Proceedings of the 6th International Conference on Educational Innovation and Psychological Insights
DOI: 10.54254/2753-7048/2025.ND26189

Who Chooses? Exploring Family, Gender, and Aspirations in Chinese High School Subject Selection

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Abstract. In 2014, China's college entrance examination (Gaokao) reform introduced the "3+1+2" curriculum framework, which links students' high school subject choices to their future college majors and enrollment opportunities. This study explores how these pivotal academic decisions are influenced by parental expectations, gender norms, and students' career aspirations within the context of the new policy. Using a mixed-methods approach—incorporating semi-structured interviews and written responses—we explore the interplay of these factors among 34 students in Beijing, China. Findings show 61.8% of students aligned their choices with parental preferences: highly educated parents (with a master's degree or higher) predominantly steered students toward STEM fields (50%), while 80% of low-educated parents (with a junior high school education or lower) favored humanities, driven by perceptions of stable employment for government jobs. Gender differences were also evident: males leaned toward STEM (e.g., computer science), and females toward arts/humanities. Most students (79.4%) had clear interests (63% influenced by family), while 20.6% made utilitarian choices. While the "3+1+2" reform expands subject choices, it remains constrained by family background and gender norms, reproducing inequalities. We recommend enhancing information support for low-educated families and providing gender-equitable guidance to foster inclusive decision-making.

Keywords: subject selection, Gender norms, Parental influence, Career aspirations, Educational inequality

1. Introduction

In 2014, China's college entrance examination (Gaokao) reform introduced the "3+1+2" curriculum framework, a critical milestone for 16-year-old students, as their subject choices shape long-term academic and career trajectories. These choices directly affect eligibility for university majors and, ultimately, socioeconomic outcomes. Under the "3+1+2" model, students take three core subjects (Chinese, Mathematics, English) and select 1 primary specialized subject (Physics or History) plus 2 secondary electives (Geography, Politics, Chemistry, Biology). To maximize college admission chances, most students opt for either the science-oriented "Physics, Chemistry, Biology" (STEM-oriented track, or PCB) or the humanities-focused "History, Politics, Geography" (Humanities track, or HPG) [1,2]. PCB aligns with STEM fields like artificial intelligence or biomedical engineering, while HPG aligns with humanities majors such as law, education, or public administration [3].

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Unconventional combinations (e.g., "History, Chemistry, Geography") are rare, as they severely limit university major options [1]. This structure creates a clear divide: PCB students often enter high-tech industries with higher earning potential, while HPG students tend to pursue stable roles in government or education [4].

Gender significantly influences subject choices. Existing research shows that girls, despite strong academic performance, often avoid science-intensive paths. Farenga and Joyce [5] noted that children's choices of "appropriate" science courses mirror adult gender patterns in higher education enrollment. While eighth-grade math scores strongly predict future STEM achievement, Tai et al. [6] found that students' career interests at that age are an even stronger indicator—highlighting the impact of early gendered interest formation. Studies by Ivie et al [7] and Ivie & Guo [8] further suggest that high school is a critical intervention period, as many female Physics professionals developed their interest during this time.

Moreover, girls often show lower interest in STEM due to stereotypes, lack of encouragement, and classroom dynamics [9]. In small groups, gendered interaction patterns emerge: girls tend to engage passively or prioritize collaboration, while boys often dominate and take leadership roles [10,11]. These differences affect confidence, engagement, and long-term aspirations, with parents and teachers reinforcing such trends through expectations that shape students' self-perceptions and academic self-efficacy [12,13].

Understanding how gendered academic inclinations and social influences intersect with structural constraints like the "3+1+2" framework is critical. These forces do not merely reflect individual aptitude or interest—they shape career trajectories and widen gender gaps across disciplines. As China prioritizes national STEM development, addressing gendered nuances in subject selection becomes essential to ensuring equitable access to high-paying, high-growth fields. This study investigates how the interplay of parental influence, gender norms, and career aspirations affects students' subject choices under the "3+1+2" policy, with particular attention to its implications for gender equity in education and the workforce.

2. Method

2.1. Participants and demographics

Thirty-four high school students (18 males, 16 females) from public and private schools in Beijing participated. All were in their final two years of high school, aged 16–18. Table 1 summarizes participant demographics, including subject selections, parental education levels, career interests, and alignment with parental career expectations.

2.2. Data collection and analysis

Data were collected between February 11 and March 22, 2025, using a mixed-methods approach. Participants engaged in one of two modes:

1. Phone interviews (14 participants): Each 10–15-minute interview addressed thematic questions.
2. Written responses (20 participants): A structured questionnaire, mirroring the interview protocol, allowed asynchronous participation.

Responses from both modes were analyzed using thematic coding to identify patterns in academic preferences and career motivations.

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2.3. Measures

The research instrument focused on three themes:

1. Academic Performance and Subject Preferences: Questions included self-reported grades in core STEM subjects (e.g., mathematics, Physics) and inquiries like, “Which subjects do you enjoy most, and why?”

2. Career Aspirations: Participants described their desired careers and influencing factors via prompts such as, “What profession do you hope to pursue, and what motivates this choice?”

3. Parental Influence: Questions explored parental opinions on subject selection (e.g., “Do your parents recommend specific subjects?”) and career expectations. Parental education levels were quantified via the question, “What is the highest degree attained by each parent?”

Table 1. Participant demographics

ID	Subject selection	Parental education level	Whether you know your interests	Interests	Are parents' choices consistent
M01	Physics Biology Chemistry	father:university mother:senior high school	yes	computer	align
M02	History Geography Politics	father:junior high school mother:junior high school	yes	sports-related	align
M03	Physics Biology Chemistry	father:senior high school mother:university	yes	sports-related	align
M04	Physics Politics Chemistry	father:junior high school mother:junior high school	yes	computer	align
M05	Physics Biology Chemistry	father:master mother:master	yes	law	align
M06	Physics Biology Chemistry	father:master mother:graduate student	yes	environmental Protection engineer	align
M07	Physics Biology Chemistry	father:junior high school mother:junior high school	no	no	align
M08	Physics Biology Chemistry	father:junior high school mother:junior high school	no	no	align
M09	Physics Biology Chemistry	father:university mother:university	yes	history-related	not align
M10	History Geography Politics	father:senior high school mother:junior high school	yes	archaeologist	not align
M11	Physics Biology Chemistry	father:senior high school mother:senior high school	yes	philosopher	not align
M12	History Geography Politics	father:senior high school mother:junior high school	yes	computer	not align
M13	Physics Biology Chemistry	father:graduate student mother:maste	yes	financial	align
M14	Physics Biology Chemistry	father:master mother:master	yes	economist	align
M15	History Geography Politics	father:graduate student mother:graduate student	yes	computer	align
M16	Physics Biology Chemistry	father:senior high school mother:junior high school	yes	computer	not align
M17	Physics Biology Chemistry	father:senior high school mother:junior high school	no	no	align
M18	Physics Biology Chemistry	father:Junior high school mother:junior high school	yes	geographist	not align
F01	Physics Biology Chemistry	father:university mother:university	yes	financial	align

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Table 1. (continued)

F02	Physics Biology Chemistry	father:senior high school mother:senior high school	yes	doctor	align
F03	History Geography Politics	father:junior high school mother:musician	yes	music conducting	align
F04	Physics Biology Chemistry	father:university mother:university	yes	psychology	align
F05	History Geography Politics	father:junior high school mother:junior high school	no	no	align
F06	History Geography Politics	father:junior high school mother:junior high school	no	no	align
F07	Physics Biology Chemistry	father:master mother:university	yes	literature	not align
F08	History Geography Politics	father:university mother:university	yes	art	not align
F09	Physics Biology Chemistry	father:university mother:university	yes	art	not align
F10	History Geography Politics	father:senior high school mother:senior high school	yes	art	not align
F11	Physics Politics Chemistry	father:senior high school mother:senior high school	yes	art	not align
F12	History Geography Politics	father:senior high school mother:senior high school	yes	art	not align
F13	Physics Biology Chemistry	father:junior high school mother:junior high school	no	no	align
F14	Physics Biology Chemistry	father:master mother:graduate student	yes	doctor	align
F15	Physics Biology Chemistry	father:senior high school mother:graduate student	yes	art	align
F16	Physics Geography Chemistry	father:master mother:master	no	no	not align

3. Results

This study explores how high school subject selection interacts with parental influence and career aspirations under the "3+1+2" framework. Qualitative data from 34 students (52.9% male, 47.1% female) reveal recurring decision-making patterns shaped by parental education and gender, suggesting how broader social forces influence educational pathways.

A majority (61.8%, 21 of 34) aligned their subject choices with parental preferences, while 38.2% (13 of 34) diverged. Among aligned choices, 76.2% (16 of 21) opted for science-heavy combinations (e.g., PCB or "Physics, Chemistry, Geography"), reflecting parental emphasis on STEM careers like computer science. Only 23.8% (5 of 21) chose HPG, often due to social pressure to prioritize "employ-ability" over personal interest. Among those who diverged, 76.9% (10 of 13) favored humanities or arts—yet 61.5% of their parents (8 of 13) insisted on STEM.

Parental education strongly shaped students' attitudes towards academic subject selection. When students and their parents align in their opinions, most of them (76.2%) picked STEM subjects. These students often had parents with higher education levels, and half of those parents had a master's degree or more. As one student (F14) explained:

"My parents both have postgraduate degrees. My mom is a psychologist and my dad is a doctor. They've fostered my interest in Physics and Biology since I was little. So when it came to choosing subjects in high school, we were on the same page --- I picked Physics, Chemistry and Biology. I

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want to be a doctor like my dad too. It makes sense that highly educated parents like them would lean toward guiding me to choose STEM."

On the other hand, 23.8% of the aligned choices were for the HPG (History-Politics-Geography) track. In those cases, 80% of the parents had only finished junior high or less. These parents tended to believe that HPG leads to "stable jobs" like working in government. Even though they didn't always have a deep understanding of the current education system, their opinions still matched what their children ended up choosing. As one student (F06) explained:

"I've never been good at science subjects, and I've had no interested in them since I was a kid. Even though I don't have a strong interest in liberal arts either, I really can't understand science. So I want to choose Humanities (the Humanities (HPG)), at least I can get higher scores that way. My mom also tells me that Humanities is a good choice. One of her colleagues has a daughter who studied Humanities (the Humanities (HPG)) and got a job as a civil servant. My mom thinks such a job is very stable and there's no fear of losing it, so she supports my choice of Humanities too."

In cases where students and parents disagreed, a clear pattern stood out among parents with lower education levels. Among students who chose humanities (38.5% of divergent cases), 80% of opposing parents (with junior high education or lower) pushed for STEM, citing fragmented online claims that STEM "offers more majors and jobs" without understanding real-world demands. One student (M18) noted:

"My parents both have high school degrees. I want to choose History, Politics and Geography, because my scores in Science subjects are not good, and I am interested in History and Geography, and my scores in these three subjects are also high. However, my parents think that such course selection makes it difficult to choose a major before entering the university, and the job prospects are not good, there is also the fact that the Internet is always saying that the advantages of choosing science are greater than those of liberal arts, so they were brainwashed. So they forced me to switch to Physics, Chemistry and Biology."

Personal interest was also an important factor in students' decisions. Most students (79.4%, or 27 out of 34) said they had clear academic interests, but even within this group, 63% (17 students) shared that their interests were influenced by their families. For example, student F03 stated that:

"I am interested in music because my mother is a musician, engaged in the music industry, and I have been influenced by such an environment since childhood. I admire my mother, I think she is very temperament. It's probably genetic, my parents, teachers and I all think I have a talent for music, so they've always nurtured me and made me very interested in music."

Student M06 noted that:

"My father is an expert in geographical environment, he told me this knowledge since childhood, which makes me very interested, and he proposed that if I engage in this industry in the future, he will give me some help. So I think that will be good for me in the future, so my current vision for the future is to work in geography."

The remaining 37% (10 out of 27) of students with personal interests connected their hobbies to potential careers, showing how personal passions also played a role in shaping their subject choices. For example, student M04 shared:

"I especially like playing games, like CSGO, Valorant. I almost every week do not write homework, play games first, my parents often because of this nag me, but I think it is particularly interesting. And I really like to study things like digital products. I also often help my parents and friends fix their computers. So I think that's something I'm interested in, and I hope that's something I can do in the future."

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Conversely, 20.6% (7 of 34) had unclear acadmic interests and made utilitarian choices. A small portion (25%, 2 of 7 students) chose subjects they felt would give them higher scores. One student (M07) explained:

"I don't have interests or career plans. I just picked subjects I'm good at to boost my Gaokao score."

The majority of this group (75%, 5 of 7) were less engaged with school overall and followed their peers' choices instead. One student (M17) said:

"I don't like studying, so I chose what my best friend did—I want good memories, not just grades."

Gendered aspirations showed up clearly in students' subject choices. 22.2% of male students (4 of 18) aimed for computer science, linking gaming and other technology-related hobbies to STEM. Meanwhile, 37.5% (6 of 16) of female students favored arts and humanities, often with parental support in areas like music.

Life goals also played a role in shaping decisions. 35% (12 of 34) said they wanted a "carefree life," choosing subjects that felt more stable—like STEM (7 students)—or simply following friends (5 students). Most of these students came from families where parents had only finished high school. In contrast, half the students (50%, 17 of 34) were more "achievement-oriented." They selected subjects that matched clear goals, such as becoming an environmental engineer, and were often supported by parents with higher levels of education.

4. Discussion and conclusion

This study highlights how parental influence and gender norms shape high school academic subject selection under China's "3+1+2" educational reform.

More than 60% of students followed their parents' preferences, and these preferences varied by education level. Parents with higher education levels often actively encouraged students toward STEM subjects to secure advantageous careers. In contrast, parents with lower education levels either passively favored humanities—believing they lead to "stable jobs" in the government—or pressured children into STEM based on incomplete or inaccurate information obtained mostly on the internet. This shows that families with less educational background often have limited access to reliable guidance when helping their children make academic decisions.

Gender patterns also persisted. Male students were more likely to choose STEM fields, often linking them to hobbies like gaming or technology. Female students were more likely to lean toward arts and humanities. These trends continue to reflect traditional gender stereotypes and may contribute to long-term gender divides in the job market.

Most students (79.4%) had clear personal preferences for academic subjects and career paths, with 63% shaped by family. Meanwhile, 20.6% of students made utilitarian (i.e. grade-oriented) or peer-oriented choices, revealing how pressure from exams and social expectations decision-making.

While the "3+1+2" reform was designed to provide more flexibility by expanding students' choices, the decisions students make are still shaped by family background and gender norms. As a result, the system can unintentionally reproduce existing inequalities: students from highly educated families get encouraged toward high-paying fields in STEM, and students from less-educated backgrounds face hidden barriers.

To make high school academic subject selection more fair and student-centered, we recommend:

1. Improving access to reliable information for families with lower education levels, so that parents can better support students' decisions.

DOI: 10.54254/2753-7048/2025.ND26189

2. Providing gender-inclusive career guidance inf schools to challenge stereotypes and encourage diverse academic interests.

3. Training teachers to recognize and educe gender bias, creating education environments where personal interests, rather than labels, guide students' choices.

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