

Pathways from Emotional Intelligence to Subjective Well-Being in College Students with Left-Behind Experience: The Mediating Roles of Peer Relationships and Psychological Resilience

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Abstract

Background: University students with Left-Behind Experience (LBE) may be vulnerable in Subjective Well-Being (SWB). This study tested whether Peer Relationships (PeR) and Psychological Resilience (PsR) mediate the link between Emotional Intelligence (EI) and SWB.

Methods: A cross-sectional online survey of Chinese university students with LBE was conducted in May–June 2025. After excluding invalid responses, the final valid sample comprised $N=493$ (25.15% male, 74.85% female; mean age = 19.51 years, $SD = 1.382$, range = 17–30; grades ranging from freshman to fifth-year undergraduates). Measures included the Emotional Intelligence Scale (EIS), Peer Relationship Scale (PeRS), Psychological Resilience Scale (PsRS), and Subjective Well-Being Scale (SWBS). A serial mediation model was tested using PROCESS v4.1 (Model 6; 5,000 bootstraps).

Results: The total effect of EI on SWB was significant ($c=0.427$, 95% CI [0.3473, 0.5072], ($p<.001$)), but the direct effect was not ($c'=0.042$, 95% CI [-0.0351, 0.1195], ($p=0.284$). The total indirect effect was significant ($\beta=0.385$, 95% CI [0.2998, 0.4769]). All indirect paths were significant: $EI \rightarrow PeR \rightarrow SWB$ ($\beta=0.179$), $EI \rightarrow PsR \rightarrow SWB$ ($\beta=0.175$), and $EI \rightarrow PeR \rightarrow PsR \rightarrow SWB$ ($\beta=0.031$). Covariates: non-only-child status predicted better PeR (lower scores; ($b=-0.422$), ($p=0.0019$); females showed lower PsR ($b=-0.164$, $p=0.033$) but higher SWB ($b=0.204$, $p=0.004$); Age showed marginal negative trends for PsR and SWB; caregiving type was non-significant.

Conclusions: Among students with LBE, EI relates to SWB primarily via PeR and PsR. Covariate patterns highlight subgroup considerations (only-child status and sex), informing targets for peer-support and resilience-building interventions.

Keywords: Left-Behind Experience; Emotional Intelligence; Subjective Well-Being; Peer Relationships; Psychological Resilience; serial mediation

Date of Submission: 25-09-2025

Date of acceptance: 05-10-2025

I. Introduction

With the continuous advancement of urbanization in China, a large number of rural populations have migrated to cities. However, due to the combined effects of economic, social, institutional, and family factors, the majority of Chinese migrant workers are unable to transfer their household registration to destination cities, which restricts their children's access to local schooling. Combined with heavy financial burdens and limited caregiving capacity, parents frequently leave their children in their home communities under the care of grandparents or other relatives, a practice that has expanded the population of "left-behind children," particularly in the southwest provinces. Prolonged parental absence has made mental health concerns increasingly salient within this cohort (Mao, Zang, & Zhang, 2020). In contexts lacking direct parental care and emotional support, Left-Behind children report elevated feelings of loneliness, anxiety, and other negative emotions (Ren, Yang, & Liu, 2017). Research further demonstrates that, relative to their Non-Left-Behind peers, these children experience higher rates of peer victimization, perceive greater stress from adverse events, and are more vulnerable to psychological trauma (X. Q. Zhang, Hong, Hou, & Liu, 2022). Such early trauma may exert long-term effects on mental health in adulthood (Lan, Jia, Lin, & Liu, 2019).

The term LBE refers to the situation in which children under the age of 18 are compelled to separate from one or both parents due to migration for work, with the separation lasting a minimum of six months during which they are cared for by relatives (Gao et al., 2010; F. Zhou & Duan, 2006). Research has shown that such experiences can have a profound impact on children's psychological well-being and social adaptation abilities (Y. Wang, Yang, Wang, & Liu, 2022). Empirical evidence indicates that childhood with LBE exert a significant and enduring detrimental effect on mental health in later life. For example, it was found that individuals with LBE have a substantially greater likelihood of developing mental disorders than those without such experiences, with the most pronounced disparities appearing in anxiety, depression, and interpersonal functioning (H. X. Liu et al., 2021; Y. Wang et al., 2022). EI is defined as an individual's ability to understand, use, manage, and regulate their own and others' emotions (Salovey & Mayer, 1990). This concept was further extended to educational and organizational contexts by Goleman (1996). Individuals with high EI typically exhibit better social adaptation and are more capable of facing adversity, thereby enhancing their mental health (Mayer, Salovey, & Caruso, 2008). It was found that EI serves as a strong moderator of psychological distress among university students, and that those with higher EI are better equipped to cope with negative life events (P. Zhang et al., 2016). Research has indicated that EI plays a crucial role in the mental health of LBE college students. Specifically, there is a significant correlation between EI and social support, with social support serving as a mediator between EI and mental health (WANG & XIANG 2022). Furthermore, research has found that college students with LBE generally have lower levels of social support and coping strategies, and that these factors significantly influence their SWB (Yuhua Wang, 2008). Overall, these findings suggest that EI can influence SWB among college students with LBE.

PeR refer to the interactions and emotional bonds between individuals and their peers, encompassing aspects such as the quality of friendships, social support, and social acceptance (Buhrmester, 1990). Positive PeR can provide emotional support and social resources, helping individuals cope with stress and thereby promoting mental health (Cohen & Wills, 1985). Existing research indicates that EI is significantly correlated with the quality of PeR. Individuals with high EI are better able to engage in positive interactions with others and create a favorable emotional environment, thereby establishing more stable PeR (Lopes, Salovey, & Straus, 2003). PsR, on the other hand, refers to an individual's ability to adapt positively and recover from adversity

(Masten, 2001), emphasizing proactive coping and growth in stressful situations (Connor & Davidson, 2003). In addition, another study revealed that EI can significantly enhance the emotional coping skills of the nursing population, thereby increasing their PsR (Li, Cao, Cao, & Liu, 2015). Additionally, the LBE college student population largely lacks parental affection during their time away from home and reports low feelings of warmth from their parents. Research has identified that LBE is a significant factor contributing to mental health issues among these students (H. Liu et al., 2020). Therefore, social support and interpersonal relationships become extremely important in this context. However, at the same time, Research indicates that Positive PeR can enhance individuals' ability to face adversity through corresponding peer support, thereby fostering greater PsR (Agarwal, Brooks, & Greenberg, 2020). Research demonstrated that PsR can significantly influence an individual's SWB (Kong, Ma, You, & Xiang, 2018). In addition, Research indicates that college students with LBE perform significantly worse than their peers without such experience in aspects such as PeR, PsR, and emotional well-being. Notably, both PeR and PsR have a positive moderating effect on mental health, and there exists a significant correlation between mental health and SWB (Junjie, Ting, & ling, 2021; Jingyu Shi et al., 2016). Based on the aforementioned research, this study integrates the Stress-Buffering Model (Cohen & Wills, 1985) and the Broaden-and-Build Theory (Fredrickson, 2001) into a testable pathway framework to explain how EI influences SWB through social and psychological resources. This study examines both parallel and serial mediation mechanisms to provide a comprehensive understanding of these relationships. Parallel mediation occurs when PeR and PsR operate as independent mediators linking EI to SWB. Serial mediation, in contrast, proposes a sequential mechanism where EI fosters PeR, which in turn enhances PsR, ultimately leading to improved SWB. The proposed serial pathway ($EI \rightarrow PeR \rightarrow PsR \rightarrow SWB$) is theoretically grounded in the Broaden-and-Build Theory. According to this theory, positive emotions and social resources—such as those gained from high-quality PeR—broaden an individual's thought-action repertoire and build enduring personal resources over time. In this context, the social support and emotional skills fostered by EI create high-quality PeR. These relationships then serve as a fundamental social resource that, through repeated positive interactions and emotional security, builds the individual's capacity for PsR—a durable psychological resource. Thus, PeR is hypothesized to temporally and mechanistically precede PsR, as social resources (PeR) are constructed and drawn upon to develop psychological resources (PsR).

Integrating the core mechanisms of both theories, this study proposes a multi-path model incorporating both parallel and serial mediation effects. The parallel mediation paths include $EI \rightarrow PeR \rightarrow SWB$ and $EI \rightarrow PsR \rightarrow SWB$, while the serial mediation path is represented as $EI \rightarrow PeR \rightarrow PsR \rightarrow SWB$. This design facilitates a comprehensive examination of the parallel and serial mediation effects. Therefore, we propose an integrated mediation model that incorporates both parallel and serial processes to test the multifaceted influences of EI on SWB. However, while these associations are well-established in general populations, their specific patterns and underlying mechanisms within the population of college students with LBE remain insufficiently explored. This population possesses unique characteristics stemming from early separation and potential emotional neglect, which may alter the strength, operation, or interplay of these psychological resources. It is therefore unknown: (a) whether the beneficial effects of EI on SWB operate through the same parallel and serial mediating pathways in this vulnerable group, and (b) to what extent PeR and PsR serve as protective mechanisms buffering the long-term negative impacts of LBE. Testing this specific integrated mediation model is a crucial next step, as it allows us to move beyond documenting general relationships to understanding the precise psychological processes that can be leveraged to enhance well-being in this high-risk cohort.

Previous research has strongly indicated the predictive role of EI on SWB; however, studies in this area concerning college students with LBE in China are relatively limited. To further enrich this field of study

and explore potential psychological mechanisms, this research introduces PeR and PsR as mediating variables. Therefore, this study constructs three hypothetical pathway models as illustrated in Figure 1 (mediating relationships) and proposes the following hypotheses:

- **H1:** EI directly predicts SWB.
- **H2:**PeR are correlated with both EI and SWB and mediate their association.
- **H3:**PsR is positively correlated with both EI and SWB and mediates their association.
- **H4:**PeR and PsR are associated with each other, and sequentially mediate the effect of EI on SWB.

Figure 1

Method

Participants and setting

This cross-sectional study employed an online questionnaire administered across six universities in Zunyi, Guizhou Province, China. Using a stratified sampling design, we selected 100 undergraduates with a history of LBE from each institution. Data were collected from May to June 2025. After excluding invalid cases (e.g., reported Left-Behind age of 0, incomplete responses), 493 questionnaires were retained for analysis, yielding a valid response rate of 82.17%. We examined missingness in SPSS. All analytic variables had 0% missingness; thus, no cases were removed. We adopted listwise deletion as the default policy; however, all analyses used the full sample (N=493).

We recruited 493 Chinese college students with LBE, including 124 males (25.15%) and 369 females (74.85%). The average age of the participants was 19.51 years (SD = 1.38, range = 17-30); grades ranging from freshman to fifth-year undergraduates. All procedures involving human participants in this study were conducted in strict accordance with the ethical standards of the Human Research Ethics Committee of Zunyi Medical University (IRB approval number: [2025]4-003), as well as the 1964 Helsinki Declaration and its subsequent amendments, or any comparable ethical standards. All participants are entitled to withdraw at any point and give written informed consent before participating.

Measures

EIS (WLEIS) (Wong & Law, 2002) consists of 16 items and encompasses four dimensions: (1) Self-Emotion Appraisal (e.g., item: I usually know the reasons for my feelings); (2) Others' Emotion Appraisal (e.g., item: I can often guess my friends' emotions from their behavior); (3) Regulation of Emotion (e.g., item: When faced with difficulties, I can control my temper); (4) Use of Emotion (e.g., item: I often tell myself that I am a capable person). Empirical analyses based on samples of mainland Chinese university students indicate that the scale possesses sound psychometric properties and is appropriate for assessment and application in this population (Junqi Shi & Wang, 2007). The scale employs a 7-point Likert scale for scoring, where 1 indicates "strongly disagree" and 7 indicates "strongly agree." Additionally, we handled missing data by excluding any observations containing missing values (i.e., listwise deletion/complete-case analysis). In this study, the Cronbach's α coefficient for the Emotional Intelligence Scale was 0.885, and the KMO value was 0.867.

PeRS (Yan, Li, Yu, & Liu, 2021) consists of 22 items and utilizes a four-point scoring system (1 = "not at all," 2 = "sometimes," 3 = "often," 4 = "always"). This scale does not have a clear delineation of primary dimensions; the related items are: (e.g., "I feel nervous when talking to new classmates"; "I am afraid other classmates do not like me") and (2) (e.g., "I look forward to going to school"; "My classmates are very kind to me"). Items 11, 12, 15, 17, 19, 20, and 21 are reverse-coded. The total score is calculated by summing the scores of all items; a higher total score indicates poorer peer relationship status. Additionally, we handled missing data by excluding

any observations containing missing values (i.e., listwise deletion/complete-case analysis). In this study, the Cronbach's α coefficient for the Peer Relationship Rating Scale was 0.864, and the KMO value was 0.888.

PsRS (CD-RISC) was developed by Connor and Davidson (2003), and the Chinese version was revised by Yu and Zhang (2007). Their validation demonstrated that the Chinese version of the Connor–Davidson Resilience Scale (CD-RISC) exhibits good reliability and validity, providing strong evidence that the instrument is suitable for Chinese populations. The Chinese version of the CD-RISC includes 25 items divided into three dimensions: (1) Resilience (e.g., item: When things seem hopeless, I do not easily give up); (2) Strength (e.g., item: Under pressure, I can focus and think clearly); (3) Optimism (e.g., item: I can see the humorous side of things). The scale uses a 5-point Likert scoring system (0 = never, 4 = almost always), where a higher total score indicates a higher level of resilience. Additionally, we handled missing data by excluding any observations containing missing values (i.e., listwise deletion/complete-case analysis). In this study, the Cronbach's α coefficient for the Resilience Scale was 0.920, and the KMO value was 0.941.

SWBS(SWBS-CC20) (Xing, 2002) employs a 6-point Likert scale, ranging from 1 to 6 (1 = strongly disagree, 6 = strongly agree). It comprises four dimensions: contentment and abundance, mental health, social confidence, and growth and progress. Example items include "I am satisfied with my family's economic situation" (contentment and abundance) and "I often feel unhappy due to some trivial matters" (mental health, reverse-coded). Specifically, items 4, 5, 6, 9, 10, 11, 13, 15, 17, 18, and 20 are reverse-coded. The total score is calculated by summing the scores of all items; a higher total score indicates a higher level of subjective well-being. According to Xing (2002), the median total score is 3.5, with scores above 4.5 indicating a high level and scores below 2.5 indicating a low level (Xing, 2002). It should be noted that these cutoffs serve as descriptive reference values; all subsequent inferential analyses in this study utilized the continuous total score. Additionally, we handled missing data by excluding any observations containing missing values (i.e., listwise deletion/complete-case analysis). In this study, the Cronbach's α coefficient for the scale was 0.859, and the KMO value was 0.859.

II. Data analysis

We constructed multiple mediation models in SPSS 26.0, using PeR and PsR as mediating variables to examine the relationship between EI and SWB. EI was set as the predictive variable, while SWB was set as the outcome variable. We utilized the PROCESS macro for SPSS (Model 6) (Hayes, 2018) to test the multiple mediation models with PeR and PsR as mediators. The mediation effects were tested using a bootstrapping method with a sample size of 5000 and a 95% confidence interval (Bolin, 2014).

In our hypothesized model, we proposed that PeR and PsR may mediate the relationship between EI and SWB. We conducted a non-rotated exploratory factor analysis using Harman's single-factor test on the four questionnaires. The KMO value was 0.917, and the Bartlett's test of sphericity was statistically significant ($\chi^2 = 21109.219$, $p < 0.001$), indicating that the data were suitable for factor analysis.

All focal variables were z-standardized prior to analysis. Because Likert-type scores are ordinal, we did not assume exact normality. Descriptive distribution checks indicated approximately symmetric, unimodal shapes: skewness ranged from -0.162 to 0.332 and kurtosis from 0.184 to 0.660 (computed on standardized variables; z-standardization does not alter skewness or kurtosis). Inference for indirect effects relied on percentile bootstrap 95% confidence intervals based on 5,000 resamples, regardless of distributional shape. For path coefficients, we also examined HC3 heteroskedasticity-robust standard errors as a sensitivity analysis; the inferences were unchanged.

III. Results

Common method bias

This study employed Harman's single-factor test to conduct a non-rotated exploratory factor analysis on the four scales. The results indicated that a total of 17 eigenvalues greater than 1 were extracted, with the first common factor explaining 21.38% of the variance, which is well below the critical threshold of 40% (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). This suggests that there is no common method bias in this study.

Test of multicollinearity

We assessed multicollinearity through tolerance tests and variance inflation factors (VIF) (Berk, 1977). In this study, the tolerance values ranged from 0.541 to 0.788, which are greater than 0.10; the VIF values ranged from 1.269 to 1.849, which are less than 10. This indicates that there is minimal multicollinearity among the factors.

Descriptive statistics and bivariate correlation analysis

Table 1 reports means, standard deviations, and correlations for Age, Sex, One-child, LBT, EI, PeR*, PsR, and SWB. Replicating our earlier pattern, EI, PsR, and SWB were strongly and positively correlated ($r = 0.43-0.63$, $p < 0.001$). As expected given the reverse coding of PeR* (higher scores indicate poorer quality of PeR), PeR* showed significant negative correlations with EI ($r = -0.36$, $p < 0.001$), PsR ($r = -0.45$, $p < 0.001$), and SWB ($r = -0.67$, $p < 0.001$).

Regarding the added covariates, Age was not significantly associated with any study variable ($|r| \leq 0.08$, $p > 0.05$). Sex showed a small negative association with PsR ($r = -0.10$, $p < 0.05$). One-child was negatively correlated with PeR* ($r = -0.14$, $p < 0.01$). LBT was not significantly related to EI, PeR*, PsR, or SWB ($|r| \leq 0.03$, $p > 0.05$).

Table 1.Descriptive statistics and correlational analysis for variables(N=493)

Verification of multiple mediation model

Figure 2 illustrates our complete mediation model, which outlines all pathways from EI to SWB.

Specifically, EI may influence SWB through the following four pathways: (1) EI → SWB; (2) EI → PeR → SWB; (3) EI → PsR → SWB; (4) EI → PeR → PsR → SWB.

Figure 2

Mediation: Total effect and direct effects

Using PROCESS v4.1 (Model 6) with Age, Sex (1 = male, 2 = female), Onechild (1 = only-child, 2 = non-only-child), and Left-Behind Type,LBT(1=father away-mother caregiving, 2 = mother away-father caregiving, 3 = both away-relatives caregiving), the standardized total effect of EI on SWB was significant ($\beta = 0.427$, 95% CI [0.3473, 0.5072], $p < 0.001$).whereas the direct effect was not ($\beta = 0.042$, 95% CI [-0.0351, 0.1195], $p = 0.284$). The total indirect effect was significant by bootstrap ($\beta = 0.385$, 95% CI [0.2998, 0.4769]) and accounted for 90.10% of the total effect.After adopting HC3 heteroskedasticity-robust standard errors, the direct effect remains insignificant, and the three indirect effects are still significant, with their directions and magnitudes essentially unchanged(Table 2).

Table 2.OLS VS HC3 results comparison(N=493)

For covariates (Table 3), non-only-child status predicted better PeR (lower PeR; $b = -0.422$, $p = 0.019$) (PeR scoring direction: lower scores indicate better peer relationships) , female sex predicted lower PsR ($b = -0.164$, $p = 0.033$) but higher SWB ($b = 0.204$, $p = 0.004$), and age showed marginal negative trends for PsR and SWB ($p = 0.06-0.08$). These covariate patterns did not alter the substantive mediation findings.

Table 3.Covariate effects on PeR,PsR,and SWB(N=493)

Mediation: Indirect effects.

The analysis revealed a significant total indirect effect, as confirmed by percentile bootstrap analysis with 5,000 resamples, where $\beta = 0.385$, 95% CI [0.2998, 0.4769]. Notably, this mediating pathway accounted for the overwhelming majority—approximately 90.10%—of the total effect of EI on SWB.

Breaking down this total indirect effect, three specific pathways were identified. First, the path through PeR (EI $\rightarrow$ PeR $\rightarrow$ SWB) was significant, with $\beta = 0.179$, 95% CI [0.1259, 0.2361]. This intermediary route accounted for 41.91% of the total effect, a finding which supports H2.

Similarly, the pathway through PsR (EI $\rightarrow$ PsR $\rightarrow$ SWB) was also a substantial and significant mediator, demonstrating an effect of $\beta = 0.175$, 95% CI [0.1276, 0.2297] and accounting for 41.01% of the total effect; consequently, this result provides strong support for H3.

Furthermore, a significant chain-mediating effect was observed (EI $\rightarrow$ PeR $\rightarrow$ PsR $\rightarrow$ SWB), indicating that EI also influences SWB sequentially through PeR and then PsR. Although this pathway was smaller, with $\beta = 0.031$, 95% CI [0.0179, 0.0469], it was statistically significant and still contributed 7.21% to the total effect, thus supporting H4.

Note: Proportions are computed relative to the adjusted total effect (0.427); minor rounding differences may occur.

Table 4. Effects in the mediation model (N=493)

IV. Discussion

Results Overview

After controlling for Age, Sex, One-child, and LBT, the results indicate that EI is significantly associated with SWB among college students with LBE, but this association is fully accounted for by PeR and PsR. Specifically, both PeR and PsR mediate this association in parallel and serial chains. The total indirect effect ($\beta=0.385$, 90.10% of the total association) includes three pathways: parallel mediation via PeR (Ind1: 41.90%) and PsR (Ind2: 41.01%), and serial mediation via PeR $\rightarrow$ PsR (Ind3: 7.21%). The inclusion of covariates slightly attenuated but did not fundamentally alter these mediation patterns, strengthening confidence in the robustness of our findings. This aligns with previous research showing that higher EI enhances social interactions and PeR, thereby improving SWB (S. Zhang, Deng, Xin, Xuebin, & Hou, 2022).

Theoretical explanation of non-significant direct effects

The non-significant direct effect of EI on SWB ($\beta=0.042$, $p=0.284$) suggests that EI may not directly improve SWB in this group but instead operates through social and psychological resources. This pattern persisted even after adjusting for demographic covariates, indicating that the indirect pathway mechanism is not merely an artifact of confounding demographic factors. First, consistent with attachment theory, early parent-child separation may compromise the development of a secure base with lasting socioemotional implications (Bowlby, 2008). In line with resilience and developmental-adaptation perspectives, LBE students may thus derive the benefits of emotional competencies primarily through external social resources (PeR) and internal coping capacities (PsR), rather than direct emotional gratification (Allen & Tan, 2016; Armsden & Greenberg, 1987; Masten, 2001). This pattern differs from non-LBE populations where EI may directly enhance SWB through immediate emotional regulation benefits.

Theoretically, this aligns with the social capital theory, which posits that individuals with early parent-child separation (e.g., LBE students) develop stronger reliance on external social support (e.g., peers) and internal coping resources (e.g., resilience) to meet emotional needs. For example, Research found that LBE children exhibit delays in socio-emotional development, which may be explained by greater dependence on PeR

and PsR to compensate for familial support deficits.(Qu et al., 2020) Furthermore, studies have indicated that among university students with LBE, higher levels of interpersonal relationships and social support can significantly enhance PsR, thereby promoting SWB(Luo & Zhou, 2017).In addition, the non-significance of the direct effect may also be attributable to two factors. First, measurement overlap: EI and SWB may share variance that is indirectly absorbed by PeR and PsR, given that emotion regulation—a core component of EI—is closely linked to resilience.This potential conceptual overlap is plausible in Chinese contexts, where EI measures developed and validated with Chinese samples emphasize interpersonal sensitivity (e.g., the others' emotion appraisal dimension of WLEIS), and where interpersonal harmony is a salient cultural value closely tied to peer-related functioning(Cheung et al., 2001). Second, a suppression effect: unmeasured covariates (e.g., family socioeconomic status) could attenuate the direct EI–SWB association; however, this concern is tempered by the substantial indirect effect, which accounts for 90.10% of the total effect.Alternative explanations include potential threshold effects, where EI may only directly influence SWB above certain levels, or temporal dynamics where direct effects emerge only after indirect pathways are established—possibilities that warrant longitudinal investigation.

PeR as a key mediator

Notably, our covariate analysis revealed that non-only-child status was a significant predictor of better peer relationships ($b = -0.422$, $p = .002$). This finding can be explained through the lens of social learning theory (Bandura & Walters, 1977). Having siblings provides a natural training ground where children continually observe, imitate, and practice social behaviors such as negotiation, cooperation, and conflict resolution. These skills, first honed within the family unit, are then readily generalized to peer interactions outside the home, thereby facilitating the development of more robust peer relationships. High EI individuals demonstrate stronger social skills (e.g., emotion perception, utilization), enabling them to build positive peer relationships (Extremera, Sánchez-Álvarez, & Rey, 2020; Hidalgo-Fuentes et al., 2024). In addition, converging empirical evidence indicates that positive peer relationships can buffer the detrimental impact of stressful life events on mental health—for example, by reducing loneliness and perceived social dissatisfaction. Specifically, studies have shown that college students with LBE report significantly higher levels of anxiety and loneliness than their non-LBE counterparts and tend to exhibit more negative patterns of social interaction. Related findings further indicate that interpersonal relationships and social support are significantly associated with loneliness, and that stronger social support promotes the mental health of LBE students, thereby enhancing SWB(Cui & Liu, 2023). These results are consistent with the stress-buffering model.

Psychological resilience as a parallel mediator

Psychological resilience (Ind2: 41.01%) emerges as another core pathway. EI enhances resilience by promoting adaptive coping strategies (e.g., positive cognitive appraisal of stress) (Schneider, Lyons, & Khazon, 2013).Our covariate analysis revealed important sex differences: females showed lower PsR ($b=-0.164$, $p=0.033$) but higher SWB ($b=0.204$, $p=0.004$), suggesting that female students may rely on alternative pathways to well-being beyond resilience, possibly through stronger emotional expression and social support seeking—patterns documented in gender socialization literature (Tamres, Janicki, & Helgeson, 2002). In addition, studies have found that college students with LBE have lower social adaptation than non-LBE students, and that this group's social adaptation is closely linked to PsR(Yang et al., 2021). Among college students with LBE, lower baseline PsR makes this pathway more influential:the observed association suggests that EI-driven resilience helps them navigate academic and interpersonal stressors, thereby being associated with improved SWB (Tzamakos et al., 2024).

Serial mediation: Peer relationships → Psychological resilience

The small but significant serial effect (Ind3: 7.21%) underscores the developmental cascade model : high-quality PeR foster PsR over time (Masten & Cicchetti, 2010). While this serial pathway accounts for only 7.21% of the total association ($\beta=0.031$), its statistical significance ($p<0.001$) and theoretical importance warrant attention. From a practical standpoint, this effect size, though modest, represents approximately one-sixth of either parallel pathway alone, suggesting that the synergistic combination of peer support leading to enhanced resilience provides incremental benefits beyond their independent contributions. In intervention terms, this corresponds to a small effect; importantly, small effects can still be practically meaningful, particularly when they accrue over repeated exposures or extended periods (Funder & Ozer, 2019). Empirical research indicates that, among college students with LBE perceived social support and PsR play significant mediating roles in shaping SWB (B.-W. Zhou & Li, 2020). Though modest in magnitude, this chain effect highlights the interdependence of social and psychological resources in this group. These findings suggest that social resources can be conceptualized as foundational scaffolds for internal coping capacities; for college students with LBE, it is therefore particularly important to emphasize the accumulation of such resources.

In summary, the findings of the present study are of significant importance as they indicate associations between EI and SWB in college students with LBE appear to operate primarily through PeR and PsR. The robustness of these pathways after covariate adjustment highlights the need for longitudinal confirmation before any practical inferences. While causal interpretations await longitudinal confirmation, the pattern of associations suggests that EI may be linked with improved interpersonal relationships and enhanced PsR, thereby potentially contributing to overall SWB among college students with LBE (with total indirect associations accounting for 90.10% of the observed relationship, though effect sizes remain modest and context-dependent).

Future studies should examine potential moderating effects of demographic variables on the EI-SWB pathways, as our covariate analysis suggests that associations may vary across different subgroups. This study suggests the adoption of a mixed-methods paradigm in future investigations, integrating quantitative outcome evaluations with qualitative process inquiries to elucidate the unique experiences and needs of university students who have had LBE backgrounds during the development of EI. Concurrently, researchers should devote close attention to the moderating role of cultural factors, systematically examining the complementarities and integration of traditional Chinese emotion-regulation wisdom with Western EI theories.

V. Limitations

We acknowledge several limitations in the present study that warrant consideration. First, although the SWB of college students with LBE may be influenced by their cultural background, these factors were not included in the scope of analysis, potentially limiting the comprehensive and accurate interpretation of the findings. Second, the study employed a cross-sectional design, which hinders the ability to make precise causal inferences about the relationships among variables, as mediation ordering remains theoretical and untested for temporal precedence in this context. Additionally, all measures relied on self-reports from a common rater, introducing potential common method bias that could inflate associations due to shared variance from response styles or social desirability. Furthermore, the PeR scale, originally developed for children and adolescents, was adapted for use with college students, which may affect its validity and sensitivity in capturing adult interpersonal dynamics. There is also a risk of recall bias in participants' self-classification of LBE, as retrospective reporting of childhood experiences could be influenced by memory inaccuracies or current emotional states. While we controlled for key covariates such as Age, Sex, One-child, and LBT, other variables

that may affect SWB—such as family support, economic status, and mental health conditions—were not accounted for, potentially leading to biased estimates of the mediating effects.

Regarding generalizability, the sample was recruited via stratified sampling from six universities in Zunyi City, Guizhou Province, southwestern China, with an initial draw of 100 participants per institution, resulting in 493 valid responses after screening. Although this stratified approach provides some structure and diversity across institutions, it may still limit the applicability of findings to broader populations of LBE college students, particularly those in different regions or institutional settings outside southwestern China. The sample also exhibited a sex imbalance (e.g., higher proportion of females), which could influence the observed associations given documented gender differences in emotional intelligence and well-being; this imbalance reflects inherent enrollment patterns in these institutions, such as higher female representation in normal (teacher-training) and medical universities (e.g., male-to-female ratios as low as 3:7), rather than a flaw in the sampling process itself.

Future research should address these limitations by incorporating cultural background factors into analyses, adopting longitudinal or experimental designs to establish temporal precedence and causality, and employing multi-method approaches (e.g., objective measures or multi-informant data) to mitigate biases. Additionally, controlling for a wider array of covariates and using more diverse, representative sampling methods (e.g., national-level sampling) would enhance the robustness and generalizability of results.

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Tables

Table 1.Descriptive statistics and correlational analysis for variables(N=493)

		M	SD	1	2	3	4	5	6	7	8
1	Age	19.51	1.38	1							
2	Sex	1.75	0.43	-0.01	1						
3	One-child	1.89	0.31	0.06	0.08	1					
4	LBT	2.43	0.84	-0.02	0.05	0.01	1				
5	EI	4.94	0.73	-0.05	-0.04	0.01	-0.01	1			
6	PeR*	2.26	0.41	-0.02	0.03	-0.14**	0.03	-0.36***	1		
7	PsR	3.32	0.49	-0.08	-0.10*	0.00	-0.01	0.63***	-0.45***	1	
8	SWB	3.86	0.59	-0.08	0.04	0.08	-0.03	0.43***	-0.67***	0.58***	1

***p<0.001,**p<0.01,*p<0.05,EI: Emotional Intelligence; SWB: Subjective Well-Being; PeR: Peer

Relationships; PsR: Psychological Resilience

*Note that a higher score on the peer relationship scale indicates a poor quality of peer relationships.

Table 2.OLS VS HC3 results comparison(N=493)

Effect Type / Path	OLS Effect	OLS 95% CI	HC3 Effect	HC3 95% CI
Total effect EI→SWB (c)	0.4270	[0.3473, 0.5072]	0.4272	[0.3272, 0.5273]
Direct effect EI→SWB (c')	0.0420	[-0.0351, 0.1195]	0.0422	[-0.0387, 0.1231]
Total indirect	0.3850	[0.2998, 0.4769]	0.3850	[0.3004, 0.4774]
Ind1: EI→PeR→SWB	0.1790	[0.1259, 0.2361]	0.1790	[0.1269, 0.2379]
Ind2: EI→PsR→SWB	0.1750	[0.1276, 0.2297]	0.1752	[0.1278, 0.2306]
Ind3: EI→PeR→PsR→SWB	0.0310	[0.0179, 0.0469]	0.0308	[0.0177, 0.0471]

EI: Emotional Intelligence; SWB: Subjective Well-Being; PeR: Peer Relationships; PsR: Psychological Resilience

Table 3.Covariate effects on PeR,PsR,and SWB(N=493)

Covariate	PeR	PsR	SWB
	b=-0.0160 [-0.0757,	b=-0.0427	b=-0.0424
Age	0.0438]	[-0.0899, 0.0044]	[-0.0858, 0.0010]
	P = 0.5999	P = 0.0758	P = 0.0557
	b=0.0583	b=-0.1639	b=0.2040
Sex (1=males,	[-0.1322, 0.2488]	[-0.3143,-0.0135]	[0.0655,0.3426]
2=females)	P = 0.5480	P = 0.0327	P = 0.0040
	b=-0.4215	b=-0.0950	b=0.0134
One-child	[-0.6861,-0.1569]	[-0.3060,0.1159]	[-0.1802,0.2070]
(1=only-child,	P = 0.0019	P = 0.3765	P = 0.8920
2=non-only-child)	b=0.0365	b=0.0043	b=-0.0206
	[-0.0612,0.1341]	[-0.0728, 0.0813]	[-0.0913,0.0501]
LBT (1/2/3)	P = 0.4634	P = 0.9137	P = 0.5667

EI: Emotional Intelligence; SWB: Subjective Well-Being; PeR: Peer Relationships; PsR: Psychological Resilience

Table 4.Effects in the mediation model(N=493)

Block	Effect Type / Path	Path Description	Standardized Effect	95% CI (Bootstrap)	Proportion of Total Effect
A	Total Effect	EI → SWB	0.427	[0.3473, 0.5072] P< 0.001	100%
A	Direct Effect (c')	EI → SWB	0.042	[-0.0351,0.1195]P = 0.284	9.88%
A	Total Indirect	EI → SWB	0.385	[0.2998,0.4769]	90.12%
B	Ind1	EI → PeR → SWB	0.179	[0.1259,0.2361]	41.90%
B	Ind2	EI → PsR → SWB	0.175	[0.1276, 0.2297]	41.01%
B	Ind3	EI → PeR → PsR → SWB	0.031	[0.0179, 0.0469]	7.21%
C	a1	EI → PeR	-0.354	[-0.4365,-0.2716] P<0 .001	—
C	a2	EI → PsR	0.533	[0.4636, 0.6029] P< 0.001	—
C	d21	PeR → PsR	-0.265	[-0.3351,-0.1945] P< 0.001	—
C	b1	PeR → SWB	-0.506	[-0.5737,-0.4378] P< 0.001	—
C	b2	PsR → SWB	0.329	[0.2468, 0.4102] P<0 .001	—

Presentation order: Area A (overall effect) → Area B (indirect effect of sub-path) → Area C (path coefficient)

EI: Emotional Intelligence; SWB: Subjective Well-Being; PeR: Peer Relationships; PsR: Psychological Resilience

Figures

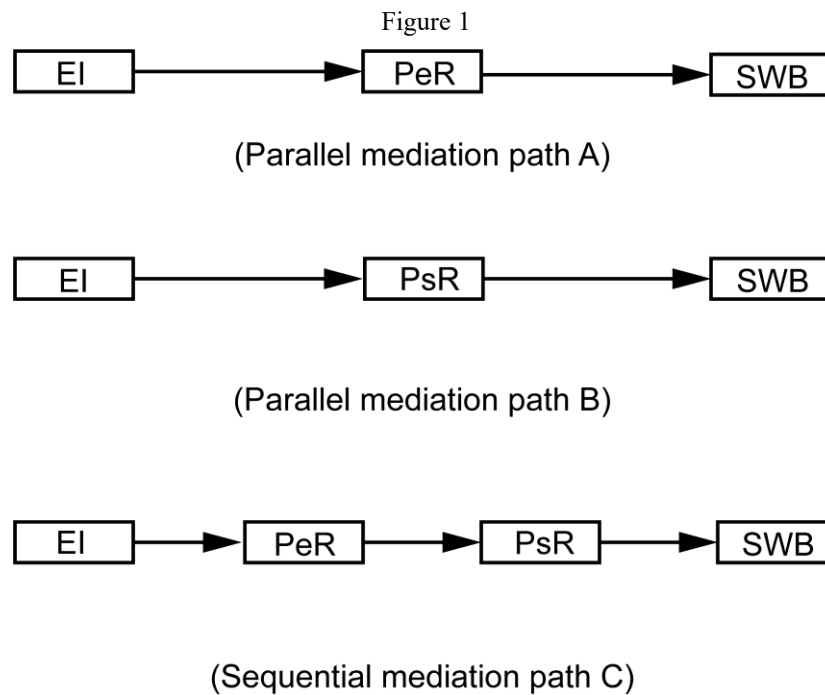
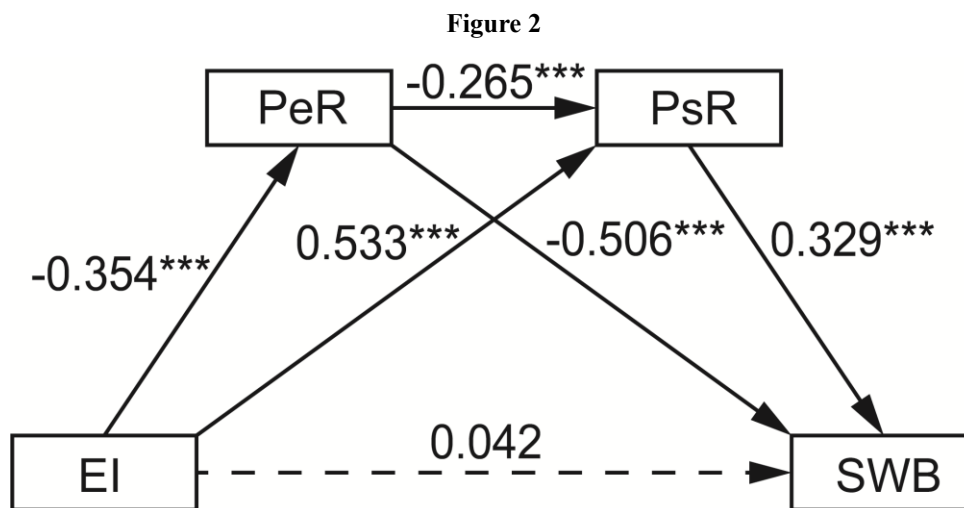


Figure 2. The multiple mediation model of Psychological Resilience and Peer Relationship in the relationship between Emotional Intelligence and Subjective Well-Being. The solid line denotes a significant path, and the dotted line denotes a nonsignificant path. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$



*** $p < 0.001$

Note that Solid lines: significant pathways; dashed lines: non-significant pathways