

# The effects of Baduanjin exercise on physical fitness and mental health of female college students

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## Abstract

**Background and Study Aim** In the context of increasing stress and declining health among female college students, there is an urgent need for effective methods to enhance their physical and mental well-being. The aim of this study is to analyze the impact of Baduanjin exercise on the physical fitness and mental health of female college students.

**Material and Methods** Sixty female college students at University were randomly selected from 150 volunteers to participate in this study. They were equally divided into an experimental group and a control group, with 30 students in each. All 60 participants completed the experiment. The study's protocol was conducted in accordance with ethical standards and was approved by the Institutional Review Board of University. Informed consent was obtained from all individual participants involved in the study. The experimental group received a 16-week intervention of traditional Baduanjin exercise, while the control group engaged in other unfixed sports activities synchronously.

**Results** After the experiment, the average weight of the experimental group decreased significantly from 52.41±6.35 kg to 50.06±5.46 kg ( $P<0.01$ ). Body mass index, waist circumference, and other indicators also showed significant improvements. The step test index in the experimental group increased from 45.09±4.45 to 50.72±4.46, which was significantly different from the baseline ( $P<0.01$ ). Improvements were noted in vital capacity, grip strength, and sit-up performance, all showing significant differences from baseline measures ( $P<0.01$ ). The standing long jump and 800 m running performances in the experimental group showed significant improvement compared to pre-experiment measurements ( $P<0.05$ ). Additionally, all mental health indicators in the experimental group demonstrated a downward trend, with significant differences in 10 indicators such as somatization, obsessive-compulsive symptoms, interpersonal sensitivity, and depression ( $P<0.05$  or  $P<0.01$ ). Moreover, there was a significant inter-group difference in motor skills and physical fitness between the experimental and control groups in the 800 m run (230.78±30.61 vs. 231.32±32.15) and standing long jump (1.81±0.33 vs. 1.78±0.42) after the intervention ( $P<0.05$ ). Furthermore, significant differences were observed in mental excitement and participation in the experimental group before and after the Baduanjin exercise as assessed by Baduanjin's Self-Perception Inventory ( $P<0.01$ ).

**Conclusions** This study demonstrates that a 16-week program of traditional Baduanjin exercise significantly improves both physical and mental health parameters among female college students. These findings suggest that Baduanjin exercise can be an effective intervention for enhancing physical fitness and alleviating psychological distress in this population. The results underscore the potential of integrating traditional physical activities into health promotion strategies for young adults in educational settings.

**Keywords:** baduanjin, female college students, physical fitness, mental health

## Introduction

Declining physical fitness among female college students poses significant health concerns. This trend has been noted across various key indicators, signaling a broader deterioration in physical health. Such declines have critical implications not only for their physical capabilities but also for their overall well-being. The challenge is compounded by external societal pressures and internal lifestyle choices driven by contemporary beauty standards. Recognizing and addressing these trends is essential

for promoting healthier lifestyles and improving the mental and physical health outcomes for these students.

These trends were highlighted in the 2019 national survey conducted by the Ministry of Education in China and six other departments [1]. The results showed that compared with 2014, many physical fitness indicators of college students aged 19 to 22 showed a downward trend. Among them, girls' grip strength, standing long jump, and sitting forward bend all declined to varying degrees, and their 800 m running performance dropped by 9.56 seconds. By 2020, the national college students' failure rate of physical health was as high as 30%.

Especially for female college students, they not only have to deal with external pressures caused by increasingly fierce social competition and an unstable job market, but also manage the internal pressures from negative outcomes related to lack of exercise and poor lifestyle choices driven by a pursuit of a slim figure [2]. Therefore, it is of paramount importance to explore effective ways to improve the physical fitness of female college students and promote their positive mental development.

Fitness Qigong has become increasingly popular worldwide in recent years. According to reports, over the past five years, Fitness Qigong has established 26 provincial-level associations and 1,211 county-level associations in China. It has trained more than 268,000 Fitness Qigong social sports instructors and 26,000 Fitness Qigong referees, established over 33,000 Fitness Qigong stations, and promoted Fitness Qigong to 63 countries and regions. The number of practitioners, both domestic and international, has exceeded 6.5 million [3]. Fitness Qigong promotes the circulation of qi and blood and cultivates physical and mental harmony through the adjustment of breathing, movements, and thoughts, and is considered a secret to maintaining health and prolonging life [4]. Baduanjin exercise, a common form of Fitness Qigong with a history of more than 800 years in China, is attracting an increasing number of young people, particularly women [5, 6]. This exercise meets their dual needs for health preservation and weight loss [7, 8]. However, Baduanjin courses are seldom offered in universities, and few college students practice Baduanjin exercise. Moreover, there are limited research reports on the effects of Baduanjin on the physical and mental health of female college students. Therefore, further research is needed to explore the impact of Baduanjin on the physical and mental health of female college students.

The widespread adoption of Fitness Qigong and its specific forms like Baduanjin underscores its relevance and potential benefits in promoting health and well-being. Despite its historical significance and growing popularity, particularly among young women, there remains a substantial gap in the academic literature regarding its effects on specific populations such as female college students. Existing studies have primarily focused on general populations or on the elderly, with fewer studies assessing the impact on younger, academically involved individuals. Given the unique stressors faced by this demographic, including academic pressures and social expectations, it is crucial to evaluate how traditional exercises like Baduanjin could contribute to their physical and mental health.

The aim of this study is to analyze the impact of Baduanjin exercise on the physical fitness and mental health of female college students.

## Materials and Methods

### *Participants*

Sixty female college students from the 2022 cohort at University were randomly selected as experimental subjects from a pool of 150 volunteers. These participants were selected based on the following criteria:

1. no previous medical history;
2. absence of harmful habits such as drinking and smoking, with regular sleeping and working schedules;
3. physical health standard test score that was rated as good or passed in November 2022;
4. aged between 19-22 years;
5. no abnormal cardiopulmonary function.

The selected participants had an average age of  $19\pm 1.3$  years, and all 60 completed the experiment, achieving a 100% retention rate. Participants were evenly assigned to either the control group or the experimental group. Prior to the experiment, all subjects were informed about the purpose and significance of the study and consent was obtained from each participant. This research was conducted in full compliance with ethical standards, with all procedures involving human participants approved by the Institutional Review Board of University.

### *Study Design*

The experiment was conducted following the approved procedures of the Sports Committee of Henan University of Urban Construction and was in accordance with the ethical standards of the responsible committee (Grant No: 2021JG047).

All subjects were tested on various experimental indices before the experiment, from September 4-6, 2023, and after the experiment, from December 25-27, 2023.

To ensure accurate results, subjects began a light diet and avoided strenuous exercise while maintaining adequate sleep for 48 hours prior to each testing session. Throughout the duration of the experiment, they were required to maintain healthy living habits, which included avoiding overeating, staying up late, drinking alcohol, and smoking.

### *Experimental Methods*

1) Experimental Teaching Time: The experiment lasted 16 weeks, from September 4 to December 27, 2023, and included normal attendance during the Mid-Autumn Festival and National Day holidays. The experimental group participated in five Baduanjin practice sessions each week, with each session lasting one hour from 19:30 to 20:30, Monday through Friday. Similarly, the control group (referred to as the referring group) also practiced five times per week during the same hours as the experimental group. Their activities consisted of focused physical exercises: basketball practice on Mondays and Wednesdays, badminton on Tuesdays

and Thursdays, and a choice of unrestricted exercise (such as table tennis, volleyball, dance, or other sports) on Fridays. Outside of these scheduled activities, neither the experimental group nor the control group engaged in additional aerobic sports.

2) Experimental Teaching Content: Baduanjin. The session includes a 10-minute warm-up activity, primarily consisting of jogging, limb joint mobility exercises, and muscle and ligament stretching. The main component, Baduanjin exercise, comprises a preparatory posture, eight distinct sections, and a closing posture. The eight sections are as follows:

1. Prop up the sky to tune the Sanjiao.
2. Draw the bow on both sides as if to shoot a vulture.
3. Stretch arms asymmetrically to enhance spleen and stomach function.
4. Look back to treat five strains and seven impairments.
5. Sway the head and buttocks to subdue the heart fire.
6. Touch feet to strengthen kidneys and waist.
7. Clench the fist and open eyes wide to enhance vitality.
8. Rise up on toes and land on heels repeatedly to cure diseases.

In order to enhance the exercise effect, music is played during the sessions to minimize external distractions and optimize the fitness outcomes for the experimental group. Participants were systematically taught Baduanjin during the first three weeks, followed by practice of combination movements over the next 13 weeks.

3) Experimental Testing Indicators: All participants in the experiment are over 18 years old. To enhance the scientific rigor and comparability of the experimental data, the student's height is used only as a basis for the calculation of the Body Mass Index (BMI) and not as a separate consideration indicator. All other indicators are indexed as much as possible, in accordance with the National Student Physical Health Standards (revised in 2014). The final determined physical fitness indicators for the students are as follows:

1. Body shape and cardiopulmonary function, and muscle strength indicators:
  - Body shape indicators include weight, BMI, waist circumference, and waist-hip ratio (WHR) [9].
  - Cardiopulmonary function and muscle strength indicators include step test index, lung capacity BMI, grip strength BMI, and sit-up BMI.
2. Sports skills indicators:
  - Physical fitness indicators include 800 m running and standing long jump.
3. Mental health indicators:
  - These are measured using the Symptom Checklist-90 (SCL-90) and the Self-

## Perception Inventory (SPI).

### *The Survey Tool*

SCL-90 is adopted to evaluate the mental health of the participants, which was revised by Wang and includes 90 questions covering various symptoms such as somatization, obsessive-compulsive symptoms, interpersonal sensitivity, depression, anxiety, hostility, terror, paranoia, psychosis, and others [10]. The evaluation was conducted via questionnaires before and after the experiment on all 60 participants. Out of 60 questionnaires distributed, 56 were validly returned, resulting in an effective response rate of 93.3%. Each item on the questionnaire is scored on a 5-point scale where 1 indicates no symptoms and 5 corresponds to the most severe symptoms.

Using the SPI, 30 female college students who participated in the Baduanjin exercise were evaluated through a questionnaire before and after the experiment. Out of 30 questionnaires distributed, 28 were validly returned, giving a sample effective rate of 93.3%. Based on expert interviews and the characteristics of this study, three sub-scales including subjective experience, will quality, and behavior habit were compiled. Each scale consists of 4 items, scored from 1 to 5 points.

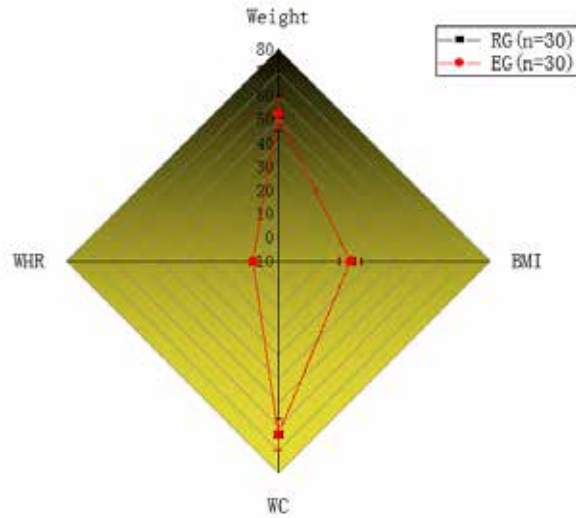
### *Statistical Analysis*

Data were analyzed using SPSS software. Descriptive statistics summarized demographics and test scores. Independent samples t-tests were used to compare the experimental and control groups, depending on the normality of the data. Changes within groups over time were assessed using repeated measures ANOVA. Statistical significance was set at  $p < 0.05$ . The validity coefficient for each symptom on the SCL-90 ranges from 0.80 to 0.94, and the Cronbach  $\alpha$  coefficient for the total scale is 0.93. For the SPI, the validity coefficient for each symptom on the self-rating scale ranges from 0.77 to 0.91, and the Cronbach  $\alpha$  coefficient for the total scale is 0.90. Cronbach's  $\alpha$  was also calculated to confirm the reliability of the scales used.

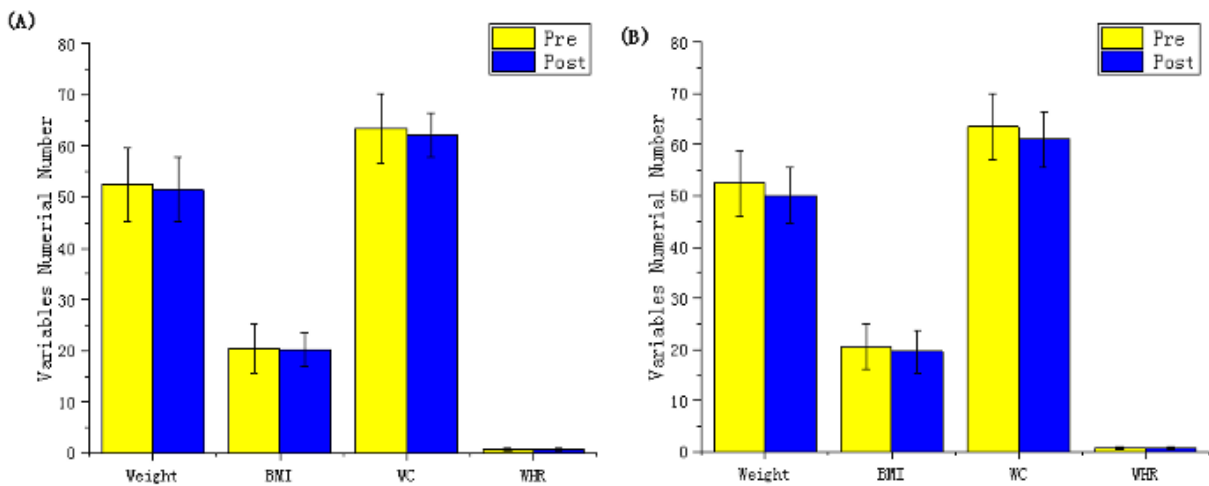
## Results

### *Body Shape Measurement Results Before and After experiment*

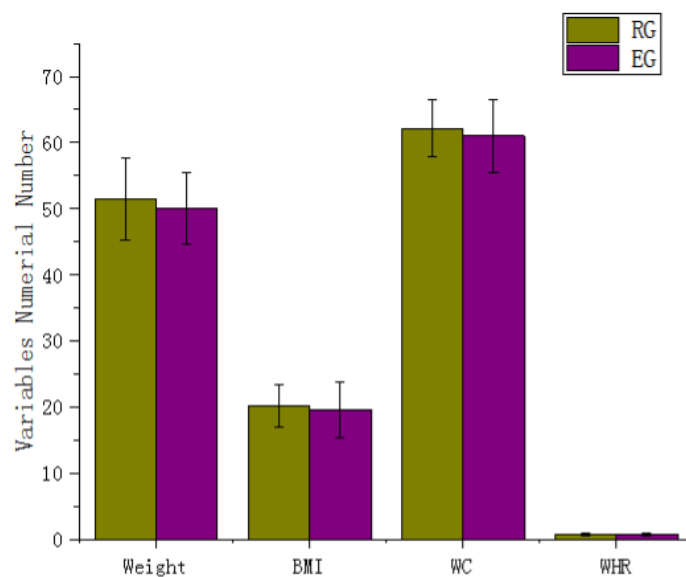
From Figure 1, it can be seen that there is no significant difference between the referring group and the experimental group in various body shape indices before the experiment ( $P > 0.05$ ). As illustrated in Figure 2, both the referring group and the experimental group show significant improvement in all body shape indicators after the experiment. Additionally, as shown in Figure 3, there are significant differences in various body shape indicators between the referring group and the experimental group after the experiment ( $P < 0.05$ ).



**Figure 1.** Comparison of body shape index test results between two groups of female college students before the experiment.



**Figure 2.** Comparison of body shape index test results in referring group of female college students before and after the experiment. (A) Comparison of body shape index test results in experimental group of female college students before and after the experiment. (B) BMI=body mass index, WC=waist circumference, WHR=waist-hip ratio.



**Figure 3.** Comparison of body shape index test results between the two groups after the experiment. BMI=body mass index, WC=waist circumference, WHR=waist-hip ratio.

*Test Results of Cardiopulmonary Function and Muscle Strength*

From Figure 4, it can be observed that there are no significant differences between the referring group and the experimental group in the indices of step test, vital capacity body mass index, grip strength body mass index, and sit-up body mass index before the experiment ( $P > 0.05$ ). Figure 5 shows that both the referring and experimental groups demonstrate significant improvements in all the indices after the experiment ( $P < 0.05$ ). Figure 6 demonstrates that there are significant differences between the referring group and the experimental group in these indices after the experiment ( $P < 0.05$ ).

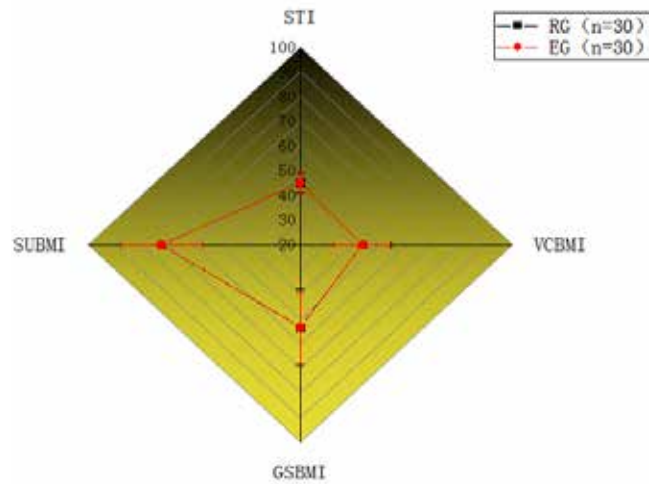
*Test Results of Motor Skills and Physical Fitness*

From Table 1, it can be seen that there are no significant differences between the referring group and the experimental group in the 800 m run and the standing long jump before the experiment ( $P$

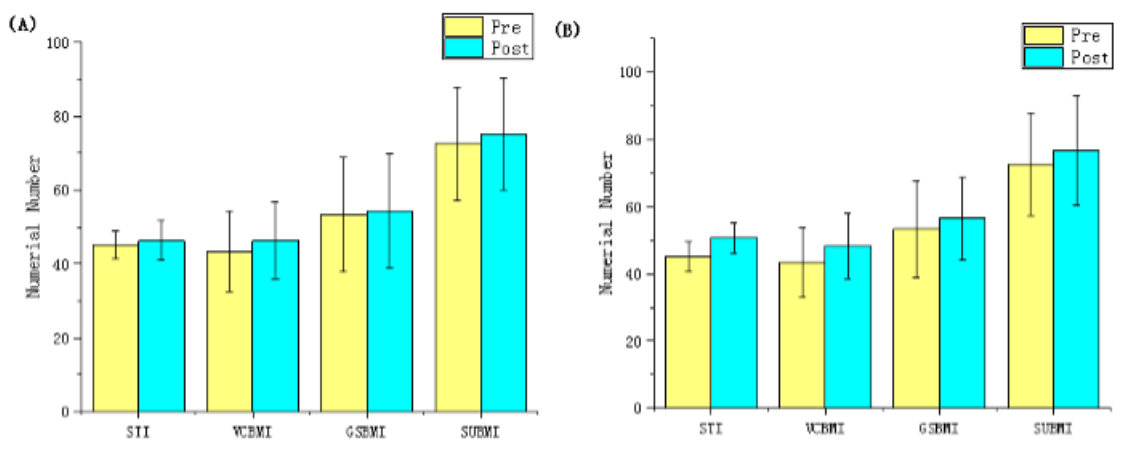
$> 0.05$ ). Both the 800 m run and the standing long jump show significant improvements before and after the experiment in the referring group ( $P < 0.005$ ). After 16 weeks of practicing Baduanjin, the experimental group also showed significant improvements in the 800 m run and standing long jump compared to before the experiment ( $P < 0.01$ ). Moreover, there was a significant difference between the two groups after the experiment ( $P < 0.05$ ), with the experimental group exhibiting greater improvements in physical fitness compared to the referring group.

*Mental Health Measurement Results*

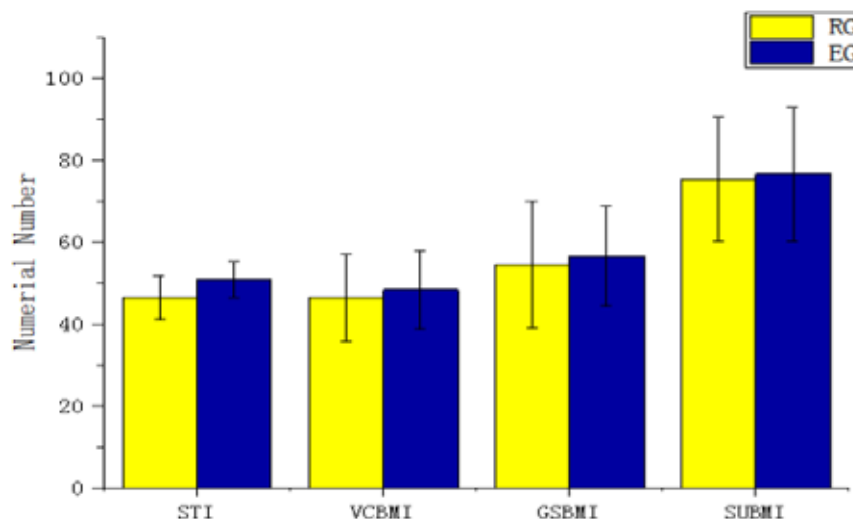
As shown in Table 2, there is no significant difference in the SCL-90 scores between the referring group and the experimental group before the experiment ( $P > 0.05$ ). All 10 indices in both groups show a downward trend after the experiment with significant differences ( $P < 0.05$  or  $P < 0.01$ ).



**Figure 4.** Test results of cardiopulmonary function and muscle strength of the two groups before the experiment. RG = referring group, EG = experimental group, STI=step test index, VCBMI=vital capacity body mass index, GSBMI=grip strength body mass index , SUBMI=sit-up body mass index.



**Figure 5.** Test results of cardiopulmonary function and muscle strength of the referring group before and after the experiment. (A) Test results of cardiopulmonary function and muscle strength of the experimental group before and after the experiment. (B) RG = referring group, EG = experimental group, STI=step test index, VCBMI=vital capacity body mass index, GSBMI=grip strength body mass index , SUBMI=sit-up body mass index.



**Figure 6.** Test results of cardiopulmonary function and muscle strength of the two groups after the experiment. RG = referring group, EG = experimental group, STI=step test index, VCBMI=vital capacity body mass index, GSBMI=grip strength body mass index , SUBMI=sit-up body mass index.

**Table 1.** Test results of motor skills and physical fitness of two groups of female college students before and after the experiment

Variables	RG (n = 30)		t-value	p-value	EG (n = 30)		t-value	p-value
	Pre	Post			Pre	Post		
800 (m/s)	238.7 ± 27.6	231.3 ± 32.2	6.17	0.01	238.7 ± 28.8	230.8 ± 30.6	5.48	0.01
SLJ (m)	1.73 ± 0.5	1.78 ± 0.4	-2.03	0.04	1.73 ± 0.4	1.81 ± 0.3	-2.54	0.01

Values are expressed as means ± standard deviations. RG - referring group, EG = experimental group, SLJ - standing long jump.

**Table 2.** Comparison of SCL-90 levels between two groups of female college students before and after the experiment

Group	Statistics before and after experiment	Statistics									
		Somatization	OCS	IS	Depression	Anxiety	Hostility	Terror	Paranoia	Psychosis	Others
RG (n=30)	Pre	1.46±0.35	1.57±0.34	1.59±0.30	1.62±0.43	1.58±0.34	1.62±0.38	1.48±0.22	1.61±0.43	1.45±0.39	1.57±0.32
	Post	1.44±0.25	1.56±0.32	1.58±0.31	1.60±0.33	1.59±0.17	1.61±0.34	1.47±0.12	1.63±0.33	1.50±0.35	1.56±0.33
	t-value	0.56	0.11	0.98	1.54	-0.66	5.41	0.70	-1.14	-1.33	1.83
	p-value	0.05	0.06	0.42	0.73	0.82	0.03	0.71	0.91	0.61	0.63
EG (n=30)	Pre	1.46±0.25	1.57±0.44	1.59±0.28	1.62±0.44	1.58±0.44	1.62±0.42	1.48±0.53	1.61±0.52	1.45±0.41	1.57±0.41
	Post	1.42±0.34	1.53±0.42	1.48±0.21	1.41±0.63	1.42±0.47	1.47±0.53	1.42±0.42	1.58±0.38	1.31±0.25	1.50±0.24
	t-value	1.25	1.32	4.58	4.84	5.68	6.62	3.83	2.23	6.62	1.71
	p-value	0.05	0.03	0.01	0.01	<0.01	<0.01	0.01	0.04	<0.01	0.04

Values are expressed as means ± standard deviations. RG - referring group, EG - experimental group, OCS - obsessive-compulsive symptoms, IS=interpersonal sensitivity.

It is evident that the indices of the experimental group are significantly different from those of the referring group after the experiment ( $P < 0.05$ ).

*Test Results of Baduanjin Practice Feeling Scale*

After 16 weeks of Baduanjin training, the experimental group of female college students (n=30) demonstrated significant improvements in their sense of spiritual arousal ( $4.27 \pm 0.78$ ) and sense of participation ( $3.86 \pm 1.06$ ), compared to their scores before the experiment ( $2.82 \pm 1.39$  and  $2.90 \pm 1.54$ ,

respectively). The t-values for these improvements were 7.18 and 8.26, with P values averaging less than 0.01, indicating significant differences. However, their sense of fatigue ( $2.02 \pm 1.59$ ) showed no significant change from the baseline ( $2.01 \pm 1.65$ ), with a t-value of 0.86 and  $P > 0.05$ .

**Discussion**

The aim of this study was to analyze the impact of Baduanjin exercise on the physical fitness and

mental health of female college students. Our findings indicate that after 16 weeks of regular Baduanjin practice, participants showed significant improvements in both physical and mental health parameters. Physically, there was an enhancement in body shape indices such as BMI, waist circumference, and overall muscle strength. Mentally, participants exhibited reduced symptoms of stress and anxiety, improved emotional regulation, and increased self-esteem, demonstrating the holistic benefits of Baduanjin exercises.

#### *The Effect of Baduanjin exercise on the Body Shape*

Our findings are consistent with previous studies that have documented the positive impacts of Baduanjin on body composition. Notably, after 16 weeks of Baduanjin training, there was a significant decrease in all body shape indexes, including weight, BMI, waist circumference, and waist-hip ratio (WHR), among our experimental group. This complements the data from the National Students' Physical Health Standard, suggesting that most college students' body shape indexes typically fall within the middle range, indicative of the general decline in physical quality among this demographic in China [11, 12].

Further comparison with existing literature, such as the study by Zhao and Chen (2017), which also observed similar improvements in BMI and WHR after Baduanjin exercises, validates our results [13]. However, our study extends these findings by showing significant reductions not only in weight and BMI but also in waist circumference and overall girth measurements, which have been less frequently reported [14, 15, 16, 17]. These outcomes suggest that prolonged Baduanjin practice can lead to a fitter, more symmetrical, and better-proportioned physique, going beyond the typical improvements noted in earlier research.

Our results underscore Baduanjin's role in not merely reducing body weight but in enhancing overall physical quality, supporting its integration into fitness programs aimed at improving body shape and health among female college students.

#### *The Effect of Baduanjin Exercise on Cardiopulmonary Function and Muscle Strength*

Our study demonstrated significant enhancements in cardiopulmonary function and muscle strength from practicing Baduanjin among female college students. Notably, we observed improvements in blood circulation, oxygen supply, and the functions of the cardiovascular and respiratory systems. This contributed to increased cardiopulmonary endurance, as confirmed by studies on circulatory systems [18]. These benefits are attributed to the integrated movements and controlled breathing that are central to Baduanjin practice, where practitioners are required to synchronize deep inhalations and slow exhalations

with physical movements, enhancing both lung capacity and overall oxygen intake [19].

Additionally, the improvement in muscle strength, particularly in upper limb strength and abdominal muscle strength as evidenced by increased grip strength and better sit-up performance, is consistent with known benefits of regular physical exercise [20]. Specific postures like “sway the head and buttocks to subdue the heart fire” and “touch feet to strengthen kidneys and waist” effectively engage core and stabilizing muscles, underlining the comprehensive physical benefits of Baduanjin [21].

Our findings align with the general understanding in physical health research that structured exercise programs like Baduanjin not only improve specific bodily functions but also contribute holistically to physical health [22]. This suggests that continued practice can yield significant and lasting benefits, supporting the inclusion of Baduanjin in fitness regimes aimed at improving the physical health and fitness of young adults.

#### *The Effect of Baduanjin Exercise on Sports Skills and Physical Fitness*

Baduanjin exercises include a variety of movements that target different aspects of physical health according to traditional Chinese medicine. Key exercises include:

- “Draw the bow on both sides as if to shoot a vulture,” enhancing upper body strength and promoting blood circulation [23].
- “Stretch arms asymmetrically to enhance spleen and stomach function,” aiding gastrointestinal function and organ traction [24].
- “Look back to treat five strains and seven impairments,” improving neck muscle functionality, body balance, and brain fatigue relief [25].
- “Sway the head and buttocks to subdue the heart fire” and “Touch feet to strengthen kidneys and waist,” which relax the mind and strengthen body tissues, particularly supporting kidney and adrenal gland function [26, 27].
- “Clench the fist and open eyes wide to enhance vitality,” which benefits eye muscles and helps prevent myopia [28].
- “Rise up on toes and land on heels repeatedly to cure diseases,” stimulating internal organs and promoting energy flow [29].

These exercises are supported by five hand types and four step types—such as natural palm, full eight-character palm, horse stance, and lunge—that encourage comprehensive body movement and health adjustment [30].

After 16 weeks of practice, female college students in the experimental group showed significant improvements in the sitting forward bend, 800m run, and standing long jump, indicating enhanced

endurance, flexibility, and strength. These findings corroborate the intended benefits of Baduanjin, demonstrating its effectiveness in improving both specific sports skills and overall physical fitness.

#### *Baduanjin's Influence on Mental Health*

In modern society, college students face numerous mental pressures, including academic demands, interpersonal relationships, and employment concerns, which can lead to increased anxiety, depression, and stress [31]. The rising incidence of mental health issues among college students is a growing concern [32].

Baduanjin, a traditional fitness regimen, has been shown not only to promote physical health but also to enhance mental well-being in this demographic [33]. The mental health benefits are multifaceted:

1. *Concentration*: Baduanjin requires focused concentration on specific movements and breathing rhythms, helping students disconnect from external distractions and reduce mental stress and anxiety [34].
2. *Relaxation*: The regimen promotes physical and mental relaxation through precise movements and controlled breathing, aligning body posture and respiration to alleviate tension and enhance mental health [35].
3. *Self-confidence and Self-esteem*: Regular practice of Baduanjin improves physical flexibility and strength, which often translates into enhanced self-confidence and self-esteem. Maintaining proper posture during exercises also improves self-presentation [36].
4. *Emotional Management*: Baduanjin enhances emotional regulation by fostering self-control through disciplined breathing and movements. This ability to manage emotions helps students maintain composure under stress, a crucial skill in university settings [37].

These aspects of Baduanjin not only corroborate findings from other studies on traditional exercises but also demonstrate its unique applicability and efficacy in improving the mental health of college students, making it a valuable component of student wellness programs.

The experimental data from this study conclusively demonstrate the positive impact of Baduanjin on the mental health of female college students. After 16 weeks of Baduanjin training,

significant improvements were observed in all measured mental health indicators, with notable enhancements in ten specific areas, including somatization, obsessive-compulsive symptoms, interpersonal sensitivity, and depression, all showing P-values less than 0.05 or 0.01. The training also significantly boosted the spirits and sense of participation among the participants, enhancing their mental outlook and contributing to increased vitality and engagement in both their personal lives and academic endeavors. Furthermore, Baduanjin has been shown to improve self-control, further supporting overall well-being.

These findings suggest that Baduanjin could be effectively integrated into mental health interventions for college students, potentially offsetting some of the psychological challenges they face today. Future research could explore the long-term impacts of regular Baduanjin practice on mental health, compare its effects across different demographic groups, or evaluate its efficacy as part of a comprehensive wellness program. Such studies would help to establish more definitively the role of traditional exercises like Baduanjin in modern health care and educational settings.

## **Conclusions**

In conclusion, Baduanjin exercise has been shown to effectively decrease body weight, enhance body shape, and improve both cardiopulmonary function and muscle strength in female college students. Additionally, it significantly reduces mental stress and anxiety, while helping students to boost their self-confidence and manage their emotions more effectively. Given these benefits, Baduanjin proves to be a practical and effective fitness approach for female college students, offering extensive physical and psychological health advantages.

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## References

1. Department of Physical Health and Arts Education, Ministry of Education. The results of the eighth national survey on students' physique and health were released. *China School Health*, 2021; 16 : 1281–1282. <https://doi.org/10.16835/j.cnki.1000-9817.2021.09.001>
2. Dong S. Experimental study on the influence of yoga exercise intervention on the health and physical fitness of female college students. *Cultural and Sports Supplies and Technology*, 2023; 6:93–95. <https://doi.org/10.3969/j.issn.1006-8902.2023.06.031>
3. Liu T. Research on the influence of physical exercise on students' physical quality based on principal component analysis. *Journal of Heilongjiang University of Technology (Comprehensive Edition)*. 2023; 1:127–131. <https://doi.org/10.1155/2023/9815461>
4. Liu X, Wang Y, Niu Y, Tong Y, Zhao Q. Enlightenment of European physical fitness testing and evaluation system for children and adolescents to China. *Journal of Harbin Institute of Physical Education*. 2023; 6:85–90.
5. Chen H, Wu X, Dou L, Zhang X, He X. Analysis and enlightenment of the American Physical Fitness Test for Visually Impaired Adolescents. *Journal Shanghai University of Sport*. 2019; 5:50–57. <https://doi.org/10.16099/j.sus.2019.05.007>
6. Qin H, Zhang G, Liu H, Su L, Qin Y. Clinical Application Research Progress of Ba Duan Jin. *Journal of Guangxi University of Traditional Chinese Medicine*, 2020; 3:83–86. <https://doi.org/10.3969/j.issn.2095-4441.2020.03.027>
7. Liu X. Baduanjin's Outreach - Fitness Qigong Public Service Level Reaches a New Level. *China Sports* [Internet]. 2023 [updated 2023 Jun 8; cited 2023 Sep 28]. Available from: <https://www.sport.gov.cn/n20001280/n20001265/n20067664/c25522406/content.html>
8. Zhou Z, Wang Y. Baduanjin "Conquers" young people. *China Business Daily* [Internet]. 2023;1 [updated 2023 Jun 8; cited 2023 Sep 28]. Available from: [https://www.sohu.com/a/736647448\\_393779](https://www.sohu.com/a/736647448_393779)
9. Sun Q, Hao W, Hong F. Sports Measurement and Evaluation. *Beijing: Higher Education Press*. 2011;8:102-170.
10. Wang M, Yang L, Feng Y, Xin Y. Investigation and analysis of college students' mental health. *China Educational Technology and Equipment*. 2023; 3:18–21. <https://doi.org/10.3969/j.issn.1671-489X.2023.03.018>
11. Ministry of Education. Physical quality of primary and secondary school students to improve the physical decline of college students. *Southeast Morning Post* [Internet]. 2021;2. [updated 2023 Jun 8; cited 2023 Sep 28]. Available from: <https://t.y.net.cn/baijia/31374545.html>
12. Jiang Y. Empirical study on college students' physical self-evaluation and physical exercise and healthy living habits. *Journal of Tianjin Institute of Physical Education*. 2015; 2:180–184. <https://doi.org/10.13297/j.cnki.issn1005-0000.2015.02.017>
13. Liu A, Lu B, Zheng Y. Discussion on Ba Duanjin's Intervention on College Students' Sleep and Physical Fitness. *Journal of Henan University (Medical Edition)*. 2012; 4: 286–289.
14. Rao Y, Wang Q, Chen Q, Wang Y. The influence of Baduanjin Kung Fu exercise on the physical health of simple obese female college students. *Wushu Research*. 2020; 1:100–102. <https://doi.org/10.13293/j.cnki.wskx.008180>
15. Lai Q, Jing C, Chen C, Jiao R, Pan H. Research on Ba Duanjin's Health Promotion for Female College Students under the Background of Healthy China. *Fujian Sports Science and Technology*. 2018; 1:44–46. <https://doi.org/10.3969/j.issn.1004-8790.2018.01.014>
16. Zhou X. Baduanjin exercise on the physical function of female college students. *Zhejiang Sports Science*. 2010; 1:112–113, 124. <https://doi.org/10.3969/j.issn.1004-3624.2010.01.035>
17. Xue Z. The influence of Baduanjin on the body shape, function and quality of female college students. *Journal of Anhui Sports Science*. 2012; 1:46–49. <https://doi.org/10.3969/j.issn.1008-7761.2012.01.014>
18. Yang H. Research on the influence of Baduanjin on college students' cardiopulmonary function indicators. *Sports Research and Education*. 2011; 2:198–200. <https://doi.org/10.16207/j.cnki.2095-235x.2011.s2.064>
19. Yan J, Wu J. The effect of resistance training in different motion ranges on improving muscle strength. *China Sports Coaches*. 2023; 3:49–52. <https://doi.org/10.16784/j.cnki.csc.2023.03.007>
20. Liu C, Han X, Gao H. Research progress of Baduanjin's fitness efficacy. *Journal of Yulin Teachers College*. 2012; 2:91–94. <https://doi.org/10.13792/j.cnki.cn45-1300/z.2012.02.036>
21. Li S. Baduanjin, a good method of nourishing yang in TCM. *China Health Care*. 2013;3:62–64.
22. Shi H, Liu C, Li S, Yu C. Analysis and clinical application of Ba Duanjin's action of two hands holding heavenly justice and triple energizer. *Journal of Traditional Chinese Medicine*. 2021;16:1462–1464. <https://doi.org/10.13288/j.11-2166/r.2021.16.017>
23. Han Z, Meng J, Tian S. Based on the infrared thermal imaging technology, explore the function principle of Baduanjin's left and right bow is like shooting an eagle. *Modern Journal of Integrated Traditional Chinese and Western Medicine*. 2023; 18:2530–2535. <https://doi.org/10.3969/j.issn.1008-8849.2023.18.009>
24. Peng X. Baduanjin health care series III: regulating the spleen and stomach must be single. *China Health Care*. 2010; 9:64–66.
25. Dai J. Chinese medicine guidance method-Baduanjin (3) regulating the spleen and stomach must look back from five strains and seven injuries. *Family Chinese Medicine*. 2020; 6:58–60.
26. Dai J. Chinese Medicine Guidance Method-Baduanjin (4) Shake one's head and wag one's tail to get rid of heart fire. *Family Chinese Medicine*. 2020; 7:75–77.

27. Qiu Y. Climb your feet to strengthen your kidney and waist with both hands, and practice yin and yang with cold dew. *China Health Care*. 2016; 10:30.
28. Peng X. Baduanjin Health Series No.7 saves fist to glare and increase strength. *Diabetes World*. 2008; 9:58–60.
29. Cheng K. Behind the seven bumps all diseases disappear. *Health and Life*. 2021; 18:31.
30. Hu X. Children's basic skills of Baduanjin (1). *Chinese Wushu*. 2019; 10:74–77.
31. Liu J, Yang Y. Current situation and countermeasures of college students' mental health in the new era. *Journal of Jilin Education College*. 2023; 12:23–27. <https://doi.org/10.16083/j.cnki.1671-1580.2023.12.005>
32. Yang X. Mental health problems of college students and causes analysis. *Journal of Huanggang Polytechnic*. 2014; 5:78–80. <https://doi.org/10.3969/j.issn.1672-1047.2014.05.23>
33. Kang T. Research on mental Health Education of College Students. *Shanxi Youth*. 2021; 10: 185–186.
34. Wan P. The impact of Baduanjin on the physical fitness, mental quality, and mental health level of college students. *Chinese Information*. 2020; 2:159–160.
35. Guo Y, Wei Y, Wei Z. The influence of Baduanjin's mind-regulating effect on college students' artistic conception homework. *Journal of Traditional Chinese Medicine*. 2020; 5: 1081–1087. <https://doi.org/10.16368/j.issn.1674-8999.2020.05.242>
36. Xu S. Explore the influence of Baduanjin on anxiety and depression of patients in novel coronavirus-Take Fangcang Hospital as an example. *Health Care Guide*. 2020; 46:169.
37. Shi Z, He Y. Study on the mental Adjustment of College Students by Practicing Baduanjin. *Science and Education Guide (Electronic Edition)*. 2020; 20:251–252.

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