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Development and Validation of a Structural Equation Model for Physical Health Promotion Based on Psychosocial Factors among University Students in Ningbo City

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Abstract

Background and Aim: University students in Ningbo City face rising health risks due to sedentary lifestyles and academic stress. Promoting physical health requires an understanding of key psychosocial factors such as self-efficacy, social support, and perceived barriers. This study aims to develop and validate a structural equation model (SEM) based on health promotion theories to identify factors influencing physical health and guide effective interventions for college students.

Materials and Methods: To guarantee demographic representation, 650 Ningbo City university students were chosen through stratified random sampling for this quantitative cross-sectional study. Six validated tools measuring physical activity, perceived barriers, perceived benefits, self-efficacy, social support, and physical health were used to gather data. Strong reliability was shown by each scale (Cronbach's $\alpha > 0.80$). AMOS version 24 was used for Structural Equation Modeling in order to evaluate the measurement and structural models. Construct validity was confirmed using confirmatory factor analysis (CFA), and then model fit was assessed.

Results: The final structural equation model consisted of six latent variables: social support, self-efficacy, perceived benefits, perceived barriers, physical activity, and physical health. The model exhibited good fit indices (GFI = 0.944, RMSEA = 0.052, $\chi^2/df = 2.744$, CFI = 0.961, TLI = 0.953), confirming its statistical validity. Social support and self-efficacy had significant positive effects on physical activity, which in turn positively influenced physical health. Perceived benefits and barriers acted as mediators in these pathways.

Conclusion: The validated SEM offers a practical, evidence-based framework for promoting physical health among university students. It emphasizes the critical roles of self-efficacy, social support, and students' perceptions of benefits and barriers in influencing physical activity and health outcomes. These findings can inform the development of targeted health promotion strategies and educational interventions in higher education settings.

Keywords: Structural Equation Model; Physical Health Promotion; Self-efficacy; Social Support; University Students

Introduction

University students' physical health has become a major global concern in recent years, especially in rapidly developing nations like China. Students frequently undergo major lifestyle changes as they move from high school to college, such as erratic sleep patterns, poor eating habits, stress related to their studies, and decreased physical activity. Together, these elements lead to a deterioration in both mental and physical health. According to recent research, among Chinese teenagers, academic stress is positively connected with anxiety and depression and negatively associated with sleep and physical activity (Zhu et al., 2021). Particularly at risk are urban areas such as Zhejiang Province's Ningbo City, where rapid development and academic competition exacerbate these health issues.

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Sedentary behavior is very common among university students, according to research, and is associated with increased risks of depression, obesity, and cardiovascular disease (Jiang et al., 2020). Furthermore, students' motivation to maintain healthy habits is frequently overshadowed by stress related to academic performance and future employment prospects. This emphasizes how urgently specific health promotion tactics that speak to the realities of students are needed.

The Health Promotion Model (HPM), created by Nola Pender, provides a useful theoretical framework to direct such initiatives. It asserts that personal experiences, perceived advantages and disadvantages, self-efficacy, and interpersonal influences all have an impact on behavior that promotes health (Bahmani et al., 2023). According to this model, one of the most important factors in encouraging physical activity is self-efficacy, or the conviction that one can carry out an action successfully. Concurrently, it has been discovered that social support from family, friends, and the academic community is crucial in influencing college students' health-related behaviors (Zhang, Hasibagen, & Zhang, 2022).

Analytical tools like Structural Equation Modeling (SEM) have grown in importance in health behavior research in recent years. A deeper understanding of causal mechanisms can be gained by using SEM to analyze intricate relationships between several latent variables, including mediating and moderating effects. For example, SEM can assist in determining whether self-efficacy has an impact on physical health as well as how it functions indirectly through mediators like perceived barriers or levels of physical activity (Badu et al., 2020).

Ningbo, a port city that is growing quickly and has a high concentration of universities, is a microcosm of Chinese student life in the city, where contemporary health issues are especially noticeable. According to recent municipal health surveys, Ningbo university students report higher rates of stress-related health problems, low levels of physical activity engagement, and high levels of sedentary behavior. Academic rigor, a lack of recreational facilities on campuses, and social pressure to perform well all contribute to these trends. As a result, Ningbo offers a crucial and contextually rich setting for examining the psychosocial elements affecting the health behaviors of students.

The current study intends to create and validate a structural equation model that explains the mechanisms by which psychosocial factors-such as self-efficacy, perceived benefits and barriers, social support, and physical activity-collectively influence physical health among Ningbo City university students. This model is based on these theoretical and empirical insights. A scientific basis for creating focused and long-lasting health interventions for college students will be provided by an understanding of these pathways.

Objectives

To develop and test a structural equation model (SEM) for physical health promotion based on psychosocial factors among university students in Ningbo, Zhejiang Province.

Literature review

The goal of this study is to create and validate a structural equation model that explains how psychosocial factors, like self-efficacy, perceived benefits and barriers, social support, and physical activity, collectively affect physical health among Ningbo City university students. This model is based on these theoretical and empirical insights. Designing focused and long-lasting health interventions for college students will be made possible by a scientific understanding of these pathways (Gómez-Oliva et al., 2023).

The Health Promotion Model (HPM), developed by Nola Pender, offers a comprehensive framework for examining the determinants of health behaviors. It emphasizes the role of individual characteristics and experiences, behavior-specific cognitions, and behavioral outcomes in shaping health-promoting actions. Recent studies have applied the HPM to university students, highlighting the significance of psychological factors such as self-efficacy and perceived health status in influencing health behaviors (Gómez-Oliva et al., 2023).

One of the most important predictors of physical activity among college students is self-efficacy, which is the belief in one's ability to carry out the behaviors required to achieve particular performance outcomes. For example, Sheng, Ariffin, and Tham (2025) discovered that there were significant gender differences in behavioral outcomes and that self-efficacy significantly mediated the relationship between motivation and actual levels of physical activity. This supports earlier findings that people who have a high level of exercise self-efficacy are more likely to continue exercising even in the face of adversity.

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Another important factor in promoting health is social support. Increasing self-efficacy and lowering perceived barriers can have both direct and indirect effects on health behaviors. Zhang, Hasibagen, and Zhang (2022) showed that students' exercise behaviors were influenced by social support in both direct and mediated ways (through self-efficacy). Furthermore, a meta-analysis by Zhang, Wang, and Zhao (2023) verified that social support, via increased self-efficacy, consistently predicts higher levels of physical activity among adolescents and young adults.

The study builds on earlier research that employed Structural Equation Modeling (SEM) to comprehend the intricacy of health behaviors, especially how students' actions are influenced by psychosocial factors. In keeping with this methodology, the current study uses SEM to examine how perceptions of advantages and disadvantages, social support, and self-efficacy influence physical activity and general health. By doing this, it applies previous models to a new setting- Ningbo City university students- with the goal of directing efficient, research-based health interventions.

Conceptual Framework

Based on Pender's Health Promotion Model, the conceptual framework proposes that social support, perceived benefits, perceived barriers, and self-efficacy all have an impact on physical health through physical activity, both directly and indirectly.

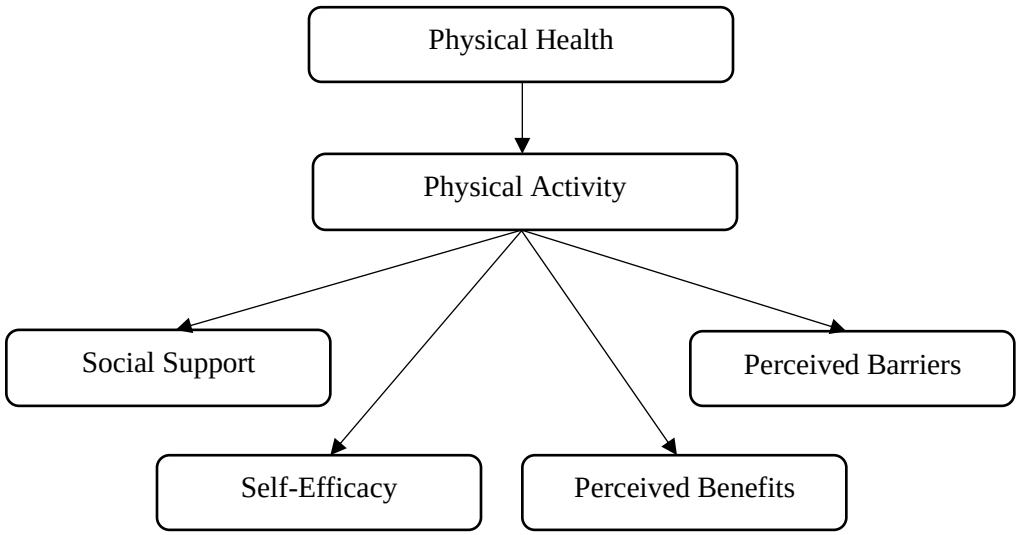

Figure 1 Conceptual framework

Methodology

Population and sample

Population: Undergraduate students enrolled in public universities in Ningbo City, Zhejiang Province, China, made up the study's population. The target population was chosen to reflect a range of academic fields and socioeconomic backgrounds in light of the study's goal of examining psychosocial factors influencing physical health.

Sample: To guarantee representativeness across faculties, genders, and academic years, a stratified random sampling technique was used. According to the guidelines for Structural Equation Modeling (SEM), which require a sample size of at least 10–15 times the number of observed variables, the total sample size was 650 students. Age between 18 and 25 years, full-time enrollment status, and voluntary participation in the study were all prerequisites for inclusion. Students with documented physical disabilities or long-term conditions that could substantially impact their levels of physical activity were excluded.

The sample size was thought to be sufficient for the planned statistical analyses, especially SEM, and it guaranteed that the results could be applied to the larger Ningbo student body.

Research design

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Hu, Q., Promthep, K., & Eakronnarongchai, W. (2025). Development and Validation of a Structural Equation Model for Physical Health Promotion Based on Psychosocial Factors among University Students in Ningbo City. International Journal of Sociologies and Anthropologies Science Reviews, 6 (1), 107-114;
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This study used a cross-sectional survey method with a quantitative research design. The goal was to create and validate a structural equation model (SEM) that uses physical activity as a mediating variable to explain the relationships between psychosocial factors—specifically, social support, self-efficacy, perceived benefits, and perceived barriers—and physical health.

Model development and empirical validation were the two primary stages of the research process. A theoretical framework was developed in the first phase using the Health Promotion Model and pertinent literature as a basis. In the second phase, a sample of university students' data was gathered using structured questionnaires, and AMOS version 24 was used for analysis to perform Structural Equation Modeling (SEM).

This design provided a thorough understanding of how psychosocial determinants impact physical health outcomes by allowing the examination of both direct and indirect effects among variables. A cross-sectional design was chosen because of practical considerations like time and resource availability, even though it restricts the ability to infer causality over time. Nevertheless, it is still suitable for identifying important associations in the model. Longitudinal methods may be used in future studies to confirm the temporal pathways and support causal conclusions.

Research Instruments

A structured questionnaire measuring six important constructs—social support, self-efficacy, perceived benefits, perceived barriers, physical activity, and physical health—was one of the research tools. Validated scales that were modified from earlier research and translated into Chinese were used to evaluate each construct; back translation was performed to guarantee accuracy and cultural relevance.

The Social Support Scale, which was derived from the Multidimensional Scale of Perceived Social Support (MSPSS), comprised items that assessed support from friends, family, and significant others using a 5-point Likert scale.

2. Self-Efficacy Scale: This subscale, which also used a 5-point Likert scale, assessed students' confidence in their capacity to participate in regular physical activity according to Bandura's theory.

3. Perceived Benefits and Barriers Scales: These subscales, which measure students' perceptions of the advantages and disadvantages of physical activity, were modified from the Exercise Benefits/Barriers Scale (EBBS).

4. Physical Activity Scale: Students' frequency, duration, and intensity of physical activity during the previous week were evaluated using the International Physical Activity Questionnaire-Short Form (IPAQ-SF).

5. Physical Health Scale: Self-reported questions about energy levels, general physical condition, and the lack of pain or illness symptoms were used to gauge physical health status.

A panel of three experts evaluated the content validity of each scale, and item-objective congruence (IOC) indices were greater than 0.80. High internal consistency was indicated by reliability analysis using Cronbach's alpha, which produced coefficients for each scale greater than 0.80.

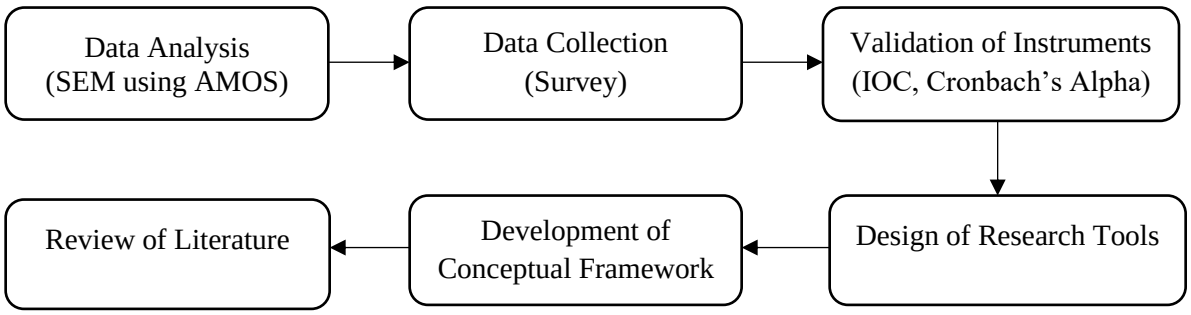

Figure 2 Diagram of the research process

Results

To test the proposed model, 650 university students in Ningbo City provided data, which was analyzed using Structural Equation Modeling (SEM) through AMOS software. Social support, self-efficacy, perceived benefits, perceived barriers, physical activity, and physical health were the six latent variables that were included in the model.

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1. Descriptive Statistics

Table 1 Descriptive Statistics of Demographic and Psychosocial Variables

Variable	Mean (M)	Standard Deviation (SD)
Gender (Female)	57%	-
Gender (Male)	43%	-
Age (years)	20.3	1.6
Physical Activity	2.91	0.78
Physical Health	3.27	0.65
Social Support	3.52	0.81
Self-Efficacy	3.45	0.76
Perceived Benefits	3.68	0.62
Perceived Barriers	2.39	0.72

Table 1: The study variables' descriptive statistics are shown in this table. With an average age of 20.3 years (SD = 1.6), the sample comprised 43% male and 57% female students. Along with physical activity and physical health, psychosocial factors like self-efficacy, perceived barriers, perceived benefits, and social support were measured. The participants' health behaviors and perceptions are fairly represented by the mean values, which all fall between the moderate and favorable ranges.

2. Confirmatory Factor Analysis (CFA)

The measurement model was validated using CFA. Construct validity was confirmed by all factor loadings exceeding 0.60 and being statistically significant ($P < 0.001$). Acceptable reliability and convergent validity were indicated by composite reliability (CR) values ranging from 0.82 to 0.89 and average variance extracted (AVE) values ranging from 0.56 to 0.71.

Table 2 Confirmatory Factor Analysis (CFA) results for the latent constructs

Construct	Number of Items	Factor Loadings Range	Composite Reliability (CR)	Average Variance Extracted (AVE)
Social Support	4	0.68–0.84	0.85	0.65
Self-Efficacy	5	0.65–0.83	0.86	0.62
Perceived Benefits	4	0.70–0.85	0.88	0.68
Perceived Barriers	4	0.60–0.78	0.82	0.59
Physical Activity	3	0.67–0.82	0.84	0.63
Physical Health	4	0.69–0.87	0.89	0.70

Table 2: The confirmatory factor analysis results for the study's six latent constructs are shown in this table. The range of factor loadings, composite reliability (CR), average variance extracted (AVE), and the number of items per construct are all included. Good convergent validity is indicated by AVE values above 0.50 and all CR values above the suggested cutoff of 0.70.

3. Structural Model Testing

The hypothesized structural model was tested and showed a good fit with the data:

- $\chi^2/df = 2.744$
- Goodness-of-Fit Index (GFI) = 0.944
- Root Mean Square Error of Approximation (RMSEA) = 0.052
- Comparative Fit Index (CFI) = 0.961
- Tucker-Lewis Index (TLI) = 0.953

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Table 3 Summary of Model Fit Indices for the Structural Equation Model (SEM)

Fit Index	Criteria	Obtained Value	Model Fit
Chi-square/df (χ^2/df)	< 3.00	2.744	Good
Goodness-of-Fit Index (GFI)	≥ 0.90	0.944	Good
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08	0.052	Good
Comparative Fit Index (CFI)	≥ 0.90	0.961	Good
Tucker-Lewis Index (TLI)	≥ 0.90	0.953	Good

Table 3: The main fit indices that were used to evaluate the structural equation model are compiled in this table. The model has a good overall fit since all values fall within recognized thresholds.

4. Path Analysis

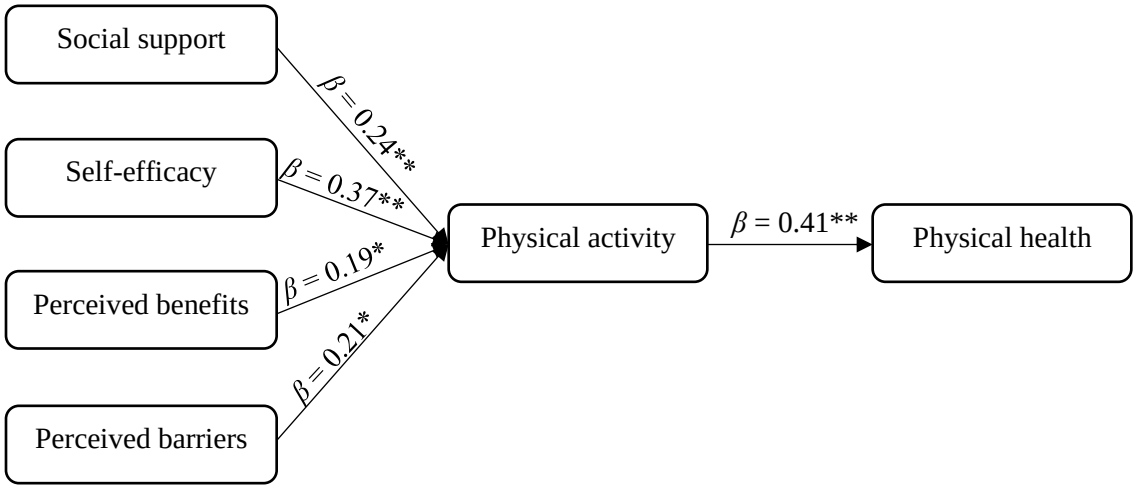

Figure 3 The diagram illustrates the results of the Structural Equation Model (SEM)

The relationships between social support, self-efficacy, perceived benefits, and perceived barriers to physical health are depicted in Figure 3's Structural Equation Model (SEM), which is mediated by physical activity. The significance levels and standardized path coefficients (β) are displayed: ** P < 0.01 and * = P < 0.05

These findings lend credence to the idea that psychosocial factors' effects on physical health are mediated by physical activity. Physical activity, social support, and self-efficacy had statistically significant indirect effects on physical health (P < 0.01).

Conclusion

In order to explain the connections between psychosocial factors and physical health among university students in Ningbo City, Zhejiang Province, this study created and validated a structural equation model (SEM). The findings showed that physical activity had a strong positive effect on physical health and was significantly influenced by social support, self-efficacy, perceived benefits, and perceived barriers. Notably, self-efficacy was found to be the most significant predictor of physical activity, confirming its pivotal position in models of health behavior change.

These results theoretically provide significant additions to Pender's Health Promotion Model (HPM). The study supports and expands the HPM framework by confirming self-efficacy as the strongest determinant. It suggests that internal cognitive drivers may be more important in motivating health-related behaviors than external factors like perceived benefits or social norms. By emphasizing the importance of psychological preparedness over knowledge or support alone, this realization improves the model.

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The study has a number of shortcomings in spite of its advantages. Although the sample was diverse, it was geographically restricted to a single Chinese urban area, which may have limited the findings' generalizability. Additionally, the cross-sectional design precludes the inference of causality. Longitudinal approaches may be used in future studies to confirm the temporal stability of the suggested pathways and better capture behavioral change over time.

Practically speaking, the validated model provides different stakeholders with useful advice. Programs to improve self-efficacy can be incorporated by university administrators into orientation and health services. To promote long-term behavioral change, curriculum designers could incorporate physical wellness elements into general education courses, and student affairs staff could look into peer-led support programs that reinforce healthy norms. Additionally, funding for psychosocially based health interventions on campuses is urged by policymakers.

All things considered, this study offers a tried-and-true framework for creating focused and long-lasting student health interventions in addition to confirming the importance of psychosocial factors in influencing health outcomes.

Discussion

In this study, a structural equation model (SEM) was developed and validated to explain the relationships between physical health and psychosocial factors, including perceived benefits, self-efficacy, social support, and perceived barriers. Physical activity was used as a mediating variable among university students in Ningbo City, Zhejiang Province.

The most significant predictor of physical activity was found to be self-efficacy, supporting Bandura's hypothesis that people who have greater confidence in their skills are more likely to adopt behaviors that promote their health. This result is consistent with earlier studies showing that university students' levels of physical activity are significantly predicted by their exercise self-efficacy. For example, a study by Han et al. (2022) found that exercise behavior is a significant mediator of the relationship between physical fitness and self-efficacy among college students. Furthermore, a review of the literature by Reide et al. (2023) emphasized the importance of self-efficacy in health promotion strategies and showed that it is a significant factor in predicting students' physical activity behavior.

Physical activity also showed a strong positive correlation with social support. This lends credence to the idea that peer, family, and academic support can increase students' motivation to be physically active. According to a meta-analysis by Wang et al. (2019), college students' levels of physical activity and social support are positively connected, highlighting the function of social networks in encouraging healthy habits.

The study found that students were more likely to engage in physical activity when they perceived more advantages and fewer obstacles. The findings of Shava et al. (2024), who found that university students' views of the advantages and obstacles of exercise had a major impact on their physical activity levels, support this conclusion.

Crucially, it was discovered that the relationship between physical health and psychosocial factors was mediated by physical activity. This mediating effect draws attention to the way that psychosocial determinants affect health outcomes. The robustness of these relationships is further confirmed by the model's good fit indices (GFI = 0.944, RMSEA = 0.052, $\chi^2/df = 2.744$).

Interventions aimed at improving the physical health of university students should emphasize the advantages of physical activity, lower perceived barriers, and increased social support and self-efficacy. Although the results are based on Pender's Health Promotion Model, they also support the Social Cognitive Theory and the Theory of Planned Behavior, emphasizing the importance of social influence, perceived behavioral control, and self-efficacy. Therefore, a multi-theoretical approach might be the best way to encourage healthy behaviors in this group.

Recommendation

Suggestions in This Research

1. Peer mentoring and structured health education programs should be implemented by universities to increase students' self-efficacy, as this could have a positive impact on their physical activity levels.

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2. By promoting group exercise activities and creating a campus environment that promotes health, social support systems should be reinforced.

3. To verify the sustainability of psychosocial influences on physical health, future studies should examine longitudinal effects and apply the validated SEM model in various educational and cultural contexts.

Suggestions for Further Research

1. To improve the suggested SEM model's generalizability, future research should use it in a variety of institutional and cultural contexts.

2. To investigate causal relationships and the long-term effects of psychosocial factors on physical health, longitudinal research is advised.

3. Other factors that might affect university students' physical activity and health outcomes, like motivation, stress levels, or digital health tools, should be investigated in future studies.

References

Badu, E., O'Brien, A. P., Mitchell, R., & Osei, A. (2020). Mediation and moderation effects of health system structure and process on the quality of mental health services in Ghana: Structural equation modelling. *PLOS ONE, 15*(5), e0233351. https://doi.org/10.1371/journal.pone.0233351

Bahmani, B., Motlagh, M. E., & Hassankhani, H. (2023). The effect of a health promotion program based on Pender's model on health behaviors among university students: A randomized clinical trial. *BMC Public Health, 23*, 1125. https://doi.org/10.1186/s12889-023-15984-2

Gómez-Oliva, R., Rodríguez-Gázquez, M. L., & Romero-Sánchez, J. M. (2023). Influence of personal factors on health-promoting behavior in university students: A structural equation modeling approach. *BMC Public Health, 23*, 1125. https://doi.org/10.1186/s12889-023-15984-2

Han, Y., Li, Y., Wang, Y., Ke, X., Meng, L., Li, J., Cui, Y., & Tong, Y. (2022). Physical fitness, exercise behaviors, and sense of self-efficacy among college students: A cross-sectional study. *Frontiers in Psychology, 13*, 932014. https://doi.org/10.3389/fpsyg.2022.932014

Hasibagen, H., & Zhang, Y. (2022). The influence of social support on the physical exercise behavior of college students: The mediating role of self-efficacy. *Frontiers in Psychology, 13*, 1037518. https://doi.org/10.3389/fpsyg.2022.1037518

Reide, L., Veseta, U., & Ābele, A. (2023). The role of self-efficacy in physical activity in students: A literature review. *Proceedings of the International Scientific Conference, 2*, 576–588. https://doi.org/10.17770/sie2023vol2.7120

Shava, L., Hove, P., Nyoni, T., & Chikodzi, D. (2024). Physical activity benefits and barriers among university students: Evidence from Zimbabwe. *Frontiers in Sports and Active Living, 6*, 1205914. https://doi.org/10.3389/fspor.2024.1205914

Sheng, J., Ariffin, I. A. B., & Tham, J. (2025). The influence of exercise self-efficacy and gender on the relationship between exercise motivation and physical activity in college students. *Scientific Reports, 15*, 11888. https://doi.org/10.1038/s41598-025-95704-5

Wang, T. T., Ren, M. Y., Shen, Y., Zhu, X. R., Zhang, X., Gao, M., et al. (2019). The association among social support, self-efficacy, use of mobile apps, and physical activity: Structural equation models with mediating effects. *JMIR mHealth and uHealth, 7*(4), e12606. https://doi.org/10.2196/12606

Zhang, Y., Hasibagen, H., & Zhang, C. (2022). The influence of social support on the physical exercise behavior of college students: The mediating role of self-efficacy. *Frontiers in Psychology, 13*, 1037518. https://doi.org/10.3389/fpsyg.2022.1037518

Zhang, Y., Wang, Y. & Zhao, X. (2023). A meta-analysis of the relationship between social support and physical activity in adolescents: The mediating role of self-efficacy. *Frontiers in Psychology, 14*, 1305425. https://doi.org/10.3389/fpsyg.2023.1305425

Zhu, X., Haegele, J. A., Liu, H., & Yu, F. (2021). Academic stress, physical activity, sleep, and mental health among Chinese adolescents. *International Journal of Environmental Research and Public Health, 18*(14), 7257. https://doi.org/10.3390/ijerph18147257

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