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Maintaining healthy lifestyle through fitness app use: A parallel mediation model from a nationwide survey

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Abstract

Objective: Adolescents face various health challenges due to academic pressures and sedentary lifestyles. Establishing healthy habits during this critical period is essential for long-term well-being. With the widespread use of fitness apps, understanding their impact on adolescent health behaviors and the underlying mechanisms is crucial. Guided by social support theory and social comparison theory, this study examined the influence of WeRun, a fitness app within WeChat, on adolescents' adoption of healthy lifestyles. It investigated the correlation between WeRun usage and healthy behaviors, as well as the underlying mechanisms driving this relationship.

Methods: A cross-sectional survey was conducted across 31 provinces and metropolitans in China, utilizing a random cluster sampling approach targeting high school and freshman students aged 15–24 ($N = 1312$). A parallel mediation model was employed to test the hypotheses.

Results: The analysis showed that WeRun use positively predicted both social support and social comparison. Meanwhile, both social support and social comparison were positively associated with healthy lifestyles. Additionally, WeRun use could not directly predict healthy lifestyles. However, WeRun use indirectly predicted healthy lifestyles via social support and social comparison.

Conclusions: The study's findings revealed the pivotal roles of social support and social comparison as mediating variables in the relationship between adolescents' WeRun usage and adoption of healthy lifestyles. The results contributed to the current comprehension of the mechanisms linking app utilization to health-promoting behaviors. Furthermore, it provided valuable insights for promoting adolescent health and informed improved design strategies for fitness apps.

Keywords

Adolescents, WeRun, social support, social comparison, healthy lifestyles

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Introduction

In recent years, a growing number of individuals have actively pursued and embraced a healthy lifestyle, driven not only by improvements in living standards and evolving societal attitudes but also by the creation and increasing affordability of smart wearables connected to smartphones. This was evident from the popularity of fitness applications available on app stores[1] and the substantial following garnered by health and fitness bloggers on social media platforms, whose large number of followers indicates a broader trend toward health-conscious behavior.

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Undoubtedly, healthy lifestyles play an essential role in disease prevention and quality of life. Prioritizing a healthy lifestyle to prevent diseases was preferable to treating them after they occur.[2] Furthermore, promoting healthy behaviors also aligned with the principles of health promotion, which include empowering individuals to make healthier choices, creating supportive environments, and encouraging community action.[3] The ultimate goal of health promotion was to achieve positive health outcomes, enhancing both physical and mental well-being.

It was crucial to explore how adolescents formed healthy lifestyles or the factors that influenced this process. On the one hand, due to the escalating academic workload and the widespread use of electronic devices, unhealthy behaviors among adolescents are becoming more prevalent, such as sedentary lifestyle, insufficient physical exercise, and sleep deprivation, which pose a formidable challenge to the overall physical and mental health of adolescents.[4–6] On the other hand, the health behaviors during adolescence were linked to the development of healthy lifestyles in adulthood.[7] Hence, investigating health-related behaviors among adolescents was vital and indispensable.

Fitness app use and healthy lifestyles

In existing research, there was a diversity of opinions regarding the definition of healthy lifestyles.[8,9] One widely accepted and utilized definition suggested that a healthy lifestyle encompassed five key factors: healthy physical activity level, healthy diet, healthy body weight, non-smoking, and moderate alcohol intake.[10] Some studies also used exercise, nutrition, and stress management as important predictors of healthy lifestyles.[11] Maintaining such habits could yield numerous beneficial outcomes. Individuals who consistently follow these practices tend to experience significantly extended lifespans and delayed onset of disability compared to those who do not adopt such habits[12] One study revealed that compared with individuals who adopted zero low-risk lifestyle factors, adherence to a healthy lifestyle could prolong life expectancy at age 50 years by 14.0 and 12.2 years for female and male US adults.[13]

The use of fitness apps was crucial in guiding and supporting individuals to adopt healthy lifestyles in the 21st century, as they offered great potential to educate a wide population on healthy habits inexpensively.[1] Numerous studies have demonstrated that the use of fitness apps was associated with the improvement of physical activity, diet, and sleep quality.[14,15] Furthermore, it partially alleviated various mental disorders.[16] This study specifically focused on a fitness application called "WeRun."

Understanding WeChat was necessary before delving into WeRun. WeChat served as China's predominant communications and social networking platform. As an official account within WeChat, WeRun functioned as both a step-tracking plugin and a pedometer database.[17,18] This integration allowed seamless access to a vast user base already engaged with the platform, enabling the establishment of fitness communities within existing WeChat networks.[19] Moreover, its distinctive features also provided space for conducting research. Therefore, we chose WeRun as a representative of fitness apps for our study.

The main functions of WeRun included tracking, ranking, and liking.[20] Specifically, WeRun tracked step counts, allowing users to view their daily step counts by following the WeRun account. Meanwhile, WeRun also provided a "leaderboard," ranking users based on their daily step count against their social networks, and the top-ranked user would set the cover photo on their friends' leaderboards. Furthermore, users could give thumbs-up (likes) to their friends' step data, motivating each other to achieve better rankings on the leaderboard. All of these features represented a form of gamification, as goal setting, leaderboard, and thumbs-up could be considered gamified elements.[21,22]

The gamification was used to describe "those features of an interactive system that aim to motivate and engage end-users through the use of game elements and mechanics."[22] Both competition and collaboration were particularly effective within gamification for producing positive behavioral outcomes.[23] Previous studies indicated that the use of mobile applications was a powerful way to promote healthy lifestyles.[24] And the use of fitness apps had a significantly positive effect on peoples' healthy life.[25] Considering that WeRun was a fitness app that included diverse gamification elements, we hypothesized that it may also have the potential to encourage positive health behaviors.

Previous studies also found that Chinese-language fitness mobile apps frequently incorporated three theoretical mechanisms: modeling/observational learning, self-regulation, and social support/social comparison.[25] Specifically, WeRun has implemented social comparison with a "leaderboard." Also, the "liking" feature allows users to provide social support by encouraging their friends with a simple gesture. The characteristics of WeRun rendered it an excellent platform for exploring the role of social influence in the relationship between fitness APP use and beneficial health outcomes. Furthermore, previous research has found a positive association between the use of social networking sites and social comparison/social support.[26]

The mediating role of social support

Social support can be defined as "the perception and experience that one is cared for, esteemed, and part of the mutually supportive social network."[27] It encompassed the comfort, assistance, and reassurance provided by partners, relatives, friends, coworkers, or community ties.[27,28] As a

multi-dimensional concept, social support can be categorized into different dimensions in various contexts,[29] the most common categorizations included instrumental support (such as material aid or practical assistance), informational support (such as advice and information provision), and emotional support (such as encouragement and reassurance).[30,31] The social support in this study included all three of these dimensions simultaneously.

Social support was associated with various beneficial health behaviors and outcomes, including heightened levels of physical activity,[32] enhanced sleep quality,[33] improved psychological well-being,[34] and so on. Moreover, social support was one of the most prevalent behavioral change constructs used in mobile health apps to foster individuals' adoption of healthy behaviors.[35]

The mediating role of social comparison

Social comparison theory, originally proposed by Festinger, argued that individuals had a drive to evaluate their opinions and abilities, and obtained accurate self-evaluation through comparing themselves with others,[36] particularly those who possessed similar ability levels or backgrounds but slightly surpassed their own.[37] Furthermore, subsequent scholars have pointed out that apart from self-evaluation, self-improvement and self-enhancement were also important motives for individuals engaging in social comparison.[37] Social comparison was unavoidable in daily life and occurred in a variety of situations such as assets, academic performance, and lifestyle.[38] Adolescents were especially susceptible to peer influence,[39] and their living environment provided them with a unique opportunity for engaging in social comparison.

Prior studies revealed that social comparison was associated with health behavior (e.g., physical activity) and well-being (e.g., loneliness, depression, and anxiety).[40,41] Many researchers have theorized social comparison as the common mechanism in the relationship between media use and health-related behaviors.[41]

Research hypotheses and objectives

Based on what we discussed above, we postulated the following research hypotheses:

H1: WeRun use is positively associated with healthy lifestyles.
H2: WeRun use is positively associated with social support and social comparison.
H3: Both social support and social comparison are positively associated with healthy lifestyles.
H4: Social support and social comparison mediate the relationship between WeRun use and healthy lifestyles.

In short, inspired by social support and social comparison theory, this study aimed to examine the relationship between WeRun use and healthy lifestyles among a nationally representative sample of Chinese adolescents. Additionally, it sought to explore the underlying mechanisms driving this relationship. Figure 1 illustrated the research framework employed in this study. This research contributed to the current understanding of how fitness apps promote adolescent health behaviors. Furthermore, the findings provided valuable insights for designing more effective health promotion strategies and developing fitness apps tailored to adolescents.

Methods

This study aimed to test hypotheses about the usage of WeRun and healthy lifestyles among Chinese adolescents. To achieve this, we conducted a cross-sectional study. Specifically, after the pilot test, a nationwide survey was carried out between May and June 2021, using a cluster-randomized sampling approach to obtain a representative sample of the target population. The questionnaire was distributed in paper format and data was input into SPSS version 25 for analysis. The methodology was elaborated upon in the following sections: participants, procedures, measurement, and statistical analysis.

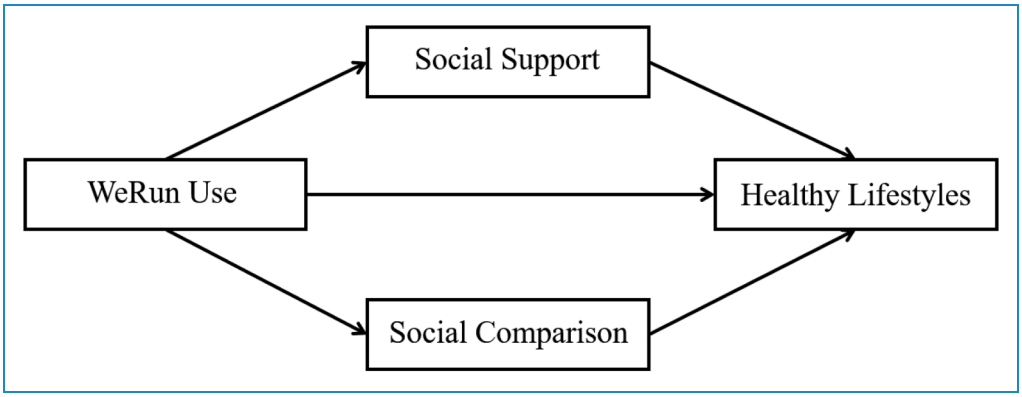

Figure 1. The research framework.

Participants

The survey targeted adolescents aged 15–24 years. Sixty-four trained investigators, recruited through formal channels at universities, were engaged in the survey. These interviewers were systematically trained in research methods and survey techniques. Their tasks included distributing questionnaires, explaining the content to participants, and collecting the completed questionnaires. Finally, a total of 3330 responses were collected from 31 provinces and metropolitan areas across China. Participants with substantial amounts of missing data could introduce bias, affecting the accuracy of the analysis results.[42] Therefore, respondents who missed more than 10% of the survey items were removed. Additionally, respondents who did not use WeRun were also excluded. This resulted in a total of 1312 valid responses, yielding an effective response rate of 39.40%.

Procedures

To ensure the reliability and validity of the measurement scales used in the survey, a comprehensive literature review preceded data collection. Furthermore, a pilot test involving 10 adolescents from high schools and colleges was conducted to obtain feedback on the questionnaire. After receiving feedback from the pilot test, problematic survey items were modified accordingly to enhance the accuracy of the questionnaire, and the final version of the scales was established. It was worth noting that we only analyzed these 10 questionnaires from a qualitative perspective, without conducting separate quantitative analyses or including them in subsequent formal analyses.

Following the refinement of the measurement scales, the survey was administered in one high school and one university in each of the 31 provinces or metropolitans across China. Before starting the survey, the interviewers, adhering to regional and school norms, obtained verbal informed consent from the schools, teachers, and students involved. Subsequently, written informed consent was obtained from all participants. The investigations were conducted anonymously in participants' respective classrooms, with detailed instructions provided by trained interviewers. The investigational sessions lasted approximately 20 min.

Measurement

The study employed typical scales to measure a series of constructs and variables, all of which showed good reliability and robust validity in this study. The details are shown below.

WeRun use. To measure the extent of participants' WeRun Use, they were asked six questions. Specifically, items involved participants' WeRun steps, social interactions, and special use: "Please check your WeRun records yesterday (another question: today of last month), what is the total number of steps?," selecting 1 = ≤ 8000 steps, 2 = 8001–12,000 steps, 3 = 12,001–16,000 steps, 4 = 16,001–20,000 steps, 5 = ≥ 20,001 steps. "In the past month, how often did you share your WeRun-related situations (including and not limited to text, screenshots, etc.) on social media platforms (such as WeChat Moments, Weibo, and QQ zone)?," "In the past month, how often did you talk to others about your use of the WeRun?"; "In the past month, the number of times you shake your phone to increase your WeRun steps?," "In the past month, how often did you walk deliberately in order to improve your ranking in WeRun?," with the answers ranging from 1 = never, 2 = once, 3 = 2–3 times, 4 = at least once per week to 5 = two or more times per week.

The WeRun use variable was measured using these six items, which were designed based on the functionalities of WeRun and optimized through preliminary research and expert interviews to ensure validity and reliability for our target population. Each item involved a rating scale from 1 to 5, representing increasing levels of engagement or intensity of use. The final score of WeRun use was calculated based on the mean of six items (Cronbach's alpha = 0.681). The data were transformed by taking the log of the distribution due to the positively skewed distributions.

Social support. Social support was measured by six items derived from the Social Support for Physical Activity Scale,[43] which was developed based on the Social Support for Exercise Scale,[44] and adjusted to a regional context. Items included "Gave me encouragement to stick with my PA program," "Changed their schedule so we could do PA together," etc. Participants were asked how often their family members or friends have said or done what is described as nearly a month, with the choices 1 = none, 2 = Rarely (<2 times/month), 3= A few times (2–3 times/month), 4 = Often (1 time per week on average), and 5 = Very often (average 2 or more times a week). The six items were averaged, and higher scores indicated higher levels of social support (Cronbach's alpha = 0.872).

Social comparison. Social comparison was assessed with five items derived from the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM).[45] Items included "I like to know how often my friends are working out so I can figure out if the number of times I work out 'matches up'," etc., rated on a five-point Likert scale from 1 = not true for me to 5 = very true for me. Average scores of the five items were calculated to represented the levels of social comparison (Cronbach's alpha = 0.885).

Healthy lifestyles. Healthy lifestyles were measured using the modified Health Promotion Lifestyle Profile Scale (HPLP-S).[46] The adapted scale consisted of 23 items,

which concerned participants' nutrition, physical activities, and stress management. Items included "Follow a planned exercise program," "Limit the use of sugars and food containing sugar (sweets)," "Get enough sleep," and so on, rated on a five-point Likert scale from 1 = not true for me to 5 = very true for me. Finally, the 23 items were averaged to form the healthy lifestyles (Cronbach's alpha = 0.883), and higher scores indicated healthier lifestyles.

Demographics. Demographic information (e.g. sex, age, height, and weight) was also collected in this survey.

Statistical analysis

Descriptive statistics were used to describe sample characteristics (including sex, age, and BMI). Pearson correlations (two-tailed) were employed to test the correlations between all variables, the Kolmogorov–Smirnov test was used to determine the normality of the variables, and path analysis was used to examine the study model. Age and sex served as control variables in the model due to their correlation with other variables in the path analysis. Descriptive statistics and Pearson correlations were conducted with SPSS version 25,[47] and the study model was tested through AMOS version 28.[48]

Model fit was assessed with the minimum discrepancy divided by its degrees of freedom (CMIN/DF), the Tucker–Lewis Index (TLI), the Adjusted Goodness of Fit Index (AGFI), the Comparative Fit Index (CFI), and the root mean squared error of approximation (RMSEA). Generally, a relatively good fit was defined as $1 \leq$ CMIN/DF ≤ 3 (or 5); TLI, AGFI, CFI ≥ 0.95 (or 0.90); and RMSEA ≤ 0.06 (or 0.08).[49,50] To test the model, the maximum likelihood (ML) and the 5000 bootstrap samples with a 95% bias-corrected confidence interval (CI) were used.

Results

Descriptive statistics

Descriptive statistics were presented in Table 1. The sample comprised 1312 valid respondents, with 51.4% of the participants were male. The average age of the participants was 19.29 years ($SD = 1.69$). In terms of BMI, 17.8% were underweight, 65.2% were classified as healthy, 12.7% were overweight, and 4.3% fell into the obesity category. Additionally, when examining the distribution of BMI categories across different age and sex groups, the analysis revealed that the proportion of underweight women (24.5%) is higher than that of men (11.6%), while the proportion of overweight men (17.8%) is higher than that of women (7.2%). There were no significant differences in age. Please see Appendix 1 for more details.

Table 1. Descriptive statistics ($N = 1312$).

	n	%
Sex		
Male	675	51.4
Female	637	48.6
Age ($M = 19.29$, $SD = 1.685$)		
15–17	215	16.4
18–20	798	60.8
21–24	299	22.8
BMI ($M = 21.25$, $SD = 3.753$)		
Underweight	234	17.8
Healthy	855	65.2
Overweight	166	12.7
Obesity	57	4.3

Note: BMI: body mass index; underweight: BMI $\leq$ 18.4; healthy: 18.5 $\leq$ BMI $\leq$ 23.9; overweight: 24 $\leq$ BMI $\leq$ 27.9; obesity: $\geq$ 28.

Table 2 presented the correlations of all variables. Significant positive correlations were identified among the independent variable, dependent variable, and mediator variables. Specifically, a stronger relationship was observed between the use of WeRun and social comparison compared to that of social support.

Model testing

Table 3 presented the results of the structural model test. According to the model fit criteria, our hypothesized model yielded an acceptable overall model fit (CMIN/DF = 4.921, TLI = 0.942, AGFI = 0.974, CFI = 0.988, RMSEA = 0.055).

We hypothesized that WeRun use was associated with healthy lifestyles, social support, and social comparison. As shown in Table 3, WeRun use could not directly predict healthy lifestyles ($\beta = 0.018$, $t = 0.748$, $p = 0.455$). Thus, H1 was rejected. However, results revealed that WeRun use positively predicts both social support ($\beta = 0.262$, $t = 9.807$, $p < 0.001$) and social comparison ($\beta = 0.300$, $t = 11.426$, $p < 0.001$). Thus, H2 was supported.

In addition, we hypothesized that both social support and social comparison were positively associated with healthy lifestyles. As hypothesized, the participants who had higher levels of social support ($\beta = 0.364$, $t = 13.656$, $p < 0.001$) or

Table 2. Correlations of all variables.

	1	2	3	4	5	6
1. WeRun use	-					
2. Social support	0.268**	-				
3. Social comparison	0.311**	0.481**	-			
4. Healthy lifestyles	0.170**	0.484**	0.409**	-		
5. Age	0.101**	−0.061*	−0.050	−0.214**	-	
6. Sex	0.062*	0.072**	0.125**	0.104**	−0.059*	-
M	1.66	2.45	2.24	2.89	-	-
SD	0.62	0.97	0.97	0.67	-	-

Note: $*p < 0.05$, $**p < 0.01$.

Table 3. Structural model test results.

Path	β	*B*	*SE*	*C.R.* (*t*-value)	*p*
WeRun use → Social Support	0.262	1.719	0.175	9.807	***
Social support → healthy lifestyles	0.364	0.251	0.018	13.656	***
WeRun use → social comparison	0.300	1.962	0.172	11.426	***
Social comparison → healthy lifestyles	0.221	0.152	0.019	8.185	***
WeRun use → healthy lifestyles	0.018	0.083	0.112	0.748	0.455
Model fit statistics: CMIN/DF = 4.921, TLI = 0.942, AGFI = 0.974, CFI = 0.988, RMSEA = 0.055					

Note: All analyses controlled the age and sex. β: standardized estimates; *B:* unstandardized estimates; *SE*: standard error.
$***p < 0.001$.

social comparison ($\beta = 0.221$, $t = 8.185$, $p < 0.001$) owned healthier lifestyles. Therefore, H3 was supported.

Mediation analysis

The study assessed the mediating role of social support and social comparison on the relationship between WeRun use and healthy lifestyles. The results revealed a significant mediating role of both social support ($B = 0.431$, $t = 7.183$, $p < 0.001$) and social comparison ($B = 0.299$, $t = 6.102$, $p < 0.001$) on the linkage between WeRun use and healthy lifestyles, supporting H4. Furthermore, the direct effect of WeRun use on healthy lifestyles in the presence of the mediators was found insignificant ($B = 0.018$, $p = 0.455$), while the total effect was significant ($B = 0.813$, $p < 0.001$). Hence, WeRun use could not directly predict healthy lifestyles. However, WeRun use indirectly predicted healthy lifestyles via social support and social comparison. The mediation analysis summary was presented in Table 4.

Discussion

Previous studies have demonstrated that using WeRun was associated with physical activity levels, but less was known about the relationship between WeRun use and healthy lifestyles. Also, the underlying mechanism linking them remained unclear. Furthermore, previous research has predominantly focused on adults, with inadequate attention given to adolescents. To fill the gaps in existing studies, this study examined the relationship between WeRun use and healthy lifestyles, and explored the underlying mechanisms driving this relationship, based on a nationally representative sample of Chinese adolescents. The theoretical and practical implications are discussed below.

Theoretical implications

The proliferation of fitness applications was influencing individuals' engagement in health-related behaviors. Active participation in fitness apps had the potential to yield positive health outcomes by improving physical fitness and exercise practices.[51] This study provided

Table 4. Mediation analysis summary.

Relationship	Total effect	Direct effect	Indirect effect	Confidence interval		*p*-value
				Lower bound	Upper bound	
WRUse-SS-HL	0.813 (<0.001)	0.018 (0.455)	0.431	0.324	0.557	<0.001
WRUse-SC-HL			0.299	0.213	0.405	<0.001

Note: WRUse: WeRun Use; SS: social support; SC: social comparison; HL: healthy lifestyles.

important theoretical contributions to adolescents' fitness app use and healthy lifestyles.

Firstly, the present study enriched the literature regarding the health outcomes of fitness apps through a large-scale national survey among Chinese adolescents. Specifically, it advanced our comprehension of the social mechanisms involved in promoting healthy lifestyles among adolescents through the use of fitness apps. In contrast, prior investigations have primarily focused on the general public, affording limited attention to the adolescent population and utilizing smaller sample sizes. The current study addressed these limitations by conducting a comprehensive national survey on adolescents in developing countries, providing evidence from diverse cultural contexts and contributing to the enhancement of relevant literature.

Secondly, we demonstrated the correlation between social influences and healthy lifestyles in the context of fitness app usage. As expected, both social support and social comparison positively predicted healthy lifestyles, partially aligning with previous research findings. Notably, prior studies had established a significant relationship between social support and improved outcomes, such as sleep quality[33] and engagement in physical activity.[52] However, discrepancies existed in the literature regarding the impact of social comparison on health behaviors. While some studies indicated a positive association between social comparison and increased physical activity,[53] others argued that downward social comparison was linked to lower self-efficacy for physical activity.[40] Our study measured social comparison as a unified construct, which may be a potential reason for the positive association between social comparisons and favorable health behaviors in our results.

Thirdly, this study provided insights into one of the pathways through which the use of fitness apps promotes healthy lifestyles among adolescents, emphasizing the crucial role of social support and social comparison in the utilization of WeRun and adolescents' health. The analysis revealed no statistically significant direct impact of WeRun usage on healthy lifestyles. However, when accounting for the mediating roles of social support and social comparison, the results changed, indicating that WeRun usage indeed predicted healthier lifestyles. Healthy lifestyle adoption is a multifaceted process influenced by various factors beyond just fitness app usage. The significance of social support and social comparison became evident. Social support could enhance adolescents' motivation for healthy behaviors and self-efficacy,[54,55] thereby facilitating the adoption of a healthier lifestyle. Simultaneously, moderate social comparison might stimulate competitive motivation[40] and goal setting,[56] motivating adolescents to embrace healthier lifestyles. Moreover, as a gamification element, goal setting also has the potential to influence the acquisition of healthy habits indirectly.

Practical implications

This study significantly contributed to the existing comprehension of the mechanisms associating fitness app utilization with healthy behaviors and provided practical implications for promoting healthy lifestyles among adolescents. While prior research had underscored the pivotal roles of behavioral regulation[57] and social support[58] in fitness app design, our study revealed the critical mediating functions of both social support and social comparison in the relationship between adolescents' use of fitness apps and the adoption of healthy lifestyles. Moreover, these mediating variables positively predict the adolescents' healthy lifestyles. The insight into how social networks interact with fitness app usage underscores the necessity for a holistic approach in interventions aimed at fostering healthy lifestyles among adolescents.

For application designers, the establishment of groups can bolster intra-group social support and inter-group social comparison. Simultaneously, improvements in page design and prompts are crucial, including increasing the liking rate and eliciting the desire for comparison through engaging liking and ranking prompts. Additionally, launching a weekly report to showcase weekly steps, likes, and rankings for users and their groups may further enhance user social support and social comparison. Undoubtedly, investing in the enhancement of gamification elements within the design is a direction worth prioritizing for all fitness application designers. This strategy not only amplifies user engagement but also catalyzes cultivating healthier habits among users.

Limitations and future directions

While this study provided valuable insights into the relationship between fitness app use and the health of Chinese adolescents, it was important to acknowledge some limitations that should be considered when interpreting the findings. Firstly, we could not establish a causal relationship between fitness app use and healthy lifestyles via the cross-sectional design, despite employing a nationally representative survey and obtaining significant results. Future research should explore experimental methods or longitudinal designs to establish causation. Secondly, although standardized measures were implemented, the measurement of mediating variables can still be improved. Therefore, we recommend that future studies explore more nuanced, context-specific measures for social support and social comparison, contributing to a comprehensive understanding of the complex interplay of these mechanisms. Thirdly, the self-reported data may introduce bias and potentially underestimate or overestimate results. Future studies should adopt a multi-method approach to enhance the robustness of data. In addition, the study focused on a specific target group aged 15–24, and more groups of testing objects could be involved in future studies.

Conclusions

In conclusion, drawing on social support and social comparison theory, the present study has provided important insights into a pathway through which the utilization of a fitness app, particularly WeRun, promoted a healthy lifestyle among Chinese adolescents. The findings enhance our understanding of the mechanisms linking fitness app usage to health-promoting behaviors, providing valuable guidance for advancing adolescent health promotion and informing improved design strategies for fitness apps.

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Appendix

Appendix 1. Descriptive statistics of BMI categories by age and gender groups.

		Underweight	Healthy	Overweight	Obesity
Sex	Male	78 (11.6%)	434 (64.3%)	120 (17.8%)	43 (6.4%)
	Female	156 (24.5%)	421 (66.1%)	46 (7.2%)	14 (2.2%)
Age	15–17	41 (19.1%)	137 (63.7%)	29 (13.5%)	8 (3.7%)
	18–20	136 (17%)	535 (67%)	95 (11.9%)	32 (4%)
	21–24	57 (19.1%)	183 (61.2%)	42 (14%)	17 (5.7%)

Note: underweight: BMI $\leq$ 18.4; healthy: 18.5 $\leq$ BMI $\leq$ 23.9; overweight: 24 $\leq$ BMI $\leq$ 27.9; obesity: $\geq$ 28.