



Advantages And Mechanisms of Academic Adaptation in First- Generation College Students: A Structural Equation Modeling Analysis Based on Peer Support, Collective Belonging, And Alienation

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ABSTRACT

This study investigates the advantages and underlying mechanisms of first-generation college students' academic adaptation, challenging the traditional "cultural deficit" perspective. By analyzing 313 valid questionnaire responses and employing Structural Equation Modeling (SEM), the results revealed that, contrary to the cultural deficit perspective's expectation that "first-generation college students exhibit lower learning engagement," first-generation students demonstrated significantly better performance than non-first-generation students in terms of academic resilience, learning drive, learning enthusiasm, and immersive learning. Peer support showed significant positive correlations with learning engagement ($\beta=0.407$) and sense of collective belonging ($\beta=0.644$), and a significant negative correlation with alienation ($\beta=-0.144$). The findings indicate that first-generation college students are not culturally "deprived" but rather exhibit strong learning resilience and agency. Accordingly, it is recommended that universities shift their support philosophy, strengthen peer support systems, and foster an inclusive campus culture to promote the positive adaptation and development of this population.

Keywords: first-generation college students; academic adaptation; learning engagement; peer support; sense of collective belonging; alienation; Structural Equation Modeling

INTRODUCTION

As higher education transitions from an elite to a mass and then to a universal phase, an increasing number of "first-generation college students" (i.e., students whose parents have not received higher education) are entering university campuses. Statistics indicate that first-generation students can constitute up to 70% of the student body at some Chinese universities (Zhang et al., 2017). The academic adaptation and developmental trajectories of this group are not only pertinent to individual development and social mobility but also carry profound implications for educational equity—whether they can successfully adapt and thrive during their university years directly affects whether intergenerational educational transmission can be disrupted, and whether higher education can truly serve as an equalizer for social stratification.

However, research conclusions regarding the academic adaptation of first-generation college students remain inconsistent, and even markedly divergent. The traditional "cultural deficit" perspective (Bourdieu, 1977) posits that due to a lack of family cultural capital, first-generation college students often face multiple maladaptations upon entering university, including in language habits, learning approaches, and information acquisition capabilities. This structural disadvantage places them at a disadvantage in academic adaptation, manifesting as lower learning engagement, weaker sense of school belonging, and higher dropout risks. In contrast, the more recently emerging "resilience" perspective (Cohen & Wills, 1985) offers a different view. This perspective argues that although many first-generation students encounter numerous challenges during their initial entry into university, they have accumulated rich life experiences, stress-coping capabilities, and practical problem-solving wisdom throughout their upbringing. These "resilience resources" enable them to gradually overcome adverse conditions, demonstrating remarkable adaptability and perseverance, and even outperforming non-first-generation students on certain academic or psychological indicators. This contradiction in research findings precisely suggests that remaining confined to a binary judgment of "disadvantage" or "advantage" is insufficient; further investigation is needed into the specific mechanisms underlying first-generation students' academic adaptation, clarifying under what conditions and through which mediating or moderating variables this group can achieve

positive adaptation, or conversely, fall into adaptation difficulties.

LITERATURE REVIEW

Theoretical Foundations

Existing research on the influencing factors of first-generation college students' academic adaptation has formed several key consensuses regarding cultural capital, social support, and psychological perception. First, in response to the scarcity of family cultural and social capital, peer support has been confirmed as a critical compensatory force that bridges "information gaps" and "experience gaps." Research has found that the parents of first-generation college students are often unable to provide effective information and guidance regarding university learning and life (Li et al., 2025), and peer support can play a significant role in this context. Relevant studies have clearly indicated that first-generation college students, through "intra-generational educational assistance" such as informational guidance and emotional support, can significantly enhance their siblings' educational aspirations and behavioral improvements (Tian & Yu, 2024). This suggests that peer groups function as "cultural capital proxies" in terms of information transmission, emotional comfort, and role modeling, directly influencing individuals' academic attitudes and behaviors. Second, closely related to peer support, sense of collective belonging and alienation constitute core psychological mechanisms for understanding academic adaptation. Liu et al. (2025) found that first-generation college students demonstrated significantly lower levels of student-faculty interaction and peer interaction compared to non-first-generation students, and this low level of interpersonal interaction directly led to lower learning gains. Conversely, supportive campus environments and positive peer relationships can significantly enhance students' sense of belonging, thereby positively promoting their learning engagement. Cultural mismatch theory (Fang & Lu, 2022) provides an important explanation for this: when the interdependent cultural values held by first-generation college students do not align with the dominant independent cultural values of the university, a strong sense of alienation ensues, which in turn impairs their academic performance and psychological adaptation. Therefore, the absence of collective belonging or high levels of alienation represent key psychological mechanisms for understanding the academic adaptation difficulties of first-generation college students. Finally, learning

engagement is widely regarded as the core and most direct predictor of academic adaptation and achievement. Bao (2022) demonstrated that learning support from relational groups (teachers, family, peers) primarily functions by influencing students' professional commitment—namely emotional and behavioral engagement. Guo et al. (2020) further found that although first-generation college students did not fall behind in routine study time, they scored significantly lower than non-first-generation students in higher-order learning engagement dimensions such as deep learning and active collaborative learning. This suggests that the adaptation issues of first-generation students are not simply a matter of insufficient "effort," but rather reflect deficiencies in "how to engage effectively" and in the psychological and social resources that support effective engagement.

Research Hypotheses

Based on the foregoing theoretical and literature review, this study proposes the following hypotheses concerning the key variables in first-generation college students' academic adaptation:

H1: There is a significant difference in learning engagement between first-generation and non-first-generation college students, with first-generation students exhibiting lower learning engagement than non-first-generation students.

Previous research has indicated that first-generation college students generally score lower than non-first-generation students in higher-order learning engagement, which is associated with their relatively weaker family cultural capital and multiple adaptation obstacles during the initial entry phase. However, other studies have found that this gap is not stable under certain circumstances. Therefore, this study hypothesizes that there is indeed a significant difference in learning engagement between the two groups, while leaving the specific direction to be tested by the data.

H2: Peer support has a positive correlation with learning engagement.

For first-generation college students, peer support is often regarded as an important social resource that compensates for "information gaps" and "experience gaps." Information

transmission and emotional support from peers can directly shape their academic attitudes and behaviors. Accordingly, this study proposes that higher levels of peer support are associated with higher levels of individual learning engagement.

H3: Peer support has a positive correlation with sense of collective belonging.

Supportive campus atmospheres and positive peer relationships are considered key factors in enhancing students' sense of belonging. Therefore, this study hypothesizes that peer support has a significant positive correlation with first-generation college students' sense of collective belonging.

H4: Peer support has a negative correlation with alienation.

Cultural mismatch theory points out that there is a certain degree of misalignment between first-generation college students' family backgrounds and the mainstream culture of the university, which can easily trigger alienation. However, high-quality peer interaction can, to some extent, alleviate this cultural conflict. Based on this, this study proposes that higher levels of peer support are associated with lower levels of individual alienation.

Empirical Research

Descriptive Statistics of Data

This study distributed questionnaires through the Wenjuanxing platform via social media circles and collected responses, yielding 313 valid questionnaires. Among them, there were 174 first-generation college students (parents' highest education level high school or below), accounting for 55.6%, and 139 non-first-generation college students, accounting for 44.4%; 156 male students (49.84%) and 157 female students (50.16%); 144 freshmen (46.00%), 141 sophomores (45.00%), 15 juniors (4.80%), and 13 seniors (4.20%). After screening the collected data, the specific descriptive statistics are presented in Table 1 below:

Table 1: *Survey Participant Demographics*

Variable	Category	Frequency	Percentage(%)	Cumulative Percentage
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Gender	1.0	156	49.84	49.84
	2.0	157	50.16	100.00
	1.0	144	46.00	46.00
Grade	2.0	141	45.00	91.00
	3.0	15	4.80	95.80
	4.0	13	4.20	100.00
First-Generation Status	1.0	139	44.40	44.40
	2.0	174	55.60	100.00

Note: 1.0 = non-first-generation, 2.0 = first-generation

Table 2: Scale Factor Loadings and Reliability/Validity

Latent Variable	Measurement Item	Standardized Loading	Cronbach's α	CR	AVE
Peer Support	Dormitory Relationship	0.833	0.779	0.780	0.639
	Classmate Relationship	0.854			
Learning Engagement	Learning Enthusiasm	0.883	0.913	0.914	0.727
	Full of Drive	0.865			
	Immersive Learning	0.861			
	Academic Resilience	0.862			
Collective Belonging	Sense of Belonging	0.782	0.883	0.885	0.720
	Close Friends	0.875			
	Collective Trust	0.867			
Alienation	Not Welcome	0.905	0.913	0.914	0.727
	Violating Rules	0.881			
	Using Violence	0.894			

Scale Reliability and Validity

The standardized factor loadings for all latent variables ranged from 0.79 to 0.91, all exceeding

0.70 and significant ($p < 0.001$). Cronbach's α coefficients for the latent variables ranged from 0.78 to 0.89, composite reliability (CR) ranged from 0.78 to 0.91, and average variance extracted (AVE) ranged from 0.64 to 0.73, all reaching acceptable levels (see Table 2), indicating good reliability and convergent validity (Elsinga et al., 2013; SPSSAU Project, 2026; Zhou, 2017; Zhou & Ma, 2024).

Table 3: *Discriminant Validity: Pearson Correlations and Square Roots of AVE*

Variable	Learning Engagement	Peer Sport	Collective Belonging	Alienation
Learning Engagement	0.853			
Peer Sport	0.346	0.799		
Collective Belonging	0.394	0.543	0.849	
Alienation	0.130	-0.109	-0.224	0.853
Note: Bold diagonal values are square roots of AVE; lower triangle values are Pearson correlation coefficients.				

Discriminant Validity of Scales

The square root of AVE method was employed to test discriminant validity.

The square root of AVE method was employed to test discriminant validity. Table 3 shows that the square roots of AVE for each latent variable (diagonal values) were all greater than the correlations between that variable and other latent variables, indicating good discriminant validity (SPSSAU Project, 2026; Zhou & Ma, 2024).

Model Fit

Table 4: *Model Fit Indices*

Index	χ^2/df	GFI	RMSEA	RMR	CFI	NFI	NNFI
Criterion	<3	>0.9	<0.10	<0.05	>0.9	>0.9	>0.9

Index	χ^2/df	GFI	RMSEA	RMR	CFI	NFI	NNFI
This Study	1.862	0.948	0.053	0.075	0.981	0.960	0.975

As shown in Table 4, the model fit indices were as follows: χ^2/df = 1.862, CFI = 0.981, RMSEA = 0.053, SRMR = 0.038. Except for a slightly elevated RMR, all other indices met excellent standards, indicating good overall model fit (SPSSAU Project, 2026; Zhou & Ma, 2024).

Structural Equation Model Analysis

Path analysis results (Table 5) showed that peer support significantly and positively correlated with learning engagement ($\beta = 0.407$, $p < 0.001$) and collective belonging ($\beta = 0.644$, $p < 0.001$), and significantly and negatively correlated with alienation ($\beta = -0.144$, $p = 0.031$) (SPSSAU Project, 2026; Zhou & Ma, 2024).

Table 5: Model Regression Coefficients Summary

Factor	Relation ship	Factor	Unstand- ardized Coefficient	SE	z-value	p	Standardized Coefficient(β)
Peer Support	→	Learning Engagement	0.478	0.088	5.455	<0.001	0.407
Learning Engage- ment	↔	Collective Belonging	0.533	0.088	6.086	<0.001	0.432
Learning Engage- ment	↔	Alienation	0.199	0.093	2.132	0.033	0.133
Peer Support	→	Collective Belonging	0.638	0.086	7.437	<0.001	0.644
Peer Support	→	Alienation	-0.174	0.082	-2.129	0.033	-0.144
Collective Belonging	↔	Alienation	-0.330	0.083	-3.962	<0.001	-0.261

Difference Tests Between First-Generation and Non-First-Generation Students

The Mann-Whitney U test was used to compare the two groups on variables including learning engagement (Table 6). Results revealed that first-generation college students scored significantly higher than non-first-generation students on academic resilience ($U = 9089.5$, $p < 0.001$), drive ($U = 9737.5$, $p = 0.002$), learning enthusiasm ($U = 9839.5$, $p = 0.004$), and immersive learning ($U = 9984.0$, $p = 0.006$) (Elliott & Hynan, 2011; SPSSAU Project, 2026; Theodorsson-Norheim, 1986; Zhou & Ma, 2024).

Table 6: *Between-Group Comparisons (Medians)*

Variable	First-Generation(n=174) Mdn	Non-First-Generaton(n=139) Mdn	U-value	P-value
Academic Resilienc e	5.00	4.00	9089.5	<0.001
Learning Drive	5.00	4.00	9737.5	0.002
Learning Enthusias m	5.00	5.00	9839.5	0.004
Immersiv e Learning	5.00	4.00	9984.0	0.006

Overall SEM Model Effect Analysis

Based on the preliminary model establishment and testing, the final structural equation model is illustrated in Figure 1 below:

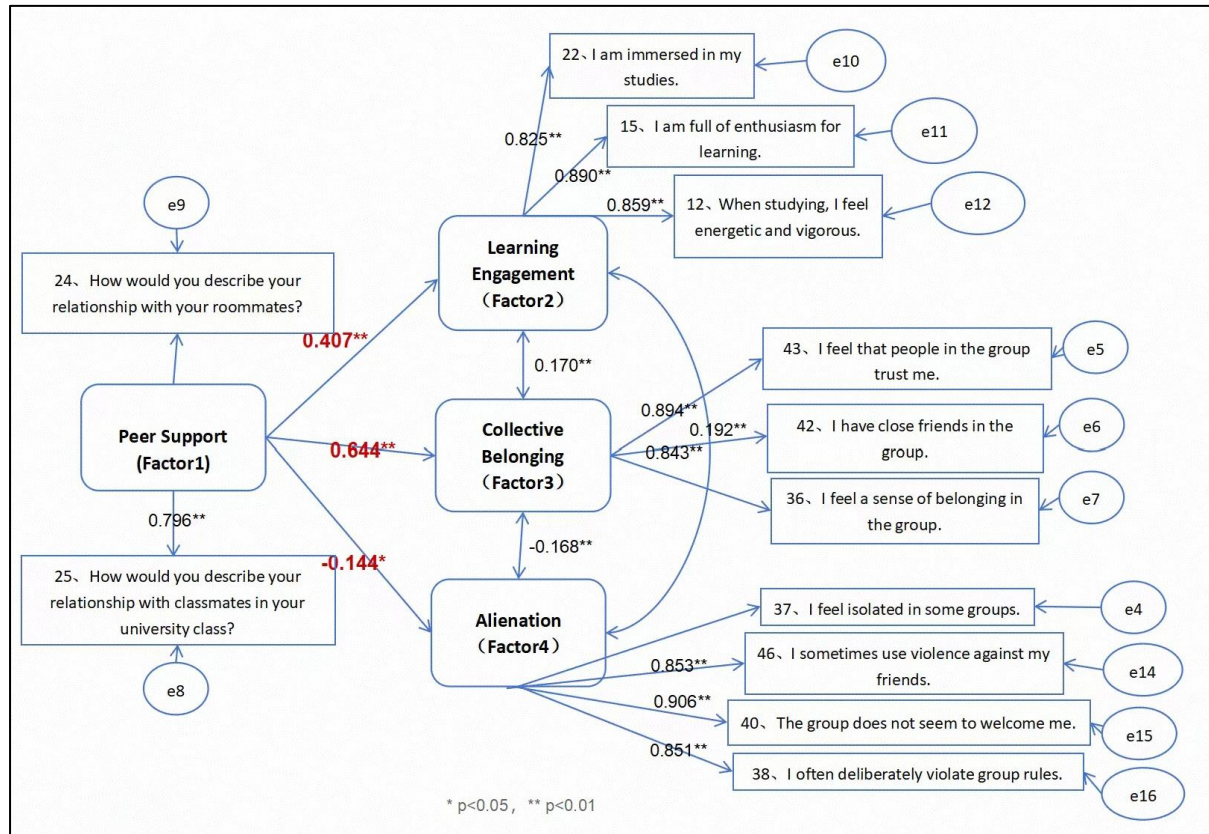


Figure 1: Final Structural Equation Model

The effect values of peer support on learning engagement, collective belonging, and alienation were 0.407, 0.644, and -0.144, respectively. The covariance relationships among learning engagement, collective belonging, and alienation were 0.170, 0.192, and -0.168, respectively. Classmate relationship and dormitory relationship were the measurement indicators for the peer support latent variable, with effect values of 0.796 and 0.803, respectively.

RESEARCH FINDINGS

Main Conclusions

Contrary to the "cultural deficit" prediction, this study found that first-generation college students scored higher on learning engagement than non-first-generation students.

Based on the literature review, this study proposed H1—"There is a significant difference in learning engagement between first-generation and non-first-generation college students, with first-generation students exhibiting lower learning engagement than non-first-generation

students." However, the empirical results (see Table 6 and Section 4.1) unequivocally rejected this hypothesis: not only was no disadvantage observed among first-generation students, but they actually scored significantly higher than non-first-generation students on dimensions including academic resilience, learning drive, learning enthusiasm, and immersive learning (all p -values < 0.01). In other words, the direction of this study's findings is completely opposite to the expectations of the traditional "cultural deficit" perspective (Bourdieu, 1977).

Regarding this "counterintuitive finding," the study offers the following three explanations: First, the applicability of the resilience perspective (Cohen & Wills, 1985). First-generation college students often accumulate more experience in coping with adversity during their upbringing (e.g., self-directed learning, problem-solving, stress tolerance), and these "resilience resources" translate into higher learning engagement and persistence during the university phase. Second, compensatory motivation. The relative scarcity of family cultural capital may stimulate a stronger desire for "upward mobility"; they cherish university educational opportunities more and thus demonstrate higher learning enthusiasm and effort. Third, limitations of sample characteristics. Freshmen and sophomores constituted up to 91% of the sample in this study; lower-grade students have not yet faced higher-order challenges such as major selection or research training. Whether the "advantage" of first-generation students diminishes as grade level advances requires longitudinal research verification. Additionally, convenience sampling may have biased the sample toward students who are socially active or more interested in educational topics, which also affects the external validity of the conclusions to some extent. Subsequent research should test whether this counterintuitive finding is robust in larger and more diverse samples.

This result reminds us that disadvantaged family background does not necessarily imply academic adaptation difficulties or insufficient learning engagement. In fact, first-generation college students demonstrate stronger initiative and resilience in their studies. They do not exhibit behavioral withdrawal in university simply because their parents did not attend college; on the contrary, they appear more engaged and persistent in many respects. This may be because they have long been accustomed to relying on themselves to solve problems during their growth, and can more effectively mobilize their coping abilities when facing unfamiliar

environments. Moreover, some informal encouragement from families or motivations accumulated during high school may also serve as compensatory forces driving their positive adaptation. In short, they are not culturally "deprived," but rather resemble "tenacious strivers" who have learned to take the initiative amidst adversity.

Results for Hypotheses H2, H3, and H4. Regarding the role of environmental resources, peer support proved to be a significant protective factor.

H2 (Peer support is positively correlated with learning engagement) is supported. Path analysis (Table 5) showed that peer support had a significant positive association with learning engagement ($\beta = 0.407$, $p < 0.001$). This indicates that first-generation students who enjoy better peer relationships also report higher levels of academic enthusiasm, drive, and resilience.

H3 (Peer support is positively correlated with sense of collective belonging) is supported. The effect of peer support on collective belonging was strong and positive ($\beta = 0.644$, $p < 0.001$), confirming that supportive peer interactions are a key source of campus belonging.

H4 (Peer support is negatively correlated with alienation) is partially supported. While the path coefficient was significant and negative ($\beta = -0.144$, $p = 0.033$), the effect size was relatively small. This suggests that peer support alone cannot fully eliminate feelings of alienation; deeper structural factors (e.g., curriculum relevance, teaching methods, institutional fairness) also play a role.

In summary, peer support acts as an important buffer for first-generation students' academic adaptation, directly boosting learning engagement and belonging, and modestly reducing alienation.

Regarding the influence of environmental resources, peer support plays a clear protective role in both learning engagement and collective belonging. Specifically, first-generation college students who enjoy better relationships with their peers are more willing to participate in class discussions, complete learning tasks on time, and more easily find their place on campus. This indicates that a good peer circle can indeed, to some extent, compensate for first-generation students' deficiencies in information and experience (Li et al., 2025; Tian & Yu, 2024).

However, interestingly, the direct alleviating effect of peer support on alienation was not significant. In other words, even with friends around, some students may still feel an inexplicable sense of estrangement or alienation from the school environment or interpersonal relationships. The reasons behind this may be more complex. The formation of alienation often involves more than just interpersonal issues; it stems more from deeper structural factors, such as whether the curriculum is relevant to students' actual lives, whether teaching methods foster a sense of participation, and whether institutional policies are perceived as fair. These issues cannot be resolved through peer support alone. Therefore, to genuinely reduce alienation among first-generation college students, it is insufficient to rely solely on students' mutual support; adjustments at the pedagogical and institutional levels are also necessary.

The results of the model test indicate that the structural equation model constructed in this study demonstrates good overall fit, with all core fit indices reaching relatively ideal standards (SPSSAU Project, 2026; Zhou & Ma, 2024). This suggests that there is no significant conflict between our proposed theoretical framework and the collected data. Additionally, the model exhibits strong explanatory power for the three core constructs—learning engagement, collective belonging, and alienation—with most path coefficients and factor loadings reaching significance, indicating that the relationships among variables are well supported at the empirical level. In other words, peer support does influence first-generation college students' academic adaptation, and this influence manifests in different ways across various dimensions—positive and direct for learning engagement and belonging, and relatively limited for alienation. Overall, the theoretical framework proposed in this study demonstrates reasonable validity and generalizability, providing a reference for subsequent research and university student support services.

It is important to note that this study's conclusion that "first-generation college students have higher learning engagement" is not contradictory to some existing studies, but rather stems from different operationalizations of the "learning engagement" construct. Guo et al. (2020) found that first-generation students did not fall behind in "routine study time" but scored significantly lower than non-first-generation students in higher-order learning engagement dimensions such as "deep learning" and "active collaborative learning." In contrast, the learning

engagement measured in this study comprises four dimensions: academic resilience, drive, learning enthusiasm, and immersive learning—indicators that focus more on psychological resilience, emotional energy, and general effort in the face of academic challenges, rather than higher-order cognitive strategies or deep learning behaviors. In other words, the "advantage" of first-generation students found in this study primarily manifests in foundational, attitude- and persistence-related learning engagement, rather than in complex academic competencies such as critical thinking, information integration, or collaborative inquiry.

This distinction carries important theoretical implications: first-generation college students may not excel across all types of academic engagement, but rather stand out on dimensions that "require persistence, resilience, and self-motivation"—which is highly consistent with the "resilience perspective" (Cohen & Wills, 1985). Deficiencies in higher-order learning engagement, however, may still be constrained by family cultural capital (Bourdieu, 1977) (e.g., exposure to academic discourse, research methods). Therefore, the "advantage" identified in this study is relative to the reference frame of foundational learning engagement and should not be generalized to higher-order learning engagement.

Furthermore, the validity of this advantage is also constrained by sample conditions. In this study, freshmen and sophomores accounted for 91% of the sample; lower-grade students have not yet been widely exposed to course tasks requiring deep collaboration and critical inquiry, making the "resilience" advantage of first-generation students more apparent. Whether this advantage can be maintained at higher grade levels, when academic difficulty and complexity increase, or whether it will expose deficiencies in strategic support, requires longitudinal research for verification. Therefore, the conclusions of this study are best understood as: under conditions of lower-grade status and foundational learning engagement as the measurement indicator, first-generation college students exhibit significantly greater resilience and proactivity than their non-first-generation counterparts.

Qualitative Supplement

Interview Study on First-Generation Students' Learning Engagement and the Role of Peer Support

To deepen understanding of the psychological and social mechanisms underlying the quantitative results, semi-structured interviews were conducted with 8 university students following the questionnaire survey. The interviewees covered various majors and grade levels, including Chinese Language and Literature, Marine Resources and Environment, and others. The interviews revolved around two core themes: first, whether they agreed with the conclusion that "first-generation college students have higher learning engagement than non-first-generation students," and the reasons; second, whether they agreed with the conclusion that "peer support protects learning engagement and collective belonging," and the reasons. The following sections present the interview data's corroboration, supplementation, and critical examination of the quantitative findings, organized by theme.

Are First-Generation College Students More Engaged?—Support, Skepticism, and "It Depends on the Individual"

Regarding the quantitative finding that "first-generation college students' learning engagement is significantly higher than that of non-first-generation students," among the 8 interviewees, 5 explicitly agreed (A, B, E, G, H), 1 disagreed (C), 1 expressed uncertainty ("not necessarily") (D), and 1 agreed but offered a different explanatory perspective (F). This distribution itself illustrates that group-level conclusions must be examined against individual experiences.

(1) Supportive Views: Information Disadvantage, Family Expectations, and Self-Drive

Interviewees who agreed with this conclusion provided reasons from three main dimensions:

a. Information and Experience Disadvantages Lead to More Time Investment

Interviewee A noted: "They can't find the direction for learning, so they spend more time studying... Non-first-generation students have learning guidance; they only need to spend a little time to achieve the same results as first-generation students." Interviewee E expressed a similar view: "First-generation students need to figure out many things through their own reality and experience, without parental or previous experience to draw on." Interviewees G and H supplemented this from the angle of "limited family help": "First-generation students, whose parents do not have a bachelor's degree or above, receive limited help with their studies;

to become university students, they must invest more of their own effort" (G). "The parents of first-generation students have limited education and often cannot provide much help in their studies... If they want to achieve better results, they often need to invest more effort in their studies" (H).

b. Family Expectations Create External Pressure

Interviewee B explicitly mentioned family factors: "Because they are the first generation in their family to attend university, their parents have high expectations for them, and they cannot provide relevant help, so they have to rely on themselves, leading to greater investment."

c. Self-Expectations to Surpass Parents

Interviewee B also noted: "They probably have higher expectations for themselves, wanting to surpass their parents and have a better future."

(2) Skeptical Views: The Intergenerational Transmission Effect of Knowledge Capital

Interviewee C explicitly disagreed and offered an explanation contrary to the quantitative findings: "For non-first-generation students, if their parents have been to university, I think their families would have higher academic expectations for them, meaning the external environment naturally imposes pressure to study... Since someone in the family has already attended university, as children, their baseline requirements are raised, with the hope of surpassing their predecessors." C's perspective reveals an important mechanism: non-first-generation families can not only set high expectations but also provide specific references for "what level of effort university studies require." This type of "informed high expectation" may differ qualitatively in its motivational effects from the "uninformed high expectation" of first-generation families. Interviewee F offered another explanation from the perspective of generational change: "The social environment, conditions, and economic circumstances of contemporary university students differ from those of the previous generation. Most students can study without excessive financial concerns due to family support, and those who genuinely devote themselves to learning still constitute the majority" (F).

(3) "It Depends on the Individual": The Inevitability of Individual Differences

Interviewee D raised a more fundamental critique of the question itself: "Learning outcomes mainly depend on the individual. Family background may influence children, but this is an uncertain factor. Parents without university education are not necessarily lacking in culture, and their parenting may not be inferior to that of university-educated parents. Learning ultimately depends on oneself; seeking external explanations is secondary." D's view is straightforward: whether first-generation status is perceived as a disadvantage or an advantage, it cannot be used to mask individual differences. Quantitative research, while presenting mean differences between groups, inevitably obscures within-group heterogeneity.

Summary

The interview data reveal notable disagreement among respondents regarding the conclusion that "first-generation students have higher learning engagement." Supporters emphasize information disadvantages, family expectations, and self-drive; opponents point to the intergenerational transmission effect of knowledge capital in non-first-generation families; and the "it depends" perspective cautions against overlooking individual differences. These divergences suggest that the "first-generation status" effect in quantitative findings may be more pronounced in specific subgroups; future research should further examine moderating variables (e.g., quality of family communication, level of personal aspiration).

II. Peer Support: Universal Agreement and Mechanistic Differentiation

All 8 interviewees agreed with the conclusion that "peer support protects learning engagement and collective belonging," yet they presented rich and nuanced descriptions of the specific mechanisms involved.

(1) Mechanisms of Peer Support in Protecting Learning Engagement

Mechanism I: Atmospheric Contagion and the "Birds of a Feather" Effect

Interviewee A used a vivid contrast to illustrate this: "Birds of a feather flock together. The atmosphere students are in influences them. If one is preparing for the CET-6 exam and peers create a good learning environment rather than saying 'Come play games, no need to study, you can pass on pure instinct,' the outcome would be completely different." Interviewee B drew on

experiences from tracking classes in middle and high school: "In good classes, the atmosphere is better, and everyone improves together; in bad classes, things get progressively worse, and people start playing on their phones in class." Interviewee F elevated this mechanism to a theoretical level: "Learning atmosphere is produced by a group of like-minded peers encouraging, supporting, helping, and motivating each other. Humans are social animals; in a learning atmosphere, one can become more engaged in learning."

Mechanism II: Mutual Monitoring and "Binding Force"

Interviewee C described the binding function of peer support from the perspective of study groups: "One person might not be able to persist in going to the library every day on their own, but when they find a like-minded partner in daily life, the two can monitor each other. If the other person doesn't come for some reason, they will consider the other's feelings before deciding to give up." Interviewee E emphasized the multidimensional role of peer support: "Peers' encouragement provides support, whether emotional or through companionship—both contribute positively to the final outcome."

(2) Critical Examination of the "Collective Belonging" Pathway

Although all interviewees agreed that peer support protects learning engagement, Interviewee C raised important boundary conditions regarding the universality of the "peer support → collective belonging" pathway: "Personally, in university, everyone has their own social circle, but the sense of collective belonging doesn't necessarily come from this social circle. It comes more from being part of collective activity units, from which you gain a sense of belonging. It's about being part of a larger family or collective, so it's not necessarily guaranteed." This perspective resonates with Interviewee B's earlier statement that "I have close friends, but I don't feel a strong sense of belonging to this collective." It reveals a key theoretical issue: the relationship between peer support and collective belonging is not simply linear. One can have close personal friendships (a "social circle") yet still lack identification with the larger collective at the class, club, or university level. This suggests that "personal friendship" and "collective identification" may be two relatively independent psychological dimensions, with the former not automatically transitioning into the latter.

Summary

The interview data strongly corroborate the protective effect of peer support on learning engagement, and demonstrate operationalizable mechanisms such as "atmospheric contagion" and "mutual monitoring." At the same time, C's reflection suggests the need for a more refined distinction between "friendship quality" and "collective identification"—the two are not equivalent, and the latter additionally requires mediating factors such as collective activities and shared goals for its cultivation.

Comprehensive Insights from Qualitative Findings

Synthesizing the perspectives of the 8 interviewees yields the following three insights:

First, first-generation students' high learning engagement is the product of multiple intertwined motivations—including external responsibility to "repay the family," personal pursuit to "surpass parents," and possibly the helpless aspect of "time compensation under information disadvantage." While affirming their efforts, universities should also be attentive to whether "inefficient diligence" is substituting for "efficient learning," and provide targeted learning strategy guidance accordingly.

Second, the protective effect of peer support varies significantly in quality and cannot be generalized. The essential difference between "studying together" and "playing games together" depends on the learning norms and values shared by the peer group. Universities can actively guide peer support toward positive outcomes by organizing structured study groups and fostering positive classroom atmospheres.

Third, the apparent tension between qualitative perspectives and quantitative findings precisely illustrates that average effects at the group level tend to obscure important internal variations and boundary conditions. In particular, the finding that "having friends does not necessarily entail collective belonging" suggests that when designing support programs, universities should not be satisfied merely with facilitating personal friendships among students; they also need to transform "I-you" relationships into "we" psychological identification through institutionalized means such as collective rituals and public narratives.

Boundary Condition Revisions from Qualitative Interviews

Synthesizing the perspectives of the 8 interviewees, this study identifies three important boundary condition revisions that should be appended to the quantitative conclusions:

Boundary Condition I: The conclusion that "first-generation college students have higher learning engagement" requires an "efficiency" boundary.

Interviewee A pointed out that first-generation students "cannot find direction" and thus spend more time, while non-first-generation students "have learning guidance and spend less time to achieve the same accomplishments." This implies that the "high engagement" in the quantitative findings may partly be a compensatory result of inefficient diligence. Therefore, this conclusion should be qualified with the boundary condition: first-generation students excel in the quantity of time invested in learning, but may not necessarily lead in learning efficiency and strategic application.

Boundary Condition II: The conclusion that "peer support positively predicts learning engagement" requires an "atmosphere quality" boundary.

Interviewees A, B, and F all pointed out that peer atmospheres can diverge in two distinct directions: "improving together" versus "declining together." Therefore, this conclusion should be revised as follows: only when the peer group is oriented toward positive learning does peer support positively promote learning engagement; in negative atmospheres, peer support may even produce adverse effects.

Boundary Condition III: The conclusion that "peer support positively predicts collective belonging" requires a "friendship-to-collective" transformation boundary.

Interviewee C explicitly stated that collective belonging "does not largely come from one's social circle, but from collective activity units." This reveals a rupture between individual friendship and collective identification. Therefore, the quantitative conclusion should be qualified with the boundary condition: the direct effect of peer support on collective belonging is significant only on average; however, individuals may have close friends yet still lack collective belonging, and universities need to proactively design collective activities to

facilitate the transition from "I-you" to "we."

Through these qualitative revisions, the quantitative findings of this study gain a more refined scope of applicability, providing more actionable guidance for subsequent research and educational practice.

Thematic Analysis Summary Table of Qualitative Interviews on Factors Influencing College Students' Learning Engagement

The main themes and sub-themes derived from the interviews are summarised in Tables 7 and 8.

Theme 1: Reasons for "First-Generation College Students' Learning Engagement Greater than Non-First-Generation"

Table 7: *Thematic analysis summary of reasons for "first-generation students' learning engagement > non-first-generation"*

Level 1 Theme	Level 2 Theme	Specific Reasons (Interviewee Viewpoints Summary)
Family Support and Resource Differences	Lack of Guidance and Experience	Non-first-generation have learning guidance, spend less time to achieve comparable results (A) Parents cannot provide help; must rely on oneself (B) First-generation lack prior experience; must explore on their own (E) Parents without bachelor's degrees provide limited learning help; need more self-investment or external assistance (G) Parents cannot transmit learning methods and habits through example; must invest more effort on their own (H)
	Family Expectations and Pressure	High parental expectations, no help available; also high self-expectations to surpass parents (B) In non-first-generation families, parents with university experience impose higher academic expectations and pressure (C)
Individual Motivation and Effort	Diligence and Self-Discipline Tendency	Stereotypically, first-generation are more diligent, willing to study all day (A) Self-reliant, high self-expectations (B)
	Goal-Driven	Desire to surpass parents and strive for a better future (B)
External Environment and Conditions	Generational and Economic	Contemporary students (including first-generation) have improved family conditions; more can invest in learning;

Level 1 Theme	Level 2 Theme	Specific Reasons (Interviewee Viewpoints Summary)
Family Support and Resource Differences	Lack of Guidance and Experience	Non-first-generation have learning guidance, spend less time to achieve comparable results (A) Parents cannot provide help; must rely on oneself (B) First-generation lack prior experience; must explore on their own (E) Parents without bachelor's degrees provide limited learning help; need more self-investment or external assistance (G) Parents cannot transmit learning methods and habits through example; must invest more effort on their own (H)
	Family Expectations and Pressure	High parental expectations, no help available; also high self-expectations to surpass parents (B) In non-first-generation families, parents with university experience impose higher academic expectations and pressure (C)
	Conditions	however, "lying flat" phenomenon exists, while genuine investors still comprise the majority (F)
Individual Factors (Questioning Dominant Family Determinism)	Social Comparison and Raised Standards	In non-first-generation families, having had university graduates previously raises baseline standards with expectation to "surpass the predecessor" (C)
	Learning Depends Primarily on Self	Family factors are uncertain; parents' educational attainment does not determine cultural level or parenting capability (D) Should look for reasons within oneself, not externally (D)

Theme 2: Reasons for "Peer Support Protects Learning Engagement and Collective Belonging"

Table 8: *Thematic analysis summary of reasons for “peer support protects learning engagement and collective belonging”*

Level 1 Theme	Level 2 Theme	Specific Reasons (Interviewee Viewpoints Summary)
Promoting Effect of Peer Support on Learning Engagement	Atmosphere Creation and Behavioral Norms	Atmosphere influences students; peers prevent misconceptions (e.g., passing on pure instinct) and encourage exam preparation (A) Good class atmosphere promotes mutual progress; bad class leads to phone use and decline (B) Study partners monitor each other, reducing abandonment due to personal reasons (C) Learning atmosphere emerges from peer support, help, mutual

Level 1 Theme	Level 2 Theme	Specific Reasons (Interviewee Viewpoints Summary)
		encouragement; humans cannot go far alone (F) Environmental atmosphere promotes or guarantees learning engagement (G)
	Emotional Support and Alleviation of Loneliness	People need emotional support; lack of affirmation leads to self-isolation (A) Peer encouragement provides emotional support, positively contributing to outcomes (E) Peer support reduces loneliness, making the learning process more motivating (H)
	Immediate Help and Problem Solving	Provides immediate learning assistance, reducing engagement decline caused by learning difficulties (H)
Relationship between Peer Support and Collective Belonging	Analysis of Peer Belonging and Sources	In university, collective belonging comes more from collective activity units (classes, clubs, etc.) than from personal social circles; but mutual support groups still provide monitoring (C)
	General Recognition	Generally holds true, with occasional exceptions (D)

RESEARCH LIMITATIONS AND FUTURE DIRECTIONS

Research Limitations

First, sample representativeness is notably insufficient. This study employed convenience sampling through "social media circles" and "peer networks," with freshmen and sophomores jointly accounting for 91% of the sample and juniors only 9%. This severe skew in grade distribution, combined with the possibility that convenience sampling may bias the sample toward students with higher social activity levels or greater interest in educational topics, constrains the external validity of the research conclusions. More importantly, lower-grade students may not yet have experienced the peak period of academic difficulties (such as major selection, research training, or employment pressures); whether the "advantage" in learning engagement among first-generation students revealed in this study can persist into higher grade levels requires further investigation. Therefore, caution should be exercised when generalizing the conclusions to other grade levels or broader university student populations.

Second, the model did not incorporate relevant control variables. Limited by sample size, the structural equation model in this study did not control for potential confounding variables such

as gender, grade level, or family socioeconomic status. For example, although the gender ratio in the sample was close to 1:1, grade distribution was severely skewed, and family economic and cultural background information was not included in the model. This may have confounded the true relationships among peer support, learning engagement, and collective belonging to some extent. Therefore, future research, when conditions permit, should expand sample size, incorporate the above variables into the analysis, and conduct robustness checks (such as subgroup regression or multi-group SEM) to verify the stability of this study's conclusions across different subgroups (SPSSAU Project, 2026; Zhou & Ma, 2024).

Third, the cross-sectional design precludes causal inference. While this study found a significant positive association between peer support and learning engagement, there is an alternative explanation in reality: students with higher learning engagement may be more inclined to actively establish and maintain good peer relationships. In other words, the unidirectional "peer support → learning engagement" relationship specified in the current model may not be the only viable direction; the two are more likely to form a bidirectional, mutually reinforcing dynamic process. Clarifying this issue requires more rigorous research designs.

Future Directions

In response to the above limitations, future research could make improvements in the following directions:

First, adopt a longitudinal tracking design. Multiple measurements could be conducted on the same cohort of students at several time points (e.g., upon freshman entry, second-year first semester, third-year second semester) to more clearly observe the temporal ordering between peer support and learning engagement. Compared to cross-sectional data ("snapshots"), longitudinal data ("documentaries") can more effectively capture the sequential order of variables. On this basis, methods such as cross-lagged analysis could be further employed to enhance the power of causal inference.

Second, expand sample size and incorporate control variables. Future research should, as much as possible, employ multi-campus joint surveys or probability sampling to cover student

populations across different grade levels, majors, and family backgrounds. Simultaneously, variables such as gender, grade level, and family socioeconomic status should be consciously included in the model analysis, and robustness checks should be conducted through methods such as subgroup regression or multi-group structural equation modeling to examine whether the core conclusions of this study remain valid across different subgroups (SPSSAU Project, 2026; Zhou & Ma, 2024).

Third, introduce qualitative research for deepening understanding. Although cross-sectional data can reveal "what" relationships exist among variables (e.g., people with higher peer support levels also have higher learning engagement scores), they cannot explain "why" this is the case. At which critical junctures do students experience peer support? Through what specific channels does this support translate into actual learning actions? These questions are difficult to answer with questionnaire data alone. Future research that conducts in-depth interviews with first-generation college students (e.g., one-hour semi-structured interviews per person) or longitudinal case tracking will help reveal the mechanisms underlying quantitative results and provide more solid empirical support for the theoretical framework.

In summary, the conclusions of this study were obtained under cross-sectional design and limited sample conditions, and should be interpreted and applied with due caution. Future research that effectively integrates longitudinal quantitative tracking, large-sample multivariable robustness testing, and in-depth qualitative interviews will surely provide a more comprehensive and in-depth understanding of the dynamic processes and underlying mechanisms of first-generation college students' academic adaptation.

Research Recommendations

The above research findings offer several practical implications for university student affairs work, particularly in optimizing support systems for first-generation college students' academic adaptation.

Set Aside Stereotypes and Treat Students as "Normal People" First

For a long time, when discussing first-generation college students, university student affairs

professionals have often unconsciously labeled them as "disadvantaged," "problematic groups," or "in need of help." Such presuppositions can themselves be problematic—if you start with the assumption that a particular student cannot succeed, the support programs you design will likely be "remedial" in nature: fixing whatever is lacking, always feeling that they are insufficient in every aspect.

However, the findings of this study suggest precisely the opposite. The data show that first-generation college students are not inferior to their non-first-generation counterparts in terms of routine study time or learning enthusiasm, and in some dimensions they even perform better. In other words, they are not "weak" learners. What they may lack is not effort or attitude, but some "invisible" things—such as knowing how to write a paper, how to interact with supervisors, or what resources are available.

Therefore, we recommend that universities first remove the "disadvantaged" label when designing support work for first-generation students. The support philosophy needs to shift from "remedial intervention" to "developmental empowerment." Instead of starting with "what are your deficiencies that I can help remedy," we should first recognize their existing strengths—such as stronger perseverance, greater appreciation for educational opportunities, and a habit of solving problems independently—and then, on this foundation, provide resources for enhancing higher-order learning competencies, such as introductory lectures on research methods, academic writing tutoring, and career planning for professional directions. In short, it is not about "providing a safety net," but about "providing a boost."

Transform Peer Support from "Personal Serendipity" to "Institutional Arrangement"

This study found that peer support is a critically important social resource for first-generation college students. Many information "blind spots" and experience "gaps" are often filled not through lectures by professors or general assemblies, but through casual remarks from classmates—for instance, a senior casually mentioning in the cafeteria that "a certain professor likes students to speak up in class," or a roommate casually reminding that "there's a club recruitment event tomorrow." These seemingly trivial moments can be pivotal for first-generation students in breaking through information barriers.

Therefore, universities cannot rely solely on students' "luck" in making friends; they should consciously and systematically build peer support networks. Specific actionable measures include:

Dormitory assignments: Consider mixed housing arrangements that bring together students from different family backgrounds, rather than concentrating first-generation students together. Mixed housing itself represents the most natural opportunity for cross-group interaction.

Learning organizations: Promote study groups, academic mutual aid clubs, and subject interest communities, ensuring that these platforms have sufficiently low barriers to entry—they should not resemble "elite clubs" but should welcome all participants.

Activity design: Student unions and club federations can regularly organize experience-sharing sessions, senior mentoring programs, and similar activities. The key lies in "regularity" and "institutionalization," rather than sporadic, one-off events. When peer support transitions from occasional personal encounters to stable institutional arrangements, its effect on enhancing collective belonging will truly materialize.

Alleviating Alienation Requires More Than "Making Friends"

This study revealed an interesting phenomenon: peer support has significant positive effects on learning engagement and belonging, but its direct alleviating effect on alienation is not pronounced. In other words, even when a person has friends around, they may still experience an inexplicable sense of "estrangement" from the school, the classroom, or institutional regulations.

This suggests that the root of alienation may not lie at the "interpersonal relationship" level. It stems more from deeper, structural factors: whether course content relates to issues students care about, whether teachers genuinely value students' ideas in the classroom, whether institutional policies are perceived as fair. These issues cannot be resolved through students' mutual "huddling together for warmth."

Therefore, universities need to address first-generation students' alienation through multiple interconnected pathways. First, with regard to student-faculty interaction, faculty should be

encouraged to pay closer attention to the learning experiences of first-generation students. Grand, time-consuming interventions are not always required; rather, small gestures—such as a brief after-class remark like "that's an interesting thought," or a specific word of encouragement in written feedback—can often have a disproportionately positive impact. Second, curriculum design deserves equal consideration. Foundational and general education courses, in particular, can be structured to help students connect disciplinary knowledge to their personal growth and to real-world social issues, which naturally enhances their intrinsic learning motivation. Third, psychological support systems should include a routine screening and early-intervention mechanism. This need not be overly complex—for example, a brief psychological well-being check conducted four to six weeks after freshman enrollment, focusing on early signs of alienation or loneliness, can be highly effective. Once potential issues are identified, timely small-group counseling or individual consultation pathways should be made available. Fourth, campus culture plays a fundamental role. Through orientation programs, thematic class meetings, and various cultural activities, universities should consistently convey a message of inclusion: this campus welcomes individuals from diverse backgrounds, and every student's experiences and perspectives are valued. This pervasive sense of acceptance often serves as the deepest remedy for alienation. In summary, to genuinely enable first-generation college students to integrate psychologically into university life, peer support alone is insufficient; multiple layers—including faculty engagement, curriculum design, institutional policies, and campus culture—must work in concert.

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