

RESEARCH ARTICLE

The influence of fitness Qigong exercise on undergraduate subjective well-being: The mediating role of basic psychological needs

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ABSTRACT

Objective: This study is committed to deeply explore the influence path and internal mechanism of fitness Qigong exercise on students' subjective well-being, and simultaneously explore the basic psychological needs as an intermediary bridge. **Methods:** We adopted the health Qigong exercise assessment scale, the subjective well-being measurement tool, and the basic psychological demand table, and carried out a comprehensive questionnaire survey for 650 students in three different educational institutions. Subsequently, we made a comprehensive and detailed analysis of the obtained data by using the SPSS 27.0 statistical software. In order to further reveal the role of basic psychological needs in the mediation bridge between fitness Qigong exercise and subjective well-being, we further used AMOS 28.0 software to construct a structural equation model, and used the Bootstrap mediation effect test to accurately analyze the complex relationship between variables. **Results:** The results showed that there was a significant correlation between fitness Qigong exercise, subjective well-being and basic psychological needs. The analysis results of direct effects clearly indicated that fitness Qigong exercise has a significant direct impact on college students' subjective well-being ($\beta = 0.400$, $P < 0.001$). However, the analysis of the mediation effect further clarified that the basic psychology needs to play a partial mediation role in the influence of fitness Qigong exercise on college students' subjective wellbeing. **Conclusion:** Fitness Qigong exercise can not only directly enhance students' subjective well-being, but also indirectly have a positive impact on students' subjective well-being through the mediation effect of basic psychological needs.

Keywords: college students; subjective well-being; health Qigong exercise; basic psychological needs

The party's 20th annual report emphasized the importance of "focusing on mental health and spiritual well-being". On April 20, 2023, the Ministry of Education and other departments jointly issued the 2023 to 2025 new era students mental health work to strengthen and improve special action plan, will "fusion, intelligence and physique, promote mental health" as one of the key tasks, especially pointed out that through physical exercise strengthening mental toughness, physical use of emotional regulation and stress relief function, promote the basis of the school sports strengthening measures. This series of measures highlights the party and the country's deep concern for the physical and mental health and all-round development of college students. Fitness Qigong, as a traditional Chinese health preservation method with profound cultural heritage, has the dual effect of strengthening the body and spiritual cultivation, and has become an effective way to relieve the negative emotions of college students and maintain the spiritual balance. Many scholars

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have deeply discussed the positive effects of fitness Qigong on mental health from psychology, medicine and other dimensions, and proved that it can improve the happiness, relieve cognitive impairment^[1] and enhance self-esteem of individuals, thus enhancing the scientific basis and explanation of fitness Qigong in promoting mental health. As the core theory of traditional Chinese medicine for depression and other psychological problems, its unique value, significant advantages and foresight in mental health promotion have been widely recognized by the academic circle. However, the research on the mechanism of the theory of how fitness Qigong can promote mental health is still insufficient. Therefore, it is of great significance to explore the cognitive level of fitness Qigong and the current development status of fitness Qigong in colleges and universities to deeply understand students' cognitive degree, learning needs and actual participation of fitness Qigong^[1].

In recent years, how physical exercise interacts with subjective well-being has become a hot topic in academia at home and abroad. The study by Chen scholars on high school students shows that those students who are keen on physical^[1] exercise have more prominent advantages in subjective well-being compared with their peers who lack sports^[2]. The reasons behind this may be related to the potential improvement of quality of life of high school students, optimization of emotional state, and further subjective well-being by shaping self^[3]-esteem and personality traits. At the same time, other scholars have deeply explored the close relationship between sports and undergraduate well-being, who revealed that there is a dose-effect relationship between individual subjective well-being^[4] and exercise intensity^[3]. This finding further confirms the idea that physical exercise has a positive predictive effect on subjective well-being. Jiang Huizhen's research emphasizes the positive effect of physical exercise on subjective well-being through the core link of emotional experience. She pointed out that the length of exercise is an important factor affecting the happiness experience of college teachers^[4]. Liu Dan's research revealed that physical activities have a significant role in improving the subjective happiness of college students^[5], and the level of college students' subjective happiness is significantly improved after participating in sports activities. In addition, Liu Dan also deeply analyzed the^[6] internal relationship between sports activities and college students' subjective well-being from the two dimensions of time management tendency and social support. In addition, the comprehensive analysis of Buecker also revealed a significant association between physical activity and multiple aspects of emotional dimensions, and physical exercise can improve the level of subjective well-being of the participants by adjusting these emotional factors^[5]. Meisong's research on college students also showed that students who participate in fitness Qigong exercise have significant advantages in terms of well-being over those who did not participate in fitness Qigong or other physical exercise^[6]. Similarly, Caldwell conducted a 15-week intervention study of fitness Qigong exercise program and found that fitness Qigong exercise can significantly improve their positive emotional state, improve sleep quality and enhance subjective well-being^[7]. Despite their differences in subjects, type of exercise, and methodology, these studies all consistently concluded that there was a positive correlation between physical exercise and subjective well-being. Therefore, this paper proposes the hypothesis that H1: fitness Qigong exercise can positively predict the subjective well-being of college students.

Under the theoretical framework of SDT, the theory of basic psychological needs (BPNT) occupies the core position. BPNT emphasizes that the growth and development of individuals cannot be separated from the satisfaction of the three basic psychological needs of autonomy, ability and relationship. These needs are seen as the cornerstone of individual growth, a key element of nourishing the individual mind and moving it forward. When these individual needs are met, they can experience the internal satisfaction and happiness, and then^[7] show their best state in all aspects. In the fitness Qigong exercise, this satisfaction is particularly obvious. By practicing fitness Qigong, individuals can not only improve their physical quality, but also

obtain great spiritual satisfaction, which is due to the improvement and satisfaction of their autonomy, ability and relationship^[8]. In recent years, with the growing understanding of the relationship between physical exercise, subjective well-being and basic psychological needs. However, despite the fruitful results of pairwise relationships, the literature that deeply explores these three as a whole remains relatively scarce. This partly limits our comprehensive understanding of this^[8] complex association. The research of Ihsan, a foreign scholar Ihsan provides us with useful enlightenment. He pointed out that the satisfaction of basic psychological needs has a significant positive effect on individual self-efficacy, which in turn can affect individual exercise habits. When individuals' basic psychological needs are met, their self-efficacy increases, making them more motivated to participate in physical exercise. This finding not only reveals the internal connection between basic psychological needs and exercise habits, but also provides a new perspective on understanding the motivation for physical exercise^[9]. Among college students, fitness Qigong exercise also shows its unique charm. By participating in fitness Qigong exercise, college students can not only improve their physical quality and skill level, but also achieve great psychological satisfaction. This satisfaction stems from improvements in their autonomy, ability and relationships, which in turn enhances their psychological resilience and ability to cope with stress. When college students experience these gratifications during the fitness Qigong exercise, their subjective well-being also increases. This finding not only validates the mediating role of basic psychological needs, but also provides new evidence for our understanding of the relationship between physical exercise and subjective well-being. To sum up, by using the theoretical framework of in-depth analysis of the relationship between physical exercise and subjective happiness of college students, we can not only fill the gap in the existing research, but also provide more rich and in-depth theoretical support and practical guidance for the complex relationship between the three. Future studies could further explore the impact of different exercise practices on the satisfaction degree of college students' basic psychological needs, and how this satisfaction further influences their subjective well-being. At the same time, we can also focus on the role of individual differences in order to more fully understand the relationship between physical exercise and subjective well-being. Through these studies, we can provide a scientific basis for developing more effective physical exercise strategies, and help college students to better meet their basic psychological needs, and thus improve their subjective well-being. Therefore, this paper proposes that hypothesis H2: Fitness Qigong exercise has a positive effect on the subjective well-being of college students through the mediation role of basic psychological needs.

To sum up, there may be a close connection between fitness Qigong exercise, subjective well-being, and basic psychological needs. This study constructed a theoretical model including mediating variables, aiming to deeply explore the mediation role of basic psychological needs between fitness Qigong exercise and the perception of college students' happiness, so as to promote the physical and mental health of college students.

1. Study subjects and methods

1.1. Study subjects

A total of 680 students from Zhaoqing University, Jilin Normal University and Changchun University of Science and Technology. The questionnaire was distributed in the form of questionnaire star, and the corresponding data were obtained. There were a total of 680 questionnaires in this survey. According to the screening principle, some invalid questionnaires were deleted. After the statistical recovery of valid questionnaires, a total of 650 valid questionnaires were obtained, with a recovery rate of 95%.

1.2. Measurement tools

1.2.1. Physical exercise level scale

In this study, we decided to adopt the Physical Activity Grade^[9] Scale (PARS-3) optimized by Liang Deqing^[10] of Wuhan University of Physical Education, which was specially customized to accurately assess the amount of fitness Qigong exercise activity of college students. The scale considers three key dimensions: the intensity of college students' physical activity, the duration of a single exercise, and the frequency of exercise, and quantifies the amount of physical exercise through a scoring system. Specifically, the calculation formula is set as: the physical exercise score is equal to the intensity of activity multiplied by (duration minus one) multiplied by the frequency of exercise. In this formula, the duration, intensity, and frequency are carefully divided into five levels, and each level is assigned a score of 1 to 5. The calculated physical activity scores range from 0 to 100 points. Further, according to different intervals of scores, physical activity is clearly divided into three levels: a score below or equal to 19 represents high activity; a score between 20 and 42 represents moderate activity; and a score above or equal to 43 represents low activity. In this study, we verified the reliability of the scale and showed a Cronbach's alpha coefficient of 0.831, which indicates a good internal consistency of the scale.

1.2.2. Subjective happiness refers to the quantity scale

In this study, the well-being assessment tool developed by Campbell^[11] et al. in 1976, which covers the two core areas of individual's overall emotional status and life satisfaction. Specifically, the first eight items focused on assessing the individual's overall emotional status and each was given the same weight; the last item specifically for life satisfaction was given 1.1 times of the first eight items to highlight their importance. In terms of scoring mechanism, the scale adopts the seven-level scoring system, with the total score ranging from 2.1 to 14.7 points. The increase of scores directly reflects the improvement of individual subjective well-being. Through the validation of this study, the internal consistency coefficient of the scale (i. e., the clonal Bach coefficient) is as high as 0.943, which fully proves its reliability.

1.2.3. Basic psychological needs scale

In this study, the Chinese version of the Basic psychological demand Table revised by Liu Junsheng et al. in 2013 was adopted. This scale includes 19 evaluation items, which are carefully divided into three main parts: autonomy demand, ability demand and attribution demand. This scale follows the five-level scoring principle, and specially sets up nine reverse scoring questions. In general, higher the scores mean that subjects are more satisfied with their basic psychological needs. After this verification, the internal consistency reliability of the scale, namely the Cronbach's alpha value, reached 0.962, showing extremely high reliability, and is currently widely used in the assessment of the basic psychological needs of students and other groups.

1.3. Common method deviation test

In this study, the Harman univariate test method was used to perform the common method bias test. The results show that there are 8 factors with a feature root greater than 1, and the first factor explained the cumulative variation of 39.107%. As long as the critical value is below 40%, there is no serious common method bias problem.

2. The results of the study

2.1. Correlation coefficient of each variable

Table 1. The correlation coefficient matrix for each variable.

	1	2	3	4	5	6	7	8
Exercise intensity	1							
Exercise time	0.614**	--						
exercise frequency	0.551**	0.634**	--					
Emotional experience	0.288**	0.293**	0.177**	--				
Life satisfaction	0.297**	0.318**	0.228**	0.766**	--			
act on one's own	0.413**	0.397**	0.338**	0.323**	0.374**	--		
be competent	0.313**	.390**	0.419**	0.196**	0.261**	0.541**	--	
belong to	0.326**	.358**	0.356**	0.347**	0.393**	0.480**	0.565**	1

Note: * represents $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

By calculating the average score of each variable and conducting correlation analysis, we draw the following conclusions: there is a significant positive correlation between the intensity of health Qigong practice and the individual subjective well-being, and the satisfaction of basic psychological needs; moreover, the satisfaction of basic psychological needs has a significant positive relationship with the subjective well-being.

2.2. Direct effect analysis

With the help of AMOS28.0 software, a direct influence model of fitness Qigong exercise on subjective well-being was constructed. After the correlation relationship and residual setting, the corresponding results were obtained, as shown in the following figure below

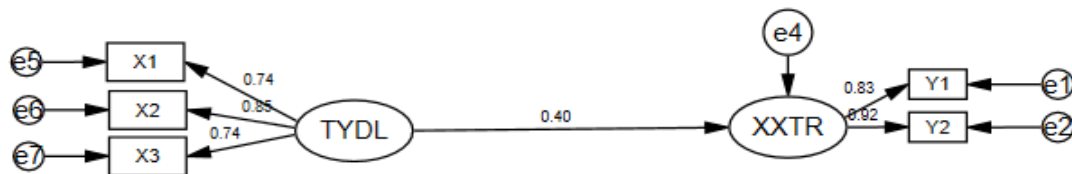


Figure 1. A model of the direct effects of fitness Qigong exercise on subjective well-being.

After constructing the direct effect model, the model was tested, as shown in the table below:

Table 2. Direct effects structural equation model fit index.

Adaptation index	χ^2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
actual value	3.103	0.057	0.991	0.977	0.994	0.984	0.994

According to the data listed in **Table 2**, (the specific value of χ^2/df is 3.103, while the value of the root mean square error approximation (RMSEA) is 0.057. According to the established assessment criteria, the RMSEA values below 0.1 are considered as reaching the standard. In addition, multiple model fit indicators, including the relative fit index (RFI), the canonical fit index (NFI), the Tucker-Lewis index (TLI), the incremental fit index (IFI), and the comparative fit index (CFI), all exceeded the threshold of 0.9. These combined results show that the evaluated models exhibit excellent fit and fit performance.

Table 3. Table of direct effects

way	Non-standardized coefficients	Standardization coefficient	S.E	t	p
Fitness Qigong exercise subjective happiness	0.524	0.397	0.068	7.674	0.000

As shown from the table above, the standardization coefficient was 0.397 ($p < 0.001$), indicating that fitness Qigong exercise has a significant positive effect on subjective well-being.

2.3. Mediation effect test

In this study, we followed the mediation^[10]effect model test method proposed by Wen Zhonglin^[12] as the theoretical framework, and tested it with the help of the professional software tool Amos 28.0. The mediation model was constructed by using the percentile Bootstrap method by using 5000 replicates, see **Figure 2** below.

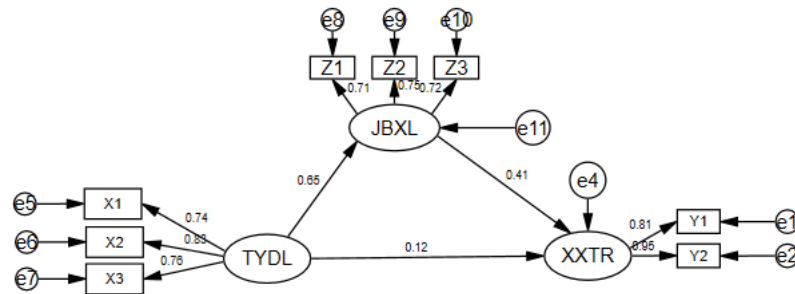


Figure 2. The mediation mechanism model of subjective well-being by fitness Qigong exercise.

Table 4. Model effect of model model model model exponeffects.

Adaptation index	χ^2/df	RMSEA	NFI	RFI	IFI	TLI	CFI
actual value	4.680	0.075	0.964	0.940	0.971	0.952	0.971

According to the data in **Table 4**, χ^2/df is 4.680, and the root mean square error approximation (RMSEA) is 0.075, which is below the commonly considered acceptable threshold of 0.08. In addition, several fit indexes, such as the normative fitting index (NFI), Tucker-Lewis index (TLI), incremental fitting index (IFI) and comparative fit index (CFI), all exceeded the limit of 0.9. Combining these data, it can be concluded that the model shows a good fitting effect.

Table 5. Table of pathway coefficient estimates of mediation effects.

way	Non-standardized coefficients	Standardization coefficient	S.E	t	p
Fitness Qigong to exercise the basic psychological needs	0.514	0.674	0.044	11.740	0.000
Fitness Qigong exercise subjective happiness	0.159	0.124	0.080	1.992	0.046
Basic psychology needs subjective well-being	0.663	0.411	0.112	5.905	0.000

According to the data in **Table 5**, the standardized regression coefficient of the path "Qigong exercise affects basic psychological needs" was 0.674, and its p-value was less than 0.001, which showed that Qigong exercise has a significant positive effect on basic psychological needs. The standardized regression coefficient of path "fitness Qigong exercise affects SWB" was 0.124 and the p-value was less than 0.05,

indicating that fitness Qigong exercise also had a significant positive effect on subjective happiness. Moreover, the standardized regression coefficient of the pathway "basic psychological needs affect subjective well-being" was 0.411 with a p-value less than 0.001, which further indicates that basic psychological needs have a significant positive contribution to subjective well-being.

Table 6. Test of mediation effects for basic psychological needs.

way	point estima te	Coefficient product multiplication		Bootstrap 5000 times			
		standard error	Z price	Bias-Corrected 95%CI		Percentile 95%CI	
				lower limit	superior limit	lower limit	superior limit
Total effect of fitness Qigong exercise on subjective well- being	0.381	0.068	10.924	0.294	0.436	0.305	0.448
The basic psychology of fitness Qigong exercise requires the indirect effect of subjective well- being	0.151	0.043	11.107	0.025	0.263	0.041	0.263
Direct effects of fitness Qigong exercise on subjective well- being	0.231	0.069	4.861	0.148	0.310	0.161	0.451

According to the data analysis in Table 6, the direct effect of fitness Qigong exercise on subjective wellbeing was 0.231, with a Bias-Corrected 95% confidence interval of [0.148,0.310] and Percentile 95% confidence interval of [0.161,0.451], neither interval contained 0, indicating that this direct effect was significant. Moreover, the indirect effect value of health Qigong exercise on subjective well-being through basic psychological needs was 0.151. The mediation effect test using the Bootstrap method showed that its Bias-Corrected 95% confidence interval was [0.025,0.263] and its Percentile 95% confidence interval was [0.041,0.263], and both intervals also did not contain 0, demonstrating a significant mediation effect. Overall, the total effect value of health Qigong exercise on subjective well-being was 0.381 with a Bias-Corrected 95% confidence interval of [0.294,0.436] and a Percentile 95% confidence interval of [0.305,0.448], with both intervals not including 0, indicating a significant total effect. Therefore, it can be concluded that basic psychological needs play a partially mediating role between fitness Qigong exercise and subjective well-being.

According to the above results, the H1 and H2 hypothesis and the mediation effect of health Qigong exercise on subjective wellbeing were tested, which were shown in the table below:

Table 7. Results of hypothesis validation of direct effects and mediation mechanisms.

Suppose the number	Suppose the content	result
H1	Fitness Qigong exercise has a positive impact on subjective well-being	support
H2	Fitness Qigong exercise has a positive effect on subjective well-being through the mediation of basic psychological needs	support

3. Discussion

3.1. Direct effect of fitness Qigong exercise on subjective well-being

This study is committed to exploring the far-reaching influence of fitness Qigong exercise on college students' perception of happiness. The research results show that there is a close and positive relationship between this traditional exercise mode with profound cultural heritage and college students' perception of happiness. Specifically, the frequency of college students to participate in health qigong and its experience of happiness presents a proportional growth trend, this important discovery not only for sports psychology research field added a new perspective and content, but^[11]also to effectively improve college students' happiness provides a strong empirical basis, has important theoretical and practical value. Subjective well-being, as a key indicator to measure personal life satisfaction and quality of life, its level can intuitively and profoundly reflect the individual's quality of life and psychological state^[13]. With the rapid development of sports psychology in recent years, more and more scholars and research institutions begin to pay^[12]attention to and deeply study the positive effects of sports activities in enhancing the perception of personal happiness. In foreign countries, the research in related fields has achieved fruitful results, and a large number of research data confirm that active participation in physical exercise can significantly improve the level of personal happiness perception. Scholars generally believe that physical exercise can not only broaden individuals' social horizons, enhance social support network and interpersonal skills, but also bring profound happiness experience to participants by stimulating positive emotions, improving life satisfaction and happiness^[14]. These research results provide valuable reference and enlightenment for us to deeply understand and grasp the internal connection between physical activity and happiness perception. Among many forms of sports, fitness Qigong stands out with its unique charm and value, and becomes one of the best ways to improve personal happiness perception. Fitness Qigong^[13], as a combination of traditional martial arts, Qigong and guidance techniques, not only has a significant effect of strengthening the body, but also shows extraordinary advantages in regulating the psychological state and improving happiness. Through rigorous empirical analysis and data comparison, it was^[14]found that the positive emotions of college students who regularly participated in fitness Qigong exercise were significantly improved, while the negative emotions were effectively alleviated and dissipated. This positive psychological change enhances their perception of happiness to varying degrees, enabling them to be more optimistic and confident to face the challenges and difficulties in life. This finding is highly consistent with the research results in related fields at home and abroad, and further^[15]confirms the unique value and significant effect of fitness Qigong in improving personal happiness perception. In addition to the positive psychological effects, this study also found that the improvement of fitness Qigong exercise on college students' happiness perception is also deeply reflected in the physiological level. Specifically, fitness Qigong exercise can indirectly improve the level of individual happiness perception through various physiological mechanisms^[15]. On the one hand, the slow movements and deep breathing exercises of fitness Qigong can effectively reduce the individual's stress hormone level, thus alleviating the negative emotions such as anxiety and depression, and improving the mental health level. On the other hand, by improving blood circulation and enhancing immunity and other physiological effects, fitness Qigong can also further improve the individual's physiological health and overall quality of life, so as to lay a solid foundation for the improvement of their happiness perception^[16]. In addition, fitness Qigong exercise can also further improve the individual's physical quality and life quality by improving sleep quality, enhancing physical strength and endurance, so as to enhance their sense of happiness and satisfaction. These findings provide us with a new understanding of the physiological mechanisms between fitness Qigong exercise and happiness perception. However, although the domestic and foreign research on physical exercise and happiness perception has made remarkable progress and

achievements, but for the fitness qigong on college students happiness perception research is still relatively small, which to a certain extent limits our potential for fitness qigong in promoting college students happiness comprehensive understanding and in-depth excavation^[17]. Therefore, future studies should further strengthen the discussion and research on the relationship between traditional sports such as fitness Qigong and happiness perception, so as to reveal its action mechanism, and promote its popularization and promotion among college students.

In conclusion, this study verified the positive impact of fitness Qigong exercise on the perception of happiness of college students by means of rigorous empirical analysis and data comparison, and deeply revealed the psychological and physiological mechanisms behind it. This important finding not only provides strong empirical support and theoretical basis for improving the happiness of college students, but also provides useful reference for promoting the development of traditional sports such as fitness Qigong. Future research should continue to deepen the discussion and research on the relationship between fitness Qigong and happiness perception, in order to contribute more wisdom and strength to the promotion of national happiness. At the same time, we should also actively advocate and promote the popularization and application of traditional sports such as fitness Qigong in college students, so that more people can benefit from this healthy, positive and cultural connotation of sports, and jointly promote the healthy and harmonious development of society.

3.2. The intermediary role of basic psychological needs

Further exploring the influence of fitness Qigong exercise on college students' subjective well-being and the satisfaction of basic psychological needs, it is not difficult to find that the research in this field not only enriches the theoretical system of the relationship between physical exercise and mental health, but also provides strong support for practical mental health intervention. Through detailed analysis and demonstration, we can further explain how fitness Qigong exercise directly and indirectly promotes the ascension of college students' subjective happiness in its unique way.

First of all, from the perspective of direct effect, fitness Qigong exercise, as a physical and mental exercise method integrating traditional culture and modern health concepts, often contains the principle of harmonizing Yin and Yang and dredging the meridians, which helps to regulate the physiological function of the human body and improve the psychological state. In the process of participating in fitness Qigong exercise, college students can not only experience physical relaxation and comfort, but also^[16] achieve peace of mind and concentration through focused breathing and movement exercises, so as to effectively relieve negative emotions such as academic pressure and social anxiety, and directly improve their subjective happiness. This harmony of body and mind is one of the important features that distinguishes fitness Qigong exercise from other forms of physical exercise^[18]. However, the promotion effect of fitness Qigong exercise on subjective well-being is not limited to this effect. More deeply, it indirectly enhances the happiness of college students by meeting their basic psychological needs. Basic psychological needs, including autonomy needs, ability needs and relationship needs, are the cornerstone of human mental health and happiness. Independent demand refers to the sense of freedom and control in behavior choice; the ability demand reflects the self-efficacy and achievement when achieving goals and overcoming difficulties; and the relationship demand concerns the need to establish stable and supportive relationships with others. In the context of fitness Qigong exercise, these needs are fully met. Specifically, the autonomy and flexibility of fitness Qigong exercise enable college students to adjust according to their own physical conditions and interests during the exercise process, so as to meet their independent needs. This right to independent choice not only enhances the interest of exercise, but also improves the persistence of exercise, and further promotes the improvement of happiness. At the same time, with the continuous exercise, college students have made

significant progress in skills mastery and physical quality improvement. The accumulation of these sense of achievement has met their ability needs^[17] and enhanced their self-confidence and sense of self-worth. In addition, fitness Qigong exercise is often conducted in the form of groups, which provides opportunities for college students to^[18] communicate and cooperate with others, promotes the establishment and deepening of friendship, meets their relationship needs, and enhances the sense of social belonging and emotional support. It is worth noting that the satisfaction of basic psychological needs does not exist in isolation, but interweave and interact on the improvement of happiness. For example, the satisfaction of independent needs may stimulate individuals to participate more actively in exercise and make greater progress in ability needs, while the satisfaction of relationship needs may provide emotional support and encouragement to enhance their courage and confidence to face challenges. This mutual promotion between needs constitutes an important mechanism for fitness Qigong exercise to improve happiness. From the practical level, the positive impact of fitness Qigong exercise on the mental health of college students has profound significance. Under the background of fierce social competition and heavy academic pressure, college students are faced with unprecedented psychological challenges. With its unique physical and mental unity characteristics, fitness Qigong exercise provides an effective way for college students to release stress and adjust their mentality^[19]. By participating in fitness Qigong exercise, college students can not only improve their physical quality and health level, but also achieve great satisfaction and growth in the psychological level. This dual benefit makes fitness Qigong exercise one of the important means of mental health intervention for college students^[20]. In addition, for educators, the promotion of fitness Qigong exercise also has important practical value. By guiding students to participate in fitness Qigong exercise, educators can help students to better understand themselves, explore their potential, and establish positive interpersonal relationships, so as to comprehensively improve their mental health level. At the same time, the popularity of fitness Qigong exercise can also promote the diversified development of campus culture, create a positive campus atmosphere, and provide strong support for the overall development of students.

To sum up, fitness Qigong exercise, with its unique physical and mental unity characteristics, not only directly improves the subjective happiness of college students, but also indirectly enhances their happiness by meeting their basic psychological needs. This dual action mechanism not only deepens our understanding of the relationship between physical exercise and mental health, but also provides an important theoretical basis and practical guidance for college students' mental health intervention. In the future, with the deepening of research and the promotion of application, fitness Qigong exercise is expected to become one of the important ways to promote college students' mental health and improve their subjective well-being.

4. Conclusion

This paper takes students' subjective well-being as the research background, based on the perspective of basic psychological needs, and introduces the basic psychological needs to construct the intermediary mechanism model of fitness Qigong exercise on subjective well-being. At the same time, through the correlation analysis and structural equation model and other statistical methods, the following conclusions are obtained:

(1) Fitness Qigong exercise of college students has a significant positive effect on subjective well-being; fitness Qigong exercise has a positive effect on subjective well-being through the partial mediation of basic psychological needs.

(2) The theoretical analysis of improving college students' subjective well-being through fitness Qigong exercise, introducing basic psychological needs as intermediary variables, and a new

path for fitness Qigong exercise to promote college students' subjective well-being has been established.

(3) Through research, it is found that fitness Qigong exercise is diverse and interesting, which can improve psychological resilience, promote the subjective happiness of college students, and indicate that the intermediary effect of basic psychological needs is established.

Conflict of interest

The authors declare no conflict of interest.

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