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The impact of fitness involvement on quality of life among Taiwanese university students: Health-promoting lifestyle as a mediator

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Abstract

In recent years, economic growth and technological advancements have contributed to the flourishing of fitness activities in Taiwan, making them an integral aspect of young people's daily routines. This study explored whether participation in fitness activities among Taiwanese university students positively influences health-promoting lifestyle (HPL) and quality of life (QOL). This study employed a cross-sectional survey of 625 Taiwanese university students. Structural equation modeling was used to examine the relationships between fitness involvement (FI), HPL, and QOL, as well as the mediating role of HPL between FI and QOL. The findings indicate that FI is positively associated with both QOL and HPL. Furthermore, HPL is positively related to QOL and partially mediates the relationship between FI and QOL. University students' involvement in fitness not only directly enhances their QOL, but also improves their satisfaction with QOL through HPL. This finding has significant implications for educational institutions in promoting the development of campus fitness facilities and offering fitness-related courses.

Keywords: Educational institutions, Fitness facilities, Mediating role, Structural equation modeling.

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1. Introduction

Recently, the rapid growth of fitness activities in Taiwan has led to a widespread increase in the prevalence of fitness centers and a steady rise in participant numbers. Fitness activities have become a prominent form of leisure [1]. In Taiwan, many universities provide on-campus fitness gyms, offering students convenient access to fitness activities, which are generally more approachable than other forms of outdoor physical exercise [1]. Participation in fitness activities not only supports physical health, but also plays a crucial role in preventing chronic diseases and reducing mortality rates [2, 3].

Regular exercise contributes to improved physical fitness, which can alleviate stress and anxiety, fostering a positive mental state [4-6].

Health-promoting lifestyle (HPL) encompasses the multidimensional, voluntary behaviors and cognitive functions individuals adopt to maintain or enhance health while striving for self-actualization and satisfaction [7]. Regular engagement in fitness activities significantly improves both physiological and psychological well-being, and fosters long-term adoption of healthy lifestyle habits [5, 8]. While previous studies have extensively examined the effects of physical activity on quality of life (QOL) [9, 10] there has been limited research focusing on whether active participation in fitness activities by Taiwanese university students influences their HPL and QOL. This study investigates the relationships among fitness involvement (FI), HPL, and QOL in university students, with a specific focus on whether HPL mediates the relationship between FI and QOL.

2. Literature Review

FI refers to an individual's self-perception of the extent to which they value, need, and are interested in fitness activities [11-13]. Higher levels of FI enhance the enjoyment and satisfaction derived from fitness activities [8] and significantly influence future behaviors and value perceptions. Participation in various types of exercise often leads to distinct behavioral outcomes, with greater involvement typically resulting in more diverse and enriched behaviors [14]. For instance, fitness club members who report greater happiness from their participation also have more positive perceptions of their health [15]. A survey conducted by Taiwan's health authorities revealed that 86.5% of businesses believe workplace fitness programs improve employee HPL Lin [16]. García-Herrera, et al. [17] identified a strong association between participation in fitness activities and health status [18], with health status being a significant predictor of HPL development [19, 20]. Based on these findings, the following hypothesis is proposed.

H_1: FI has a positive effect on HPL.

The concept of QOL refers to an individual's evaluation of their life experiences, encompassing current circumstances and future expectations. It reflects intrinsic feelings of pleasure and satisfaction, and serves as an overall subjective assessment of life [15, 21, 22]. Moreover, QOL is a key predictor of subjective well-being [23]. Research indicates that regular participation in physical activities or fitness exercises significantly contributes to disease prevention [24]. Such activities also alleviate depression, anxiety, and negative emotions, enhance cognitive function and self-esteem, and ultimately improve life satisfaction [25]. For instance, Urchaga, et al. [8] demonstrated that adolescents' engagement in physical activities strongly correlated with life satisfaction and friendship satisfaction. Similarly, Rodrigues, et al. [26] identified a significant positive relationship between regular physical activity and positive emotions, which indirectly enhanced life satisfaction. These findings suggest that FI may be associated with life satisfaction. Based on this evidence, the following hypothesis is proposed.

H_2: FI has a positive effect on QOL.

Throughout history, physical exercise has been recognized by both ancient and modern societies as a crucial means of disease prevention, health promotion, and well-being enhancement (24). Previous research has identified HPL as a significant factor influencing life satisfaction [27, 28]. For instance, Ke and Chen [29] reported that HPL had a substantial impact on residents' life satisfaction both before and after the start of the COVID-19 pandemic. Similarly, Huang and Chen [28] examined HPL and subjective well-being among local older adult populations, finding that HPL serves as an effective predictor of subjective well-being [28]. Based on this evidence, a correlation between HPL and QOL is evident. Therefore, the following hypothesis is proposed.

H_3: HPL has a positive effect on QOL.

Pao [30] found that greater motivation and involvement in fitness activities corresponded to more substantial leisure benefits, including a heightened sense of accomplishment and improved social interactions through exercise [30]. When individuals perceive the adoption and reinforcement of healthy habits as a means to improve their overall health, regular physical activity positively impacts physical, psychological, physiological, and social well-being [6, 8, 31]. First, regarding the relationship between FI and HPL: Lee, et al. [32] examined the structural relationships among adolescents' health cognition, sports participation, and health-promoting behaviors, concluding that sports participation positively influences health-promoting behaviors. Similarly, Liu, et al. [19] investigated the correlation between adolescents' FI and HPL, finding that health status and physical condition significantly predicted HPL outcomes [19]. Second, concerning the relationship between HPL and QOL: Wu, et al. [33] studied the link between HPL and psychological well-being among older Indigenous people in Taiwan, reporting that HPL significantly enhanced psychological well-being [33]. Additionally, Ke and Chen [29] conducted a comparative study on residents' life satisfaction before and after the start of the COVID-19 pandemic, demonstrating that HPL's influence on life satisfaction remained significant across both periods. Based on these findings, it can be inferred that HPL may function as a mediator between FI and QOL. Thus, hypothesis H_4 is proposed as follows.

H_4: HPL mediates the relationship between FI and QOL among university students.

3. Materials and Method

3.1. Participants

This study employed a sampling survey of university students across northern, central, southern, and eastern Taiwan, yielding 625 valid responses. Among the participants, 354 were male (56.6%) and 271 were female (43.4%). The majority of respondents (96.8%, n = 605) were aged 18–24, while 18 individuals (2.9%) were aged 25–34 and 2 individuals (0.3%)

were aged 35–44. Regarding regional distribution, 206 participants (33%) resided in the northern region, 268 (42.9%) in the central region, 132 (21.1%) in the southern region, 13 (2.1%) in the eastern region, and 6 (1%) on outlying islands.

3.2. Data Analysis

The data collected in this study were analyzed using SPSS and AMOS statistical software (IBM, Armonk, NY, USA). Reliability analysis was conducted first, followed by confirmatory factor analysis (CFA) to evaluate convergent validity, discriminant validity, and the goodness of fit for each variable. Path analysis using structural equation modeling was then performed to examine the relationships among FI, HPL, and QOL. Furthermore, the bootstrapping method was employed to assess the mediating effect of HPL on the relationship between FI and QOL.

3.3. Instruments

This study utilized FI, HPL, and QOL scales assessed using a 5-point Likert scale, enabling participants to self-evaluate various indicators and express their attitudes and perspectives. Internal consistency reliability was evaluated using Cronbach's alpha, with $\alpha > 0.7$ considered acceptable [34]. To ensure model fit, several fit indices were applied. The chi-squared ratio (χ^2/df) should be between 1 and 5 [35]. Additional criteria included goodness-of-fit index (GFI) > 0.9 [36]; adjusted GFI (AGFI) > 0.8 [37]; standardized root mean square residual (SRMR) < 0.08 [38]; and non-normed fit index (NNFI), comparative fit index (CFI), and normed fit index (NFI) > 0.9 [39].

3.3.1. Fitness Involvement Scale

This scale was developed specifically for this study, drawing on and adapting items from previously established scales [11, 40-42]. It comprises nine items across three sub-dimensions: attraction (e.g., “I believe fitness activities enhance the enjoyment of my daily life”), self-expression (e.g., “I enjoy engaging in fitness activities as a leisure activity”), and centrality to lifestyle (e.g., “I habitually participate in fitness activities”). The CFA results indicate an acceptable model fit ($\chi^2/df = 4.254$, SRMR = 0.026, GFI = 0.977, AGFI = 0.932, NNFI = 0.967, CFI = 0.978, NFI = 0.972, PNFI = 0.448, PGFI = 0.514). Cronbach's α for the overall scale is .861, with subscale values of .787 for attraction, .861 for self-expression, and .862 for centrality of lifestyle, all meeting established reliability standards.

3.3.2. Health-promoting Lifestyle Scale

This scale is adapted from the HPL scale revisions by Lin [43] and Huang and Chiou [44]. It comprises 15 items across five sub-dimensions: self-actualization (e.g., “I feel that my work is meaningful”), health responsibility (e.g., “I check my pulse during exercise”), interpersonal support (e.g., “I maintain contact with people who care about me”), stress management (e.g., “I monitor sources of stress”), and nutrition (e.g., “I consume 1500 cc of water daily”). The CFA results indicate acceptable fit indices ($\chi^2/df = 2.546$, SRMR = 0.044, GFI = 0.958, AGFI = 0.937, NNFI = 0.971, CFI = 0.978, NFI = 0.939, PNFI = 0.735, PGFI = 0.639). Cronbach's α for the overall scale is 0.868, with subscale values of 0.886 for self-actualization, 0.897 for interpersonal support, 0.933 for health responsibility, 0.726 for stress management, and 0.760 for nutrition, all meeting reliability standards.

3.3.3. Quality of Life Scale

This scale is based on the Taiwanese version of the QOL Scale, revised to align with relevant thematic characteristics and research objectives [45]. It includes 11 items across four sub-dimensions: physical health (e.g., “Are you satisfied with your ability to complete daily activities?”), psychological health (e.g., “Do you enjoy your current life?”), social relationships (e.g., “Do you feel dignified and generally respected?”), and environment (e.g., “Can you easily access the information you need for daily life?”). The CFA results demonstrate acceptable fit indices ($\chi^2/df = 2.885$, SRMR = 0.024, GFI = 0.965, AGFI = 0.944, NNFI = 0.983, CFI = 0.987, NFI = 0.981, PNFI = 0.713, PGFI = 0.594). Cronbach's α for the overall scale is 0.944, with subscale values of 0.930 for physical health, 0.926 for psychological health, 0.913 for social relationships, and 0.934 for environment, all meeting reliability standards.

4. Results

4.1. Validity Analysis

As depicted in Table 1, the factor loadings (FL) of all items in the research questionnaire range from 0.568 to 0.969, exceeding the threshold of 0.5. Additionally, the composite reliability (CR) values for each construct range from 0.740 to 0.936, surpassing the minimum criterion of 0.7. The average variance extracted (AVE) values range from 0.511 to 0.830, all exceeding 0.5 [46]. These results indicate that the constructs in the research questionnaire demonstrate strong discriminant validity.

Table 1.
Convergent validity analysis (n = 625).

Variables	Dimension	Items	FL	CR	AVE
FI					
	Centrality	FI-1	0.658	0.835	0.633
		FI-2	0.909		
		FI-3	0.799		
	Attraction	FI-3	0.886	0.892	0.734
		FI-4	0.838		
		FI-5	0.845		
	Self-expression	FI-6	0.824	0.862	0.676
		FI-7	0.850		
		FI-8	0.792		
HPL					
	Self-actualization	HPL-1	0.843	0.888	0.727
		HPL-2	0.903		
		HPL-3	0.809		
	Health responsibility	HPL-4	0.875	0.901	0.754
		HPL-5	0.955		
		HPL-6	0.765		
	Interpersonal support	HPL-7	0.832	0.935	0.829
		HPL-8	0.969		
		HPL-9	0.925		
	Stress management	HPL-10	0.771	0.740	0.511
		HPL-11	0.668		
		HPL-12	0.746		
	Nutrition	HPL-13	0.732	0.771	0.532
		HPL-14	0.804		
		HPL-15	0.741		
QOL					
	Physical health	QOL-1	0.928	0.931	0.818
		QOL-2	0.906		
		QOL-3	0.878		
	Psychological health	QOL-4	0.905	0.927	0.808
		QOL-5	0.913		
		QOL-6	0.879		
	Social relationships	QOL-7	0.873	0.914	0.779
		QOL-8	0.910		
		QOL-9	0.865		
	Environment	QOL-10	0.867	0.936	0.830
		QOL-11	0.922		
		QOL-12	0.942		

Table 2.
Discriminant validity analysis (n = 625).

	Correlation coefficient											
Dimension	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Self-actualization	0.852											
2. Health responsibility	0.278	0.868										
3. Interpersonal support	0.362	0.136	0.910									
4. Stress management	0.445	0.240	0.528	0.715								
5. Nutrition	0.409	0.355	0.266	0.387	0.729							
6. Centrality	0.350	0.191	0.209	0.244	0.255	0.795						
7. Attraction	0.142	0.319	0.226	0.347	0.286	0.282	0.856					
8. Self-expression	0.332	0.236	0.167	0.231	0.280	0.726	0.308	0.822				
9. Physical health	0.350	0.102	0.450	40.4	0.271	0.389	0.238	0.310	0.904			
10. Psychological health	0.328	0.120	0.385	0.338	0.281	0.432	0.272	0.384	0.593	0.899		
11. Social relationships	0.358	0.183	0.334	337	0.319	0.412	0.272	0.387	0.564	0.621	0.882	
12. Environment	0.343	0.157	0.376	0.378	0.284	0.583	0.295	0.514	0.654	0.655	0.609	0.910

Note: Diagonal values show the square AVE.

According to the criteria proposed by Fawcett, et al. [47], the correlation between two distinct constructs should be smaller than the square root of their respective AVE. As depicted in Table 2, the square root of the AVE for each construct

ranges from 0.715 to 0.910, all exceeding the correlation coefficients between constructs. These results confirm that the constructs exhibit strong discriminant validity.

4.2. Structural Equation Modeling Analysis

The structural model path analysis results, as shown in Figure 1, demonstrate several significant relationships. First, FI has a significant positive impact on QOL (β = 0.250, p < 0.001), providing support for hypothesis H_1. Second, FI also exerts a significant positive effect on HPL (β = 0.230, p < 0.001), confirming hypothesis H_2. Finally, HPL significantly and positively influences QOL (β = 0.532, p < 0.001), supporting hypothesis H_3. These findings collectively validate the proposed relationships within the structural model.

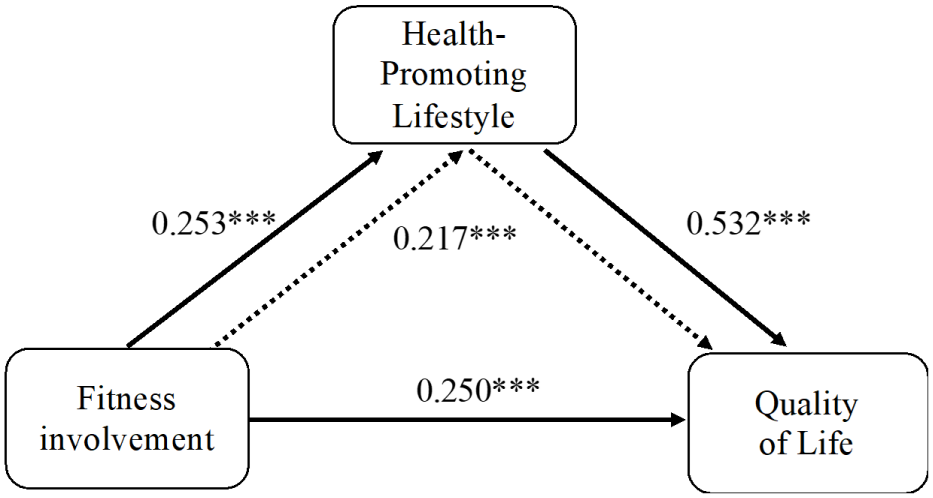

Figure 1.
Structural equation modeling analysis results.

4.3. Mediation Analysis

This study utilized the bootstrapping method to examine the mediating role of HPL between FI and QOL. The results indicate that the indirect effect of FI → HPL → QOL is 0.217 (95% CI: [0.161, 0.277], p < 0.001), while the direct effect of HPL on QOL is 0.405 (95% CI: [0.319, 0.486], p < 0.001). Because both the indirect and direct effects are significant, and the confidence intervals exclude zero, these findings confirm that HPL serves as a partial mediator between FI and QOL. Consequently, the results support hypothesis H_4, suggesting that HPL partially mediates the influence of FI on QOL.

5. Discussion

The findings of this study reveal a significant relationship between university students' FI and HPL. This suggests that greater engagement in fitness activities is associated with a higher likelihood of adopting habits that support HPL. Consistent with previous research, health-promoting behavior theory indicates that an individual's exercise experiences can directly or indirectly influence health-promoting behaviors, shaped by their current health goals [48]. Engaging in fitness activities not only enhances physical fitness and strength, but also alleviates stress, thereby improving both physical and mental well-being [3, 24, 25]. An individual's physical condition is strongly associated with their overall health status and disease susceptibility, with exercise playing a crucial role in fostering improvements [24, 28]. Numerous studies have emphasized the close link between physical and mental health and an individual's capacity for daily living and physical fitness [49-53]. Specifically, fitness activities not only enhance daily life and work performance, but also support the cultivation of a positive lifestyle, fostering the development of good health habits.

The analysis of the research findings indicates that FI positively impacts QOL among university students. This suggests that engaging in fitness activities not only enhances physical and mental well-being, but also raises health awareness, thereby improving overall life satisfaction. This result is consistent with previous studies [54, 55]. The observed correlation can be attributed to several factors: exercise serves as a key predictor of well-being, physical activity fulfills psychological needs, and leisure satisfaction derived from fitness activities further contributes to life satisfaction. Fitness activities improve physical health [56-58], facilitate social interactions, provide inner psychological fulfillment, and help alleviate stress and depression [59-62]. Moreover, the challenges and stimulation inherent in fitness activities generate positive emotions and encourage reflection on exercise experiences [63]. For instance, improved body shape and appearance satisfaction resulting from fitness activities can enhance overall self-perception and positively influence life evaluation [64]. Numerous studies have also reported a significant positive relationship between exercise participation, well-being, and life satisfaction [26, 65-67]. In conclusion, this study underscores the critical role of FI in enhancing the QOL of university students in Taiwan. These findings highlight the need for educational institutions to promote fitness facilities on campuses and develop fitness-related courses to encourage greater student participation.

The results of this study demonstrate that HPL significantly predicts life satisfaction, highlighting the importance of adopting and maintaining healthy attitudes and behaviors to enhance QOL. Prior research has established that good physical fitness is a foundational prerequisite for achieving high QOL [68]. Conversely, individuals with chronic illnesses

experience significantly lower QOL compared to their healthier counterparts [69, 70]. Moreover, good health and physical fitness are strongly associated with HPL [7]. These findings suggest that QOL is influenced by an individual's lifestyle, as well as their attitudes and behaviors toward health promotion. Kiajamali, et al. [71] emphasized that while physical state serves as a critical health indicator, it also plays a significant role in shaping QOL [71]. As a determinant of QOL, bolstering HPL by prioritizing lifestyle modifications and employing health promotion could be a key strategy for improving life satisfaction [72].

The findings of this study reveal that HPL serves as a partial mediator between FI and QOL. Previous research underscores the significant relationship between HPL, QOL, and physical and mental states [68, 69]. Participation in fitness activities has been shown to enhance physical and mental well-being [3, 24, 25]. Additionally, Liu, et al. [19] demonstrated a strong correlation between physical fitness, health levels, and their predictive influence on HPL. In summary, these findings suggest that promoting FI among Taiwanese university students can enhance HPL, which, in turn, contributes to greater satisfaction with QOL. This highlights the importance of fitness activities not only for physical health, but also for fostering HPL, which positively impacts overall well-being.

6. Conclusion

This study found that FI is positively associated with both QOL and HPL. Furthermore, HPL is positively related to QOL and partially mediates the relationship between FI and QOL. These findings indicate that participation in fitness activities improves the physical and mental health of Taiwanese university students, fosters HPL, and enhances their overall satisfaction with QOL. As fitness continues to gain popularity in Taiwan and emerges as one of the most favored activities in recent years, universities should consider expanding fitness facilities and offering fitness-related courses.

6.1. Implications

In summary, the findings of this study underscore the critical role of fitness activities in enhancing the HPL and QOL of Taiwanese university students. Fitness activities continue to rapidly develop in Taiwan, and the increasing number of fitness clubs and sports facilities reflects this growing trend. Given that HPL, once established, is challenging to modify in adulthood, educational institutions have a responsibility to promote physical activities among university students. Universities should prioritize the provision of accessible fitness facilities and encourage students to incorporate fitness activities into their daily campus routines. Integrating fitness into the physical education curriculum and emphasizing its physiological, psychological, and health-related benefits can further support this objective. By fostering a culture of regular physical activity, universities can help students establish a robust HPL, ultimately improving their QOL and overall life satisfaction.

6.2. Research Limitations and Recommendations

This study analyzed university students' FI, HPL, and QOL through a questionnaire survey, but did not include other age groups, such as high school students or adults in broader society. Given the diversity of job types and work patterns, the results may differ in different populations, warranting future research to explore these variations. Furthermore, this study focused solely on fitness exercises, excluding other forms of physical activities, which may yield different outcomes depending on the type of exercise. The cross-sectional research design employed in this study is another limitation, as it did not allow for longitudinal observation of time-based impacts or differences across academic years. To address this, future studies should consider examining a wider variety of exercise types and lifestyles or focus on specific subgroups with distinct job types. A longitudinal approach is also recommended to track whether the level of FI observed during university years is maintained post-graduation, and how it influences HPL and QOL satisfaction over time. Such an approach could help validate the stability of the causal relationships identified in the structural equation model and offer deeper insights into the long-term effects of FI on HPL and QOL.

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