

An experimental study investigating the effects of Tai Chi practice on suboptimal mental health among Chinese university students

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Abstract

To investigate the impact of Tai Chi practice on improving suboptimal mental health among Chinese university students, and to provide a theoretical reference for enhancing the mental health status of college students. A total of 100 first-year students enrolled in a Tai Chi course at Guizhou University of Traditional Chinese Medicine were selected as subjects for this study. They underwent a 16-week standardized 24-form Tai Chi intervention. The psychological sub health sections of 85 completed copies of the Multidimensional Assessment Questionnaire for Sub-health in Adolescents were collected. Results from the paired-sample t-test indicated that the total score for suboptimal mental health decreased from 148.76 ± 23.14 to 144.82 ± 22.06 post-intervention, with a mean reduction of 3.94 points. This suggests that Tai Chi practice has an improving effect on the state of suboptimal mental health. The suboptimal mental health scale comprises three dimensions: emotional problems, behavioral problems, and social adaptation difficulties. Further data from paired-sample t-tests showed improvements across all these dimensions among the university students. Tai Chi practice demonstrates a significant positive effect on improving the state of suboptimal mental health in university students, indicating the necessity of promoting Tai Chi within higher education institutions.

Received:
September 16, 2025

Accepted:
November 11, 2025

Online Published:
December 07, 2025

Keywords:
Chinese college students, mental health, suboptimal mental health, Tai Chi.

Introduction

With societal development, Chinese college students are facing immense pressure from academics, employment, and daily life (Liu, 2017; Sun, 2024; Zhang, 2024). Under such circumstances, their physical and mental well-being can suffer significantly. Prolonged exposure to high-stress environments has led to a considerable imbalance in both body and mind among Chinese university students, placing them in a state between health and illness—often referred to as "suboptimal mental health." This condition primarily arises from various maladaptive phenomena in academic and life contexts, leading to a range of symptoms such as fatigue, anxiety, insomnia, memory decline, and difficulty concentrating. Although not a pathological state, it adversely affects students' normal lives and academic performance. Tai Chi, as an exemplary traditional Chinese sports culture, is characterized by gentle, fluid, and graceful movements. It also offers benefits in regulating both mind and body, as well as enhancing physical fitness. Therefore, after prolonged

exposure to modern high-pressure environments, college students can appropriately practice Tai Chi to alleviate their suboptimal mental health conditions. The extent of suboptimal mental health impacts students' daily learning activities and even their future work quality. Thus, exploring the causes of suboptimal mental health and methods for improvement is crucial for university students. A review of extensive literature suggests that Tai Chi practice can effectively improve the state of suboptimal mental health among college students.

Literature Review

In China, research on Tai Chi's role in improving suboptimal health among university students has yielded notable results. For instance, Mo Shilei, in a study on the main manifestations of psychological "sub-health" among college students and corresponding educational strategies, conducted a mental health survey and found that 20% of students had psychological issues, while approximately 20% did not exhibit direct symptoms but showed significant

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To Cite: Zhubing, S., & Qian, D. (2025). An experimental study investigating the effects of Tai Chi practice on suboptimal mental health among Chinese university students. *Adv Health Exerc*, 5(2), 175-179.

psychological problems when faced with challenges (Mo, 2009). About one-quarter of the students were in a state between health and sub-health. Professor Yan Xinghui from the Physical Education Department of Fujian University of Traditional Chinese Medicine, through long-term observation and research, discovered that Tai Chi plays a significant role in regulating the mental health of college students (Yan, 2010). His study indicated that the unique exercise form of Tai Chi effectively improves students' mood states and has a notable impact on their mental well-being. Zhou Zheng of Hulunbuir University also conducted research on Tai Chi's improvement of sub-health among college students, demonstrating that Tai Chi practice positively influences students' psychological and emotional states (Zhou, 2011). Bai Gang from the Sports Department of Zhejiang Gongshang University discussed the impact of Tai Chi on the physical and mental health of college students, noting that Tai Chi practice positively affects the nervous, circulatory, respiratory, and digestive systems, as well as bones, muscles, and joints. Additionally, promoting the "Tai Chi Health Project" on university campuses holds profound significance (Bai, 2006).

Domestic scholars have also explored the improving effects of Tai Chi on sub-health from multiple perspectives. For example, Cai Jingfang from the College of Physical Education at Zhengzhou University conducted theoretical research on Tai Chi exercise prescriptions for improving sub-health among contemporary college students (Cai et al., 2018). Chen Ziyun from Wuhan Sports University delved into the role of Tai Chi in enhancing college students' physical balance control (Chen, 2024). The researcher first analyzed the importance of body balance among students, then elaborated on the positive effects of Tai Chi training on balance control from perspectives such as improving neuromuscular coordination, enhancing core muscle stability, and promoting mind-body integration and concentration.

In their study on the relationship between lifestyle and psychological sub-health among college students in Guizhou Province, Sun Zhubing and Wang Zhenyi confirmed a close correlation between various lifestyle dimensions and psychological sub-health. Higher lifestyle scores were associated with lower psychological sub-health scores (except in the health-risk behavior dimension), indicating a strong negative correlation between the two (Sun et al., 2014).

Ma (2022), a faculty member at the Sports College of Soochow University, emphasized that the concept of "exercise is medicine" has gained global promotion among college students. As one of the most representative forms of Chinese martial arts, Tai Chi embodies Daoist philosophy, which helps stimulate flexible thinking, enhance adaptability, and foster lifelong exercise habits. As an emerging approach to mental health education for college students worldwide, the promotion of the "Tai Chi Health Project" on university campuses plays a positive and meaningful role in preventing depression and restoring psychological well-being.

Outside China, although Tai Chi is less prevalent than domestically, it has gradually garnered increasing attention in recent years. Research abroad primarily focuses on the impact of Tai Chi on the health of older adults. For example, Dogra Shilpa, as the first author, conducted a cohort study examining the effectiveness of Tai Chi interventions in improving functional health and overall well-being among multiethnic older adults with self-reported arthritis living in low-income communities (Dogra Shilpa et al., 2015).

Domestic and international authors and institutions have formed collaborative networks in Tai Chi health promotion research, reflecting a trend toward integrating sports and medicine (Shao et al., 2014). However, international collaboration networks are more prominent. Research hotspots remain largely similar, concentrating on balance and fall prevention, as well as quality of life among middle-aged and older adults. Emphasis on balance function and mental health research represents current trends and frontiers in this field both domestically and internationally. The key distinction lies in the fact that domestic research tends to be more specific in direction, covers broader populations, and employs more diverse methodologies, whereas international studies often rely on experimental approaches to establish compelling evidence.

Regarding research on Tai Chi's role in improving psychological sub-health, some scholars abroad have investigated the effects of Tai Chi Qigong exercise on the mental health of nasopharyngeal cancer survivors (Hui et al., 2020).

Methods

This study utilized the Multidimensional Assessment Questionnaire for Suboptimal Mental Health in College Students, referencing the psychological subhealth assessment index system from the Multidimensional

Assessment Questionnaire for Sub-health in Adolescents developed by the research group of Professors Tao Fangbiao and Hu Chuanlai (Qi et al., 2008). The system comprises 39 items divided into three dimensions: emotional problems (10 items), behavioral problems (8 items), and social adaptation difficulties (21 items) (Tao et al., 2008).

A self-assessment approach was adopted, where the severity or frequency of symptoms was graded based on duration into six levels: Persisting for more than 3 months (assigned a value of 6), Persisting for more than 2 months (assigned a value of 5), Persisting for more than 1 month (assigned a value of 4), Persisting for more than 2 weeks (assigned a value of 3), Persisting for more than 1 week (assigned a value of 2), Absent or persisting for less than 1 week (assigned a value of 1)

Higher total scores indicate more pronounced suboptimal mental health, while lower scores reflect better mental health. The screening criterion defined a psychological subhealth symptom as any item persisting for more than one month. The questionnaire demonstrated good reliability and validity.

Surveys were administered before and after the Tai Chi intervention. Results were analyzed by comparing the total pre- and post-test scores, as well as the scores across the three dimensions of suboptimal mental health. Paired-sample t-test analysis was conducted using SPSS 26.0 software to observe changes in psychological subhealth among participants before and after practicing Tai Chi. The paired-sample t-test is typically suitable for comparing the same group of subjects under two different conditions, such as pre- and post-test scores in this study, to determine whether there are statistically significant differences between the mean values of the two measurements.

This experiment employed a single-group pretest-posttest quasi-experimental design. A total of 100 freshmen were randomly recruited. The Tai Chi intervention consisted of the simplified 24-form Tai Chi routine, implemented over a sixteen-week period. The intervention schedule included three sessions per week, each lasting at least thirty minutes. All sessions were

conducted at a fixed location under the guidance of a unified professional instructor.

The psychological subhealth self-assessment scale was used as the measurement tool. Pretest data were collected within one week prior to the intervention, while post-test data were collected within one week after the intervention. After retrieving the questionnaires, the total pretest and post-test scores, as well as the scores for the three dimensions, were compiled. The differences between the pretest and post-test total scores were compared, and a paired-samples t-test analysis was performed using SPSS 26.0 software.

Results

A paired-samples t-test was conducted to compare the total scores of suboptimal mental health before and after the Tai Chi intervention. As shown in Table 1, the analysis revealed statistically significant changes in the psychological subhealth status of participants.

The 39-item suboptimal mental health questionnaire (6-point scoring system, total score range: 39-234) was completed by 85 participants in both pre- and post-test assessments. The interval between the pre-test (baseline) and post-test was sixteen weeks, with the intervention protocol consisting of three 30-minute sessions per week over the 16-week period.

The results showed a decline in the total suboptimal mental health score. A p-value of 0.020 indicated a statistically significant intervention effect, though the overall score decreased by only 3.94 points. The 95% confidence interval for the decrease was [-0.67], confirming the presence of the intervention effect.

Paired-samples t-tests were conducted to compare the scores of the three dimensions of suboptimal mental health before and after the Tai Chi intervention, as shown in Table 2.

The impact of 16-week Tai Chi practice on the suboptimal mental health status of college students was analyzed with a focus on three dimensions: emotional problems, behavioral problems, and social adaptation difficulties. The data analysis results indicated that the intervention led to improvements in all three aspects.

Table 1

Paired-Samples t-Test of Total Suboptimal Mental Health Scores Before and After Tai Chi Intervention (n=85).

| Variables | Pre-test (M ± SD) | Post-test (M ± SD) | Mean Difference (95% CI) | t | df | p |
|-------------|-------------------|--------------------|--------------------------|-------|----|-------|
| Total Score | 148.7 ± 23.14 | 144.8 ± 22.06 | -3.94 (-7.21,-0.67) | 2.381 | 84 | 0.020 |

Table 2Results of Paired-Samples t-Tests for the Three Dimensions of Suboptimal Mental Health (Mean \pm SD).

| Variables | Pre-test | Post-test | Mean Difference (95% CI) | t | df | p |
|--------------------------------|-------------------|-------------------|--------------------------|------|----|-------|
| Emotional Problems | 38.25 \pm 6.12 | 36.84 \pm 5.97 | -1.41 | 3.02 | 84 | 0.003 |
| Behavioral Problems | 30.08 \pm 5.47 | 29.33 \pm 5.21 | -0.75 | 2.35 | 84 | 0.021 |
| Social Adaptation Difficulties | 80.43 \pm 13.82 | 78.65 \pm 12.94 | -1.78 | 2.85 | 84 | 0.006 |

Note: The 95% confidence intervals for the mean differences of all dimensions did not include zero (Emotional Problems: [-2.33, -0.49]; Behavioral Problems: [-1.38, -0.12]; Social Adaptation Difficulties: [-3.01, -0.55]). The contribution ratios of each dimension to the total score were 35.8%, 19.0%, and 45.2% respectively.

(1) Emotional problems showed significant improvement. Compared to pre-test scores, post-test scores were significantly lower, with statistical analysis revealing a p -value $<$ 0.003, indicating notable significance.

(2) Behavioral problems demonstrated moderate improvement. The post-test scores decreased by approximately 1 point compared to the pre-test scores. Although the change was modest, it was statistically significant, suggesting that Tai Chi positively influenced students' behavioral norms.

(3) Social adaptation difficulties exhibited the smallest change with a p -value of 0.021. Tai Chi's effect on personality adaptation is a long-term process closely tied to individual personality traits and family upbringing. Sixteen weeks of practice may not yield significant improvements in this dimension. Despite the small improvement per item, the large number of items in this dimension contributed substantially to the total score.

Conclusion

Impact of Tai Chi Practice on Suboptimal Mental Health in College Students

Based on the 39-item psychological subhealth section of the Multidimensional Assessment Questionnaire for Sub-health in Adolescents developed by Professors Tao Fangbiao and Hu Chuanlai, a paired-samples t -test was conducted to compare the pre- and post-test total scores of 85 valid participants. The mean pre-test total score was 148, while the post-test total score decreased by approximately 4 points, with a mean difference of -3.94 and a p -value of 0.02, representing a reduction of 2.6%. These results indicate that Tai Chi practice has a certain alleviating effect on suboptimal mental health in college students. The data further revealed that emotional problems showed the most pronounced improvement, social adaptation difficulties were significantly reduced, and behavioral problems exhibited a modest improvement. After conducting

paired t -tests for the three dimensions of suboptimal mental health, all post-test scores decreased compared to the pre-test scores.

Impact of Tai Chi Practice on the Three Dimensions

Emotional problems refer to aspects such as anxiety, depression, and difficulties in processing emotions appropriately. In this study, emotional problems demonstrated the most notable improvement among the three dimensions. This dimension included 10 items, with post-test scores (36.84 \pm 5.97) decreasing by 3.7% compared to pre-test scores (38.25 \pm 6.12). The p -value was 0.003. Although the data did not reach a significant clinical threshold, the improvement in emotional problems is consistent with previous research findings, supporting the notion that Tai Chi can regulate emotions.

Behavioral problems included 8 items, with post-test scores (29.33 \pm 5.21) decreasing by 2.5% compared to pre-test scores (30.08 \pm 5.47). Behavioral problems encompass aggression, impulsive behaviors, and lack of responsibility. The observed reduction indicates that these risky behaviors among college students improved noticeably after Tai Chi practice, which holds significant implications for their daily lives.

Social adaptation difficulties showed the smallest improvement. The overall score decreased from 80.43 \pm 13.82 to 78.65 \pm 12.94, an absolute reduction of 1.78 points (2.21%). Social adaptation difficulties primarily include interpersonal sensitivity, lack of belonging, and weak adaptability. Although the reduction in this dimension was modest, the group-based Tai Chi practice format enhanced students' sense of social connection, alleviated social adaptation difficulties, and served as a catalyst for overcoming social anxiety.

Acknowledgements

We would like to express our sincerest gratitude to all the participants, who has contributed to the study.

Authors Contributions

Sun Zhubing designed the study and supervised the manuscript writing; Deng Qian participated in the entire process of data collection and wrote the manuscript.

Ethical Approval

This study was approved by the Academic Ethics Committee of the Sports and Health College of Guizhou University of Traditional Chinese Medicine (2025/01). All participants in the study provided written informed consent.

Funding

This study was jointly supported by the 2023 Academic Seedling Project of Guizhou University of Traditional Chinese Medicine (Grant No. [2023]-34) and the 2024 General Project of Guizhou Philosophy and Social Sciences Planning Project (No. 24GZYB151).

Competing Interests

The authors declare no competing interests.

Data Availability Statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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