Academic Education
Publishing House
-AEPH-

# The Bidirectional Relationship Between Positive Psychological Qualities and Mental Sub-Health among College Students in Ethnic Regions: A Cross-Lagged Model Analysis

**Yingying Jiang***

*Department of Educational Science, Sichuan Minzu College, Kangding, Sichuan, China*
*\*Corresponding Author*

**Abstract: This longitudinal investigation aimed to clarify the directional influences between positive psychological qualities (PPQ) and mental sub-health (MSH) among university students in China's ethnic minority regions. Data were collected at two time points, one year apart, from students enrolled at universities within these regions. Analysis via a cross-lagged panel model (CLPM) was conducted. After accounting for the temporal stability of the constructs, results indicated that baseline PPQ significantly and negatively predicted subsequent MSH levels. Conversely, baseline MSH also exerted a significant negative prediction on later PPQ. A stable bidirectional negative predictive relationship was thus established between the two variables. These findings confirm a mutually reinforcing negative cycle linking PPQ and MSH in this student population. Consequently, mental health promotion initiatives for these students should adopt a dual-focus strategy, integrating systematic cultivation of PPQ through positive education with targeted interventions to mitigate MSH.**

**Keywords: Positive Psychological Qualities; Mental Sub-Health; Cross-Lagged Panel Analysis; College Students**

## 1. Introduction

The mental well-being of university students has become a focus of increasing public concern in recent years. Due to disparities in economic and educational resources, the mental health status of college students in ethnic regions presents unique characteristics and challenges. Mental sub-health, an intermediate state between complete health and illness characterized by persistent low mood, cognitive decline, and social adaptation difficulties, has become a significant factor affecting the comprehensive development of college students[1].

Positive psychological qualities, serving as crucial psychological resources for individuals facing challenges, encompass multiple dimensions such as resilience, optimism, self-efficacy, and gratitude, playing a vital role in maintaining and promoting mental health[2-3]. However, most existing research on the relationship between positive psychological qualities and mental sub-health remains at the cross-sectional survey level, lacking in-depth exploration of their causal direction. This research gap limits our understanding of their dynamic relationship and affects the targeting and effectiveness of related interventions.

As a special group, college students in ethnic regions not only face common challenges shared by their peers, such as academic pressure and interpersonal adaptation, but also need to cope with unique challenges like cultural and environmental adaptation[4]. These factors render their mental health issues more complex and make research exploring the relationship between positive psychological qualities and mental sub-health particularly urgent and important.

From a theoretical perspective, the broaden-and-build theory[5] posits that positive psychological qualities can expand individuals' cognitive-behavioral resources and build lasting psychological capital, thereby effectively preventing the occurrence of mental sub-health. Conversely, the conservation of resources theory[6] emphasizes that the state of mental sub-health continuously depletes individuals' psychological resources, hindering the development of positive psychological qualities. These two theoretical perspectives explain the relationship from different directions, yet no study has simultaneously tested both pathways among college students in ethnic regions. Previous research methodologies have notable

limitations. Most studies employ cross-sectional designs, which cannot establish causal relationships between variables. The cross-lagged panel model, as an advanced longitudinal data analysis method, can simultaneously examine the mutual influence between variables, providing more reliable evidence for revealing causality[7].

Therefore, applying this method to study the relationship between positive psychological qualities and mental sub-health among college students in ethnic regions holds significant methodological value.

This study employed a one-year longitudinal design and CLPM to investigate the bidirectional relationship between PPQ and MSH among college students in ethnic regions. Specifically, it addressed three questions: (1) Does baseline PPQ predict MSH levels one year later? (2) Does baseline MSH predict PPQ levels one year later? (3) Is there evidence of a stable bidirectional predictive relationship? The answers are expected to inform both theory and practice regarding mental health promotion for this student demographic.

## 2. Methods

### 2.1 Participants

This study utilized a cluster sampling method to select participants from three universities in western ethnic regions of China. These universities are located in different ethnic areas, offering a degree of representativeness. At the initial assessment (T1), 850 questionnaires were distributed, with 785 valid questionnaires returned, yielding an effective response rate of 92.4%. One year later (T2), a second questionnaire survey was conducted, successfully following up with 723 college students, resulting in a follow-up success rate of 92.1%.

The final sample's demographic characteristics were as follows: 323 males (44.7%) and 400 females (55.3%); mean age 19.74 years (SD = 1.43). Ethnic composition included 208 Tibetan students (28.4%), 185 Yi students (25.6%), 164 Mongolian students (22.7%), and 166 students from other ethnic minorities (23.3%). Regarding major distribution, 256 were in humanities (35.4%), 238 in science (32.9%), and 229 in engineering (31.7%). All participants provided informed consent and participated voluntarily.

### 2.2 Mearuements

Positive Psychological Qualities Scale. This study employed the Chinese College Student Positive Psychological Qualities Scale revised by Meng and Guan[8]. It consists of 62 items divided into six dimensions corresponding to wisdom and knowledge, courage, humanity, justice, temperance, and transcendence, representing cognitive, emotional, interpersonal, civic, avoidance of extremes, and spiritual belief strengths, respectively. The number of items per dimension varies: 12 for cognitive, 9 for interpersonal, 11 for emotional, 9 for justice, 11 for temperance, and 10 for transcendence. The scale demonstrates good reliability and validity and is suitable for large-scale surveys on the development of positive psychological qualities among Chinese college students. It uses a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). In this study, the Cronbach's α coefficients for the total scale were .92 at T1 and .94 at T2, with α coefficients for the subscales ranging from .82 to .89, indicating good reliability.

Mental Sub-Health Scale. Mental sub-health was assessed using the psychological subscale from the College Student Mental Sub-Health Assessment Questionnaire compiled by Qi et al.[9]. This scale contains 39 items covering emotional sub-health, behavioral sub-health, social adaptation sub-health, mental sub-health symptoms, and mental sub-health status. Each item has 6 criteria based on symptom duration (1: duration > 3 months; 2: duration > 2 months; 3: duration > 1 month; 4: duration > 2 weeks; 5: duration > 1 week; 6: none or duration ≤ 1 week). A lower score indicates a longer duration of adolescent sub-health. Among the 39 items, having 1 ≤ "number of items with duration > 1 month" < 8 is assessed as mental sub-health symptoms. The emotional problems dimension has 18 items; having "number of items with duration > 1 month" ≥ 3 determines emotional sub-health. The behavioral problems dimension has 8 items; having "number of items with duration > 1 month" ≥ 1 determines behavioral sub-health. The social adaptation difficulties dimension has 13 items; having "number of items with duration > 1 month" ≥ 4 determines social adaptation sub-health. In this study, the Cronbach's α coefficient for this scale was .87. The total Cronbach's α coefficients were .89 at T1 and .91 at T2, with subscale α coefficients ranging from .84 to 0=.88. Additionally,

participants' demographic variables, including gender, age, ethnicity, and major, were collected and included in the analysis as control variables.

## 2.3 Procedure and Data Analysis

Procedure: This study was approved by the university ethics committee. Data collection occurred in two phases: Phase 1 (T1) was conducted in September 2024 after freshman enrollment, and Phase 2 (T2) was conducted in September 2025. Both surveys employed a group administration format, with questionnaires completed by class under the guidance of professional researchers. Each survey session lasted approximately 30–40 minutes.

To ensure data quality, the following measures were taken: (1) All survey administrators received uniform training on standardized instructions and precautions; (2) The research purpose and confidentiality principles were explained in detail to participants before the survey, and informed consent forms were signed; (3) A uniform environment for questionnaire completion was provided to minimize external interference; (4) Returned questionnaires were strictly screened, and invalid ones with patterned responses or excessive omissions were excluded. To protect participant privacy, all questionnaires were anonymous, and data matching between the two surveys was achieved through coding.

Data Analysis: SPSS 26.0 was used for data preprocessing and descriptive statistical analysis, including calculating means, standard deviations, and correlation coefficients for the variables. Mplus 8.3 software was used to establish the cross-lagged panel model, using maximum likelihood estimation.

The specific analysis steps were as follows: First, confirmatory factor analysis was conducted to test the goodness of fit of the measurement model. Second, a baseline model (containing only autoregressive paths) was established. Then, cross-lagged paths were added to the baseline model to establish the cross-lagged model. Finally, the optimal model was determined through model comparison. Model fit was evaluated using the following criteria: $\chi^2/df < 5$, CFI > .90, TLI > .90, RMSEA < .08, SRMR <.05[10]. Demographic variables were included as controls.

## 3. Results

### 3.1 Common Method Bias Test

Harman's single-factor test was performed on all questionnaire items using unrotated exploratory factor analysis. The results showed that there were 12 factors with eigenvalues greater than 1, and the first factor explained 28.7% of the variance, below the 40% critical standard. This indicates that the data in this study do not have a serious common method bias problem, and subsequent analyses can be conducted.

### 3.2 Descriptive Statistics and Correlation Analysis

The means, standard deviations, and correlation coefficients for the study variables are presented in Table 1. Positive psychological qualities and mental sub-health were significantly negatively correlated at both T1 and T2 ($r = -.43$, $p < .01$; $r = -.47$, $p < .01$). Furthermore, both positive psychological qualities and mental sub-health demonstrated high stability over the one-year period ($r = .61$, $p < .01$; $r = .58$, $p < .01$).

**Table 1. Means, Standard Deviations, and Correlations for Study Variables (N = 723)**

| Variable | $M$ | $SD$ | PSQ-T1 | SMH-T1 | PSQ-T2 | SMH-T2 |
|---|---|---|---|---|---|---|
| PSQ-T1 | 3.85 | .62 | 1 | | | |
| SMH-T1 | 2.78 | .71 | -.043** | 1 | | |
| PSQ-T2 | 3.91 | .65 | .61** | -.38** | 1 | |
| SMH-T2 | 2.69 | .68 | -.39** | .58** | -.47** | 1 |

Note. PPQ = Positive Psychological Qualities; MSH = Mental Sub-Health; T1 = Time 1; T2 = Time 2; ** $p < .01$.

The descriptive statistics reveal several noteworthy patterns. First, the mean levels of positive psychological qualities increased slightly from T1 to T2 (from 3.85 to 3.91 on a 5-point scale), suggesting an overall enhancement of these qualities during the first year of university. This finding aligns with developmental perspectives that view emerging adulthood as a period of growth in psychological strengths. Conversely, mental sub-health showed a slight decrease from T1 to T2 (from 2.78 to 2.69 on a 5-point scale), indicating some improvement in mental health symptoms over time. The stability coefficients (.61 for positive qualities and .58 for mental sub-health) indicate moderate to high rank-order stability, meaning that individuals tended to maintain their relative positions on these constructs over the one-year interval. These stability coefficients are substantial enough to suggest trait-like consistency while leaving sufficient room for change to be explained by cross-lagged effects.

The cross-sectional correlations between positive qualities and mental sub-health were moderate in magnitude (-.43 at T1 and -.47 at T2), indicating that approximately 18-22% of the variance in one construct is shared with the other at each time point. These substantial correlations provide initial support for investigating their longitudinal relationships.

### 3.3 Measurement Invariance Test

Prior to cross-lagged analysis, measurement invariance was tested. The results showed that the configural, weak, and strong invariance models all exhibited good fit indices (all ΔCFI < .01), indicating that the measurement tools were stable across different time points and suitable for longitudinal comparison.

### 3.4 Cross-Lagged Panel Model Analysis

The cross-lagged model demonstrated good fit indices: $\chi^2/df$ = 2.84, CFI = .96, TLI = .94, RMSEA = .051, SRMR = .043. The model results (see Figure 1) showed that the path coefficient from T1 positive psychological qualities to T2 mental sub-health was $\beta$ = -.18 (p < .01), and the path coefficient from T1 mental sub-health to T2 positive psychological qualities was $\beta$ = -.15 ($p$ < .01). Both cross-lagged paths were statistically significant, indicating a bidirectional negative predictive relationship between positive psychological qualities and mental sub-health.

The cross-lagged path coefficients, while statistically significant, are modest in magnitude, accounting for approximately 3.2% of the variance in T2 mental sub-health (from T1 positive qualities) and 2.3% of the variance in T2 positive qualities (from T1 mental sub-health) beyond the variance explained by autoregressive effects. While these effect sizes may appear small by conventional standards, they are meaningful in the context of longitudinal prediction where substantial variance is already accounted for by prior levels of the same construct. The finding that both cross-lagged paths are significant supports a reciprocal model wherein positive qualities and mental sub-health mutually influence each other over time. This pattern suggests a potential negative spiral: lower positive qualities predict increased mental sub-health, which in turn predicts further declines in positive qualities. The gender effect observed (with females reporting higher mental sub-health) is consistent with extensive literature

documenting gender differences in mental health outcomes, though it is noteworthy that gender did not moderate the cross-lagged relationships in our model (as tested in supplementary analyses not reported here). The model fit indices all fall within acceptable ranges, with the RMSEA value of 0.051 indicating close fit and the CFI and TLI values above .95 indicating excellent fit relative to the null model.
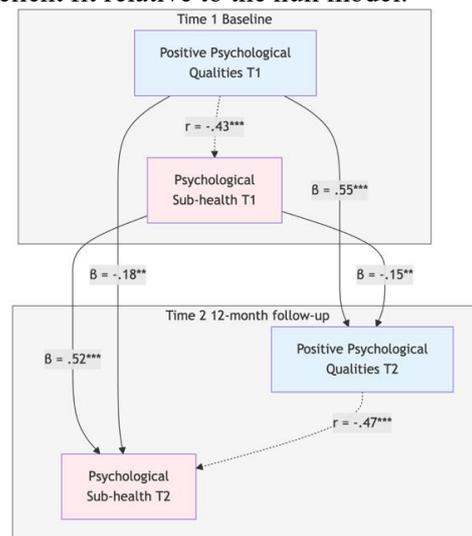


**Figure 1. Cross-lagged Panel Model of Positive Psychological Qualities and Psychological Sub-health**

Note: Standardized path coefficients are shown. T1 = Time 1; T2 = Time 2 (12-month follow-up). Solid arrows represent cross-lagged and autoregressive paths, while curved arrows represent concurrent correlations. ** = $p$ < .01, *** = $p$ < .001.

Additionally, the autoregressive paths showed that both positive psychological qualities ($\beta$ = .55, $p$ < .01) and mental sub-health ($\beta$ = .52, $p$ < .01) exhibited high temporal stability. Among the control variables, gender had a significant effect on mental sub-health ($\beta$ = .08, $p$ < .05), with female students reporting slightly higher levels of mental sub-health than males.

### 4. Discussion

Employing a rigorous CLPM design, this study is the first to identify a reciprocal negative predictive relationship between PPQ and MSH among college students in ethnic regions, revealing a potential vicious cycle where each construct detrimentally influences the other over time.

### 4.1 Theoretical Implications

Our findings extend previous theoretical

frameworks by demonstrating their applicability to ethnic minority college student populations. The bidirectional relationships observed suggest that theoretical models focusing exclusively on either the protective effects of positive qualities or the debilitating effects of mental sub-health may be incomplete. Instead, an integrative theoretical perspective that accounts for reciprocal influences over time may better capture the dynamic processes underlying mental health in this population. From a developmental perspective, our findings highlight the importance of the university years as a period when reciprocal relationships between psychological strengths and vulnerabilities become established. These patterns may set trajectories that influence long-term mental health outcomes beyond the college years. Furthermore, our results underscore the need to contextualize psychological theories within specific cultural and institutional contexts. The manifestation of both positive qualities and mental sub-health, as well as their interrelationships, may be shaped by cultural values, minority status experiences, and institutional characteristics unique to ethnic regions and their educational systems.

## 4.2 Practical Implications

Our results suggest several specific directions for intervention development. First, interventions targeting positive psychological qualities should be tailored to the cultural context of ethnic minority students. This might involve incorporating culturally relevant examples, drawing on traditional stories or wisdom that exemplify psychological strengths, and recognizing cultural variations in the expression and valuation of different qualities. Second, given the bidirectional relationships observed, interventions might be most effective when they simultaneously address both positive qualities enhancement and mental sub-health reduction. For example, resilience-building programs could incorporate components that teach coping strategies for specific mental sub-health symptoms, while mental health awareness campaigns could include modules on strength identification and development. Third, the significant autoregressive paths in our model suggest that early assessment and intervention are particularly important, as both positive qualities and mental sub-health show considerable stability over time. Universities might implement screening during orientation programs to identify students at risk for mental sub-health or with lower levels of positive qualities, followed by targeted support programs. Finally, the gender differences observed suggest that interventions may need to be gender-sensitive, addressing potentially different manifestations of mental sub-health and pathways to developing positive qualities among male and female students.

## 5. Conclusion

This study verifies a bidirectional negative predictive link between PPQ and MSH among ethnic region college students, indicative of a mutually weakening cycle. Mental health promotion for this group therefore requires comprehensive strategies that combine systematic fostering of psychological strengths with proactive identification and mitigation of sub-health symptoms. These insights provide a valuable foundation for enhancing the mental health service framework targeting this student population.

## References

[1] Wang Y, Zhang L, Liu X. Mental sub-health status and its associated factors among college students: A nationwide survey in China. Journal of Affective Disorders, 2023, 324:1-8.

[2] van Zyl L E, Dik B J, Donaldson S I, et al. Positive organisational psychology 2.0: Embracing the technological revolution. The Journal of Positive Psychology, 2024, 19(4):699-711.

[3] Liu Y, Yu H, Shi Y, Ma C. The effect of perceived stress on depression in college students: the role of emotion regulation and positive psychological capital. Frontiers in Psychology, 2023, 14:1110798.

[4] Liu W T. Research on Integrating Socialist Core Values into College Students' Mental Health Education. Journal of Huainan

Vocational & Technical College, 2022, 22(1):1-3.

[5] Fredrickson B L. The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. American Psychologist, 2001, 56(3):218-226.

[6] Hobfoll S E. Conservation of resources: a new attempt at conceptualizing stress. American Psychologist, 1989, 44(3):513-524.

[7] Meule A, Lieb K, Chmitorz A, Voderholzer U. Resilience and depressive symptoms in inpatients with depression: A cross-lagged panel model. Clinical Psychology & Psychotherapy, 2024, 31(1):e2926.

[8] Meng W J, Guan Q. Report on the development of the Chinese College Student Positive Psychological Qualities Scale. Chinese Journal of Special Education, 2009, (8):71-77.

[9] Qi X Y, Tao F B, Hu C L, Xing C, Cao D Z, Wan Y H, Hao J H. Development of a Multidimensional Sub-health Questionnaire for Chinese Adolescents. Chinese Journal of Public Health, 2008, 24(9):1025-1028.

[10] Little T D. Longitudinal structural equation modeling. Guilford Publications, 2024.