived from RCT, especially under Coleman's model, primary and secondary effects, and thin and thick models, can account for Chinese students' choice of major in college, providing a more comprehensive insight into motivations for major-related decisions. At the micro-level, students are swayed by risk aversion, which is closely related to one's personality, abilities, academic preparation, and avoidance of social demotion; and are driven by the expected costs and benefits related to certain major choices, both direct and indirect. The choice of a college major is also an outcome of personal preferences and values, and interactions with parents and society. Particularly, the influence of family and social values has been accentuated in Chinese culture. However, a limitation of this thesis is that the degree to which students are motivated by the discussed determinants remains uncertain, due to a lack of current research addressing all the foregoing factors. In addition, further research on internal differences among students with similar SES is warranted, as segmenting the research objects enables the detailed elaboration of the decision-making mechanisms and constructive advice for students, families, schools, and policymakers, and this study provides a good starting point for discussion and future attempts.

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