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Developing a Physical Activity Exercise Program to Improve Self-Confidence of Secondary School Students in Guangzhou

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Abstract

Background and Aims: Adolescents in highly competitive school settings frequently encounter psychological strain that can adversely affect their self-esteem and social development. Physical activity is commonly acknowledged as an effective approach to enhance teenagers' psychological well-being. The goal of this study was to create and test an organized physical activity program for secondary school students in Guangzhou that would help them feel more confident.

Methodology: Adolescents in competitive academic environments often experience psychological stress that can negatively impact their self-esteem and social development. Physical activity is well recognized as an effective means to improve adolescents' psychological well-being. The goal of this study was to create and test an organized physical activity program for secondary school students in Guangzhou that would help them feel more confident.

Results: The findings revealed that students in the experimental group exhibited markedly enhanced self-confidence across many dimensions in comparison to the control group ($p < 0.05$). Incremental enhancements in self-confidence were noted from pre-test to mid-test and post-test. Moreover, behavioral assessments conducted by educators and classmates indicated notable enhancements in initiative, communication, persistence, social engagement, and receptiveness to feedback among children included in the structured physical activity program.

Conclusion: The results indicate that the organized physical activity program significantly improves self-confidence and associated social behaviors among secondary school pupils. Incorporating structured physical exercise programs into school curricula may effectively enhance teenagers' psychosocial development and foster healthy educational environments.

Keywords: Physical Activity Exercise Program; Self-confidence; Adolescents; Secondary School Students; Guangzhou

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Introduction

In the early twenty-first century, global societies experienced rapid transformation driven by technological advancement, globalization, and changing labor markets. These changes have reshaped educational systems and youth development worldwide. Adolescents today face increasing pressures related to academic expectations, digital environments, and social competition, which contribute to rising psychological stress and mental health concerns. Recent international reports indicate that adolescents are experiencing higher levels of anxiety, emotional instability, and academic stress compared with previous generations, making adolescent mental well-being an important global public health and educational issue (World Health Organization, 2023).

Within this global context, China represents a particularly distinctive case due to its highly competitive education system and strong cultural emphasis on academic achievement. Chinese students often experience intense academic pressure from early adolescence, especially in preparation for the National College Entrance Examination (Gaokao), which strongly influences future educational and career opportunities. To reduce excessive academic burdens, the Chinese government introduced the "Double Reduction" policy (Shuang Jian) in July 2021, aiming to limit excessive homework and restrict off-campus tutoring institutions. Although early evaluations suggest improvements in students' leisure time and reductions in parental tutoring expenses, academic competition and examination-oriented learning remain dominant within the educational system (Zhang & Bray, 2022). Consequently, many adolescents still face heavy academic workloads that limit opportunities for social interaction, recreation, and physical activity.

These challenges are particularly evident in large metropolitan areas such as Guangzhou, one of China's major economic and cultural centers. Rapid urban development, strong parental expectations, and intense educational competition contribute to increasing academic pressure among adolescents. Previous studies have shown that Chinese students frequently experience heavy academic workloads and high levels of academic stress, which can negatively influence their psychological well-being and social development (Cheng et al., 2023). Moreover, heavy academic demands are associated with reduced sleep duration, lower levels of physical activity, and increased risks of anxiety and emotional distress among adolescents. These findings suggest an imbalance between academic achievement and holistic adolescent development.

Adolescence is a critical developmental stage characterized by significant biological, psychological, and social changes. During this period, individuals develop self-identity, interpersonal competence, and emotional regulation abilities that are essential for long-term well-being (Steinberg, 2021). However, prolonged exposure to academic stress and limited opportunities for social interaction may increase adolescents' vulnerability to emotional

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difficulties such as anxiety, low self-esteem, and social withdrawal (Sowislo & Orth, 2013; Steinberg, 2021). In competitive educational contexts such as Guangzhou, these challenges highlight the need for strategies that support adolescents' psychological well-being alongside academic development.

Among the psychological factors associated with adolescent development, self-confidence plays a crucial role. Self-confidence reflects an individual's belief in their ability to successfully perform tasks and overcome challenges. Adolescents with higher self-confidence tend to demonstrate stronger academic motivation, better peer relationships, and greater resilience in stressful situations (Orth & Robins, 2019). In contrast, low self-confidence is associated with higher risks of depression, anxiety, and social maladjustment (Sowislo & Orth, 2013; Pérez-Sánchez et al., 2024). Therefore, promoting self-confidence during adolescence is essential for supporting both psychological health and academic success.

Participation in structured physical activity has been widely recognized as an effective strategy for enhancing adolescent self-confidence. Research indicates that regular physical activity not only improves physical fitness but also enhances self-esteem, self-efficacy, and emotional well-being (Lubans et al., 2016; Howie et al., 2020). Physical activity provides opportunities for mastery experiences, goal achievement, and social interaction, which strengthen individuals' perceptions of competence and self-worth (Bailey, 2006). Team sports promote cooperation and social belonging, while individual physical challenges foster personal achievement and confidence.

Despite these benefits, many Chinese adolescents do not meet recommended levels of daily physical activity. National surveys show that fewer than one-third of Chinese youth achieve the recommended sixty minutes of moderate-to-vigorous physical activity per day, largely due to academic pressure and limited time for recreational activities (Huang et al., 2019; Chinese Center for Disease Control and Prevention, 2022). In highly urbanized cities in China, heavy academic workloads and sedentary study patterns may reduce adolescents' opportunities to engage in physical activity (Zhu et al., 2017). This situation highlights the need for structured and school-based physical activity programs that support adolescents' physical and psychological development.

Contemporary research suggests that effective physical activity programs should be developmentally appropriate and grounded in motivational theories. According to Self-Determination Theory, individuals experience greater motivation and well-being when the psychological needs for competence, autonomy, and relatedness are satisfied (Ryan & Deci, 2020). Physical activity programs that incorporate skill development, cooperative activities, and

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supportive learning environments can therefore enhance adolescents' motivation, confidence, and social engagement (Lubans et al., 2016; Howie et al., 2020).

Given the close relationship between self-confidence and self-esteem, adolescent psychological research often assesses both constructs simultaneously. Self-esteem reflects an individual's overall sense of self-worth, whereas self-confidence refers to perceived competence in specific domains such as social interaction and physical performance. Previous research has demonstrated strong associations between these constructs, suggesting shared psychological foundations in adolescent self-concept development (Orth & Robins, 2019; Pérez-Sánchez et al., 2024). Accordingly, this study utilizes the Self-Description Questionnaire II–Short Form (SDQ-II-S), which measures multiple aspects of adolescent self-perception, including social confidence, emotional stability, and general self-concept.

In summary, adolescents in Guangzhou face substantial academic pressures and limited opportunities for physical activity, which may negatively influence their psychological well-being and social self-confidence. Although physical activity has been shown to improve adolescents' psychological development, research examining structured physical activity programs designed specifically to enhance social self-confidence among urban Chinese adolescents remains limited. Therefore, this study aims to design and implement an eight-week structured physical activity program for adolescents aged 12–15 years in Guangzhou. The findings of this research are expected to provide practical guidance for schools, physical education teachers, and educational policymakers in promoting adolescent mental well-being and supporting balanced educational environments that foster both academic success and healthy psychological development.

Objectives

1. To develop and evaluate a structured physical activity exercise program aimed at enhancing self-confidence among secondary school students in Guangzhou.

2. To compare post-intervention self-confidence levels between students participating in the structured physical activity program and those in the control group.

3. To assess changes in self-confidence within the experimental group from pre-test to post-test measurements.

Literature Review

Regular participation in physical activity has been widely recognized as an important factor in promoting adolescents' psychological and social development. Physical activity is generally defined as purposeful bodily movement that contributes to physical fitness and psychosocial well-

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being (Caspersen et al., 1985; Wang, 2011). Previous studies have consistently shown that school-based physical activity can enhance adolescents' emotional well-being, strengthen peer relationships, and improve perceptions of personal competence, all of which contribute to the development of self-confidence (Ekeland et al., 2005; Babic et al., 2014). In particular, sport participation provides opportunities for mastery experiences and social interaction, which are key mechanisms for strengthening adolescents' self-belief and social confidence (Dishman et al., 2006; Son et al., 2021).

Team-based sports such as basketball and football provide opportunities for cooperation, communication, and peer feedback, which help adolescents develop interpersonal confidence and a sense of belonging within social groups (Bailey, 2006). Meanwhile, skill-oriented sports such as badminton allow students to experience progressive achievement through practice and partner interaction, supporting concentration, self-regulation, and confidence development (Sui Hu, 2023). These mechanisms are supported by psychological theories explaining how physical activity contributes to confidence development. Self-Efficacy Theory highlights the role of mastery experience, modeling, and verbal encouragement in strengthening individuals' belief in their capabilities (Bandura, 1997). Similarly, Self-Determination Theory emphasizes that satisfying the needs for competence, autonomy, and relatedness promotes intrinsic motivation and psychological growth (Ryan & Deci, 2000).

Adolescence, particularly between the ages of 12 and 15, is a critical developmental stage characterized by rapid physical growth, increasing self-awareness, and expanding peer relationships. During this period, adolescents become more sensitive to academic pressure and social evaluation, making self-confidence an important protective factor for psychological well-being and social adaptation (Sowislo & Orth, 2013; Orth & Robins, 2014). Previous research has also shown that self-esteem and self-confidence are closely related constructs, as perceptions of personal competence and global self-worth interact to influence adolescents' emotional and social development (Pérez-Sánchez et al., 2024). Empirical studies conducted internationally and in China consistently report that sports participation is positively associated with adolescents' self-confidence, self-esteem, and psychological well-being, while being negatively associated with anxiety and depressive symptoms (Son et al., 2021; De Marco et al., 2023; Laurier et al., 2024).

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Despite these findings, several limitations remain in existing research. Many studies focus on single-sport interventions or short-term programs, and relatively few studies examine integrated physical activity programs combining multiple sports within structured school-based interventions. In addition, limited research has applied multidimensional psychological assessment tools to evaluate changes in adolescents' social self-confidence, particularly in high-pressure urban educational contexts such as Guangzhou (Jiang, 2023; Zhang Wei, 2023). Therefore, the present study aims to address this research gap by designing and implementing an eight-week structured physical activity program integrating basketball, badminton, and football activities for secondary school students in Guangzhou. Guided by Self-Efficacy Theory and Self-Determination Theory, this study evaluates the effectiveness of the program in promoting adolescents' social self-confidence using the SDQ-II-S and complementary teacher observations.

Conceptual Framework

The conceptual framework of this study integrates physical activity exercise programs as inputs, an 8-week structured intervention process, and improved self-confidence as the output. The framework is guided by training theory and adolescent development principles.

INPUT		PROCESS		OUTPUT
1. The Physical Activity Exercise Program A structured program incorporating: • Team-based Activities: Including group drills and team games. • Individual Challenges: Such as goal-setting and progressive tasks. • Expressive Movement: various rhythmic exercises. 2. Principles of training theory 3. Development of Adolescents in Secondary School Students 4. Self-confidence theory	⇨	1. Literature reviews 2. A designed activity exercise program incorporating 3. 8 weeks of experimental in two groups	⇨	Physical activity exercise program to improve the self-confidence of secondary school students in Guangzhou -Validity -Reliability -Self-Confidence skill

Figure 1 Conceptual Framework

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Methodology

1. Population and Sample

The target population of this study consisted of secondary school students aged 12–15 years who were enrolled in public junior high schools in Guangzhou, China, during the 2024 academic year and expected to graduate in 2026. These students are typically in Grades 7–9 and are at a developmental stage characterized by increasing academic pressure and social interaction demands.

The accessible population was students from Panyu Experimental Middle School in Guangzhou. This school was selected because it represents a typical public junior high school in Guangzhou in terms of academic environment, student demographics, and educational structure.

The sample consisted of 60 Grade 8 students aged between 12 and 15 years who were enrolled in two intact classes at Panyu Experimental Middle School. Among the participants, there were both male and female students who were regularly attending physical education classes. All students in the selected classes were invited to participate in the study. Participation was voluntary and required both student assent and parental consent.

To ensure initial equivalence between groups, students first completed a baseline self-confidence assessment using the Self-Description Questionnaire II–Short Form (SDQ-II-S). Based on their baseline scores, students were ranked from highest to lowest and then systematically assigned alternately into two groups:

Experimental group: 30 students

Control group: 30 students

This matching procedure helped ensure that the two groups had similar levels of self-confidence before the intervention.

The inclusion criteria were:

1. Enrollment in Grade 8 at the selected school.
2. Age between 12 and 15 years.
3. Student assent and parental consent to participate.

The exclusion criteria were:

1. Students with medical conditions that contraindicate physical activity.
2. Students who are currently participating in elite sports training programs.

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3. Students who attended fewer than 80% of the intervention sessions.

4. Students who voluntarily withdrew during the study period.

2. Research Instruments

Two primary research instruments were used in this study.

2.1 Self-Description Questionnaire II–Short Form (SDQ-II-S)

The SDQ-II-S was used to measure adolescents' self-confidence and self-concept. The questionnaire includes multiple dimensions related to self-perception, including social confidence, emotional stability, and general self-worth.

Participants responded to each item using a Likert scale format, allowing researchers to quantify perceived changes in self-confidence across different stages of the intervention. The SDQ-II-S has been widely used in adolescent psychological research and demonstrates good reliability and validity for measuring self-perception constructs (Marsh, 2005; Pérez-Sánchez et al., 2024).

2.2 Behavioral Observation Checklist

In addition to the questionnaire, a behavioral observation checklist was developed to evaluate observable indicators of self-confidence during physical activity sessions. Teachers and peers recorded behaviors such as participation willingness, communication with teammates, leadership behavior, and persistence in challenging tasks. This instrument provided complementary behavioral evidence to support questionnaire results.

3. Development and Quality Verification of Research Instruments

The research instruments underwent a quality verification process to ensure validity and reliability.

Content Validity

The SDQ-II-S questionnaire and the behavioral observation checklist were reviewed by a panel of experts consisting of specialists in physical education, sport psychology, and educational measurement. Each expert evaluated the relevance and clarity of the instrument items using the Index of Item Objective Congruence (IOC). Items with IOC values greater than 0.80 were retained for the study.

Reliability

To ensure internal consistency and reliability, the questionnaire was pilot-tested with a group of students who had similar characteristics to the study participants. Cronbach's alpha

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coefficient was calculated to assess reliability. A reliability coefficient greater than 0.70 was considered acceptable for the study.

4. Data Collection Procedure

The study employed a quasi-experimental design with pre-test, mid-test, and post-test measurements conducted over an eight-week intervention period during the 2024 academic semester.

Pre-test Stage

Before the intervention, all participants completed the SDQ-II-S questionnaire to measure baseline levels of self-confidence. At the same time, teachers completed initial behavioral observations during regular physical education classes.

Intervention Stage

The experimental group participated in a structured physical activity program designed to enhance adolescents' self-confidence. The program lasted eight weeks, with two sessions per week, and each session lasted approximately 70 minutes.

The training program incorporated three main activity components:

1. Team-based sports activities (basketball and football tactical games) to promote cooperation, communication, and social interaction.

2. Skill-based activities (badminton drills and partner exercises) to enhance individual skill mastery and concentration.

3. Expressive and cooperative movement activities designed to encourage creativity, peer support, and positive social engagement.

Each session followed a structured format including warm-up activities, main physical activity tasks, cooperative games, and cool-down exercises. The control group continued their regular physical education classes following the school's standard curriculum without the structured intervention program.

Mid-test Stage

After four weeks, a mid-test assessment was conducted using the SDQ-II-S questionnaire and behavioral observation checklist to monitor intermediate changes in students' self-confidence.

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Post-test Stage

At the end of the eight-week intervention, participants completed the SDQ-II-S questionnaire again. Teachers and peers also completed the behavioral observation checklist to evaluate changes in students' social confidence and participation behavior.

5. Data Analysis

The data collected were entered into and analyzed using statistical software. Both descriptive and inferential statistical methods were applied to examine the effectiveness of the structured physical activity program.

6. Statistical Methods Used in Data Analysis

Several statistical techniques were used in this study:

1. Descriptive statistics, including mean and standard deviation, were used to summarize the characteristics of the participants and the overall distribution of self-confidence scores.

2. Independent-samples t-tests were conducted to compare differences in self-confidence scores between the experimental and control groups.

3. Repeated measures ANOVA was used to examine changes in self-confidence scores across three measurement points (pre-test, mid-test, and post-test) within and between groups.

4. The significance level for statistical tests was set at $p < 0.05$.

Results

A total of 60 secondary-school students participated in this quasi-experimental study, with 30 students assigned to the experimental group and 30 to the control group. The experimental group received an 8-week structured physical activity program, whereas the control group continued the standard physical education curriculum. Outcomes were measured at three points: pre-test (baseline), mid-test (Week 4), and post-test (Week 8). Self-confidence was assessed using the SDQ-II-S (11 dimensions), and social-confidence–related behaviors were evaluated using the Behavioral Observation Checklist (BOC), rated by teachers and classmates.

Participant Characteristic:

Baseline characteristics were comparable between groups. In the experimental group, mean height, weight, age, and BMI were 164.87 ± 7.92 cm, 54.07 ± 7.14 kg, 14.40 ± 0.50 years, and 22.86 ± 0.74, respectively. In the control group, values were 165.33 ± 8.14 cm, 52.83 ± 7.80 kg, 14.47 ± 0.51 years, and 22.30 ± 0.29.

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Table 1 Means and standard deviations of height, age, and weight of all subjects

Variable	Experimental group (n=30)	Control group (n=30)
	M± SD	M± SD
Age(yrs.)	14.40±0.50	14.47 ± 0.51
Height(cm)	164.87±7.92	165.33±8.14
Weight(kg.)	54.07±7.14	52.83 ±7.80
BMI	22.86 ± 0.74	22.3 ± 0.29

SDQ-II-S Self-Confidence Outcomes:

Descriptive results showed progressive improvements in the experimental group across most SDQ-II-S domains from baseline to Week 4 and Week 8, while the control group remained relatively stable across time points.

Table 2 Mean and standard deviation of SDQ-II-S Dimension Scores of the experimental and control groups.

Variable	Experimental Group (n=30)			Control Group (n=30)		
	Pre-test	Mid-test	Post-test	Pre-test	Mid-test	Post-test
	M ±SD	M ±SD	M ±SD	M ±SD	M ±SD	M ±SD
General School	3.47 ±0.50	3.70 ±0.53	4.37 ±0.49	3.47 ±0.25	3.47 ±0.25	3.25 ±0.25
Math	3.43 ±0.45	3.27 ±0.44	3.23 ±0.38	3.47 ±0.25	3.53 ±0.25	3.75 ±0.25
Verbal	3.50 ±0.16	3.74 ±0.26	4.39 ±0.25	3.49 ±0.10	3.49 ±0.10	3.80 ±0.26
Physical Abilities	3.70 ±0.77	3.97 ±0.85	4.54 ±0.77	3.43 ±0.50	3.00 ±0.50	3.75 ±0.85
Physical Appearance	3.27 ±0.44	3.39 ±0.45	4.16 ±0.45	3.25 ±0.26	3.25 ±0.26	3.50 ±0.45
Parent Relations	4.04 ±0.39	4.18 ±0.43	4.83 ±0.26	3.97 ±0.25	3.97 ±0.25	4.00 ±0.43
Same-Sex Relations	3.44 ±0.43	3.63 ±0.41	4.33 ±0.47	3.47 ±0.25	3.47 ±0.25	3.63 ±0.41
Opposite-Sex Relations	3.25 ±0.41	3.46 ±0.44	4.13 ±0.46	3.20 ±0.32	3.20 ±0.32	3.50 ±0.44

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Variable	Experimental Group (n=30)			Control Group (n=30)		
	Pre-test	Mid-test	Post-test	Pre-test	Mid-test	Post-test
	M ±SD	M ±SD	M ±SD	M ±SD	M ±SD	M ±SD
Honesty-Trustworthiness	3.48 ±0.09	3.68 ±0.15	4.31 ±0.22	3.48 ±0.05	3.48 ±0.05	3.67 ±0.15
Emotional Stability	3.61 ±0.56	3.17 ±0.72	2.78 ±0.66	3.55 ±0.36	3.65 ±0.47	3.20 ±0.72
General Self	3.58 ±0.27	3.78 ±0.29	4.46 ±0.31	3.48 ±0.17	3.48 ±0.17	3.83 ±0.29

Independent-samples t-test indicated significant between-group differences in SDQ-II-S scores at post-test, with the experimental group consistently scoring higher than the control group across all dimensions ($p < .05$).

Table 3 Comparison between the experimental and control groups with the post-test Self-Confidence Scores, by independent t-test.

Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
General School	4.37±0.50	3.47±0.25	-2.94	-1.63	-8.88	0.01*
Math	3.23±0.38	3.53±0.252	0.39	1.46	3.59	0.01*
Verbal	4.39±0.25	3.49±0.1008	-5.68	-3.70	-18.19	0.01*
Physical Abilities	4.54±0.77	3.43±0.504	-2.30	-1.11	-6.62	0.01*
Physical Appearance	4.16±0.45	3.25±0.2626	-3.12	-1.78	-9.51	0.01*
Parent Relations	4.83±0.26	3.97±0.252	-4.11	-2.53	-12.89	0.01*
Same-Sex Relations	4.33±0.48	3.47±0.252	-2.93	-1.62	-8.83	0.01*
Opposite-Sex Relations	4.13±0.46	3.20±0.3151	-3.03	-1.70	-9.18	0.01*
Honesty-Trustworthiness	4.31±0.22	3.48±0.0519	-6.19	-4.06	-19.87	0.01*

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Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
General School	4.37±0.50	3.47±0.25	-2.94	-1.63	-8.88	0.01*
Emotional Stability	2.78±0.66	3.65±0.4666	0.94	2.09	5.90	0.01*
General Self	4.46±0.31	3.48±0.1714	-4.79	-3.04	-15.19	0.01*

*p<0.05

Within the experimental group, repeated measures ANOVA demonstrated a significant time effect across SDQ-II-S dimensions, and Bonferroni post hoc comparisons confirmed significant improvements from pre-test to mid-test and from mid-test to post-test in most domains ($p < .05$).

Table 4 Comparison of self-confidence scores, including the general school, math, verbal, physical abilities, physical appearance, parent relations, same-sex relations, opposite-sex relations, honesty-trustworthiness, emotional stability, and general self within the experimental group using one-way ANOVA repeated measures and Bonferroni post hoc.

Dependent variables / Test		Bonferroni				$\overline{X}$ ± SD	F	p
		Mean Difference	Std. Error	t	p			
General School								
Pre-test	Mid-test	-0.23	0.04	-6.51	.01*	3.47 ±0.09	352	.01*
	Post-test	-0.90	0.02	-39.57	.01*			
Mid-test	Pre-test	0.23	0.04	6.51	.01*	3.70±0.10		
	Post-test	-0.67	0.04	-15.23	.01*			
Post-test	Pre-test	0.90	0.02	39.57	.01*	4.37± 0.09		
	Mid-test	0.67	0.04	15.23	.01*			
Math								
Pre-test	Mid-test	-0.17	0.14	1.23	.68	3.43±0.08	1.83	.17
	Post-test	-0.20	0.13	1.50	.43			
Mid-test	Pre-test	0.17	0.14	1.23	.68	3.27±0.08		
	Post-test	-0.03	0.04	0.85	1.00			
Post-test	Pre-test	0.20	0.13	1.50	.43	3.23±0.07		

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Dependent variables / Test		Bonferroni				$\bar{X}$ ± SD	F	p
		Mean Difference	Std. Error	t	p			
	Mid-test	0.03	0.04	0.85	1.00			
Verbal								
Pre-test	Mid-test	-0.24	0.03	-7.11	.01*	3.50±0.03	419.00	.01*
	Post-test	-0.89	0.03	-33.36	.01*			
Mid-test	Pre-test	0.24	0.03	7.11	.01*	3.74±0.05		
	Post-test	-0.65	0.03	-18.94	.01*			
Post-test	Pre-test	0.89	0.03	33.36	.01*	4.39±0.05		
	Mid-test	0.65	0.03	18.94	.01*			
Physical Abilities								
Pre-test	Mid-test	-0.27	0.04	-5.96	.01*	3.70±0.14	182.00	.01*
	Post-test	-0.84	0.03	-24.11	.01*			
Mid-test	Pre-test	0.27	0.04	5.96	.01*	3.97±0.16		
	Post-test	-0.58	0.05	-11.24	.01*			
Post-test	Pre-test	0.84	0.03	24.11	.01*	4.54±0.14		
	Mid-test	0.58	0.05	11.24	.01*			
Physical Appearance								
Pre-test	Mid-test	-0.13	0.03	-4.01	.01*	3.27±0.08	478.00	.01*
	Post-test	-0.89	0.02	-38.76	.01*			
Mid-test	Pre-test	0.13	0.03	4.01	.01*	3.39±0.08		
	Post-test	-0.77	0.04	-20.29	.01*			
Post-test	Pre-test	0.89	0.02	38.76	.01*	4.16±0.08		
	Mid-test	0.77	0.04	20.29	.01*			
Parent Relations								
Pre-test	Mid-test	-0.14	0.03	-4.26	.01*	4.04±0.07	142.00	.01*
	Post-test	-0.78	0.05	-14.35	.01*			
Mid-test	Pre-test	0.14	0.03	4.26	.01*	4.18±0.08		
	Post-test	-0.64	0.06	-11.24	.01*			
Post-test	Pre-test	0.78	0.05	14.35	.01*	4.83±0.05		
	Mid-test	0.64	0.06	11.24	.01*			
Same-Sex Relations								

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Dependent variables / Test		Bonferroni				$\bar{X}$ ± SD	F	p
		Mean Difference	Std. Error	t	p			
Pre-test	Mid-test	-0.19	0.04	-5.14	.01*	3.44±0.08	265.00	.01*
	Post-test	-0.89	0.03	-28.77	.01*			
Mid-test	Pre-test	0.19	0.04	5.14	.01*	3.63±0.07		
	Post-test	-0.70	0.05	-13.61	.01*			
Post-test	Pre-test	0.89	0.03	28.77	.01*	4.33±0.09		
	Mid-test	0.70	0.05	13.61	.01*			
Opposite-Sex Relations								
Pre-test	Mid-test	-0.21	0.04	-5.57	.01*	3.25±0.08	297.00	.01*
	Post-test	-0.89	0.03	-33.36	.01*			
Mid-test	Pre-test	0.21	0.04	5.57	.01*	3.46±0.08		
	Post-test	-0.67	0.05	-14.49	.01*			
Post-test	Pre-test	0.89	0.03	33.36	.01*	4.13±0.08		
	Mid-test	0.67	0.05	14.49	.01*			
Honesty-Trustworthiness								
Pre-test	Mid-test	-0.20	0.03	-6.43	.01*	3.48±0.02	209.00	.01*
	Post-test	-0.83	0.05	-17.88	.01*			
Mid-test	Pre-test	0.20	0.03	6.43	.01*	3.68±0.03		
	Post-test	-0.63	0.05	-13.30	.01*			
Post-test	Pre-test	0.83	0.05	17.88	.01*	4.31±0.04		
	Mid-test	0.63	0.05	13.30	.01*			
Emotional Stability								
Pre-test	Mid-test	0.45	0.22	2.03	.16	3.61±0.10	10.90	.01*
	Post-test	0.83	0.21	3.89	.01*			
Mid-test	Pre-test	-0.45	0.22	-2.03	.16	3.17±0.13		
	Post-test	0.39	0.04	10.10	.01*			
Post-test	Pre-test	-0.83	0.21	-3.89	.01*	2.78±0.12		
	Mid-test	-0.39	0.04	-10.10	.01*			
General Self								
Pre-test	Mid-test	-0.20	0.03	-5.97	.01*	3.58±0.05	405.00	.01*
	Post-test	-0.88	0.02	-38.75	.01*			

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Dependent variables / Test		Bonferroni				$\bar{X}$ ± SD	F	p
		Mean Difference	Std. Error	t	p			
Mid-test	Pre-test	0.20	0.03	5.97	.01*	3.78±0.05		
	Post-test	-0.68	0.04	-17.40	.01*			
Post-test	Pre-test	0.88	0.02	38.75	.01*	4.46±0.06		
	Mid-test	0.68	0.04	17.40	.01*			

*p<0.05

These findings indicate that self-reported self-confidence and self-concept improved progressively throughout the intervention period.

Teacher-Rated Behavioral Observation Outcomes (BOC)

At baseline, teacher-rated BOC scores showed no statistically significant differences between the experimental and control groups, supporting pre-intervention equivalence (p > .05).

Table 5 Compared between the experiment and control groups with the pre-test of the BOC (Teacher), by t-test independently.

Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
Initiative total	3.03 ± 0.10	2.99 ± 0.09	-0.00	0.10	1.83	0.07
Communication total	2.99 ± 0.12	3.01 ± 0.10	-0.07	0.04	-0.53	0.60
Persistence total	2.99 ± 0.11	3.00 ± 0.13	-0.07	0.06	-0.13	0.90
Social Engagement total	3.03 ± 0.10	3.03 ± 0.13	-0.06	0.06	0.09	0.93
Boldness total	3.00 ± 0.10	3.02 ± 0.10	-0.07	0.04	-0.65	0.52
Acceptance of Feedback total	3.03 ± 0.12	2.98 ± 0.11	-0.01	0.11	1.71	0.09

*p<.05

Before 8 weeks, the experimental group and control group were not significantly different across all six domains (initiative, communication, persistence, social engagement, boldness, and acceptance of feedback; p < .05).

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Table 6 Compared between the experiment and control groups with the post-test of the BOC (Teacher), by t-test independent.

Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
Initiative total	4.22 ± 0.12	3.09 ± 0.12	1.07	1.19	37.78	.01*
Communication total	4.14 ± 0.12	3.12 ± 0.13	0.96	1.09	32.68	.01*
Persistence total	4.20 ± 0.12	3.13 ± 0.11	1.01	1.13	35.80	.01*
Social Engagement total	4.21 ± 0.11	3.09 ± 0.12	1.06	1.17	39.19	.01*
Boldness total	4.18 ± 0.10	3.07 ± 0.11	1.06	1.17	41.67	.01*
Acceptance of Feedback total	4.19 ± 0.09	3.09 ± 0.12	1.05	1.16	40.58	.01*

*p<.05

After 8 weeks, the experimental group demonstrated significantly higher teacher-rated behavioral scores than the control group across all six domains (initiative, communication, persistence, social engagement, boldness, and acceptance of feedback; $p < .05$).

Table 7 Comparison of BOC (Teacher) scores, including six aspects within the experimental group, using one-way ANOVA repeated measures and Bonferroni post hoc.

Dependent variables / Test		Bonferroni				$\bar{X}$ ±SD	F	p
		Mean Difference	Std. Error	t	p			
Initiative								
Pre-test	Mid-test	-0.28	0.03	-9.61	.01*	3.03 ± 0.10		
	Post-test	-1.18	0.03	-45.05	.01*			
Mid-test	Pre-test	0.28	0.03	9.61	.01*	3.31 ± 0.12	891	.01*
	Post-test	-0.90	0.03	-28.02	.01*			
Post-test	Pre-test	1.18	0.03	45.05	.01*	4.22 ± 0.12		
	Mid-test	0.90	0.03	28.02	.01*			
Communication								
Pre-test	Mid-test	-0.31	0.03	-10.8	.01*	3.00 ±0.12	909	.01*
	Post-test	-1.15	0.03	-45.7	.01*			

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Dependent variables / Test		Bonferroni				$\bar{X}$ ±SD	F	p
		Mean Difference	Std. Error	t	p			
Mid-test	Pre-test	0.31	0.03	10.8	.01*	3.30 ± 0.11		
	Post-test	-0.84	0.03	-28.4	.01*			
Post-test	Pre-test	1.15	0.03	45.7	.01*	4.14 ± 0.12		
	Mid-test	0.84	0.03	10.8	.01*			
Persistence								
Pre-test	Mid-test	-0.31	0.03	-10.6	.01*	2.99 ± 0.11		
	Post-test	-1.21	0.03	-38.8	.01*			
Mid-test	Pre-test	0.31	0.03	10.6	.01*	3.30 ± 0.11	839	.01*
	Post-test	-0.90	0.03	-28.3	.01*			
Post-test	Pre-test	1.21	0.03	38.8	.01*	4.20 ±0.12		
	Mid-test	-0.31	0.03	28.3	.01*			
Social Engagement								
Pre-test	Mid-test	-0.29	0.03	-9.85	.01*	3.03 ± 0.10		
	Post-test	-1.18	0.02	-47.27	.01*			
Mid-test	Pre-test	0.29	0.03	9.85	.01*	3.32 ± 0.12	939	.01*
	Post-test	-0.89	0.03	-29.23	.01*			
Post-test	Pre-test	1.18	0.02	47.27	.01*	4.21 ± 0.11		
	Mid-test	0.29	0.03	29.23	.01*			
Boldness								
Pre-test	Mid-test	-0.30	0.03	-10.1	.01*	3.00 ± 0.10		
	Post-test	-1.18	0.03	-42.1	.01*			
Mid-test	Pre-test	0.30	0.03	10.1	.01*	3.30 ± 0.13	858	.01*
	Post-test	-0.88	0.03	-28.4	.01*			
Post-test	Pre-test	1.18	0.03	42.1	.01*	4.18 ± 0.10		
	Mid-test	0.88	0.03	28.4	.01*			
Acceptance of Feedback								
Pre-test	Mid-test	-0.29	0.03	-8.79	.01*	3.03 ±0.12		
	Post-test	-1.16	0.03	-43.91	.01*			
Mid-test	Pre-test	0.29	0.03	8.79	.01*	3.31 ± 0.11	855	.01*
	Post-test	-0.88	0.03	-30.56	.01*			
Post-test	Pre-test	1.16	0.03	43.91	.01*	4.19 ± 0.09		

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Dependent variables / Test	Bonferroni				$\bar{X}$ ±SD	F	p
	Mean Difference	Std. Error	t	p			
Mid-test	0.88	0.03	30.56	.01*			

This suggests that the intervention strengthened observable confidence-related behaviors as evaluated by teachers.

Classmate-Rated Behavioral Observation Outcomes (BOC)

Similarly, classmate-rated BOC scores showed no meaningful baseline differences between groups.

Table 8 Compared between the experiment and control groups with the pre-test of the BOC (Classmate), by t-test independent.

Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
Initiative total	2.90±0.13	2.93±0.13	-0.10	0.04	-0.81	0.42
Communication total	2.94±0.13	2.89±0.16	-0.02	0.13	1.42	.01*
Persistence total	2.94±0.10	2.92±0.13	-0.04	0.08	0.76	0.45
Social Engagement total	2.96±0.13	2.89±0.13	0.00	0.14	2.14	0.04
Boldness total	2.92±0.14	2.87±0.13	-0.02	0.12	1.33	0.19
Acceptance of Feedback total	2.90±0.31	2.90±0.35	-0.18	0.16	-0.08	0.94

*p<.05

At pre-test, the experimental group scored significantly higher than the control group on all peer-rated behavioral domains ($p < .05$), indicating improved peer-observed social confidence behaviors.

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Table 9 Comparison between the experimental and control groups with the post-test of the BOC (Classmate), by independent t-test.

Variable	Experimental Group (n=30)	Control Group (n=30)	95% Confidence Interval of the Difference		t	p
	M ±SD	M ±SD	Lower	Upper		
Initiative total	3.97±0.15	2.99±0.13	0.91	1.05	27.63	.01*
Communication total	3.99±0.14	2.99±0.12	0.93	1.07	29.49	.01*
Persistence total	3.99±0.14	3.00±0.12	0.92	1.05	30.05	.01*
Social Engagement total	3.99±0.09	2.99±0.14	0.94	1.06	33.29	.01*
Boldness total	4.03±0.14	2.99±0.13	0.97	1.11	29.59	.01*
Acceptance of Feedback total	4.00±0.14	2.99±0.12	0.95	1.08	30.68	.01*

*p<.05

Repeated measures ANOVA further confirmed significant improvement over time within the experimental group ($p < .05$), supported by Bonferroni post hoc comparisons.

Table 10 Comparison of BOC (classmate) scores, including six items within the experimental group, using one-way ANOVA with repeated measures and Bonferroni post hoc.

Dependent variables / Test		Bonferroni				$\bar{X}$ ±SD	F	p
		Mean Difference	Std. Error	t	p			
Initiative total								
Pre-test	Mid-test	-0.90	0.06	-4.70	.01*	2.9 ± 0.13	151	.01*
	Post-test	-3.20	0.06	-18.14	.01*			
Mid-test	Pre-test	0.90	0.07	-11.27	.01*	3.2 ± 0.14		
	Post-test	-2.30	0.06	4.70	.01*			
Post-test	Pre-test	3.20	0.06	18.14	.01*	3.97 ± 0.15		
	Mid-test	2.30	0.07	11.27	.01*			
Communication total								
Pre-test	Mid-test	-0.87	0.06	-5.58	.01*	2.94 ± 0.13	137	.01*
	Post-test	-3.13	0.06	-16.83	.01*			

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Dependent variables / Test		Bonferroni				$\overline{X}$ ±SD	F	p
		Mean Difference	Std. Error	t	p			
Mid-test	Pre-test	0.87	0.06	-10.43	.01*	3.24 ± 0.14		
	Post-test	-2.26	0.06	5.58	.01*			
Post-test	Pre-test	3.13	0.06	16.83	.01*	3.99 ± 0.14		
	Mid-test	2.26	0.06	10.43	.01*			
Persistence total								
Pre-test	Mid-test	-0.87	0.05	-5.84	.01*	2.94 ± 0.10		
	Post-test	-3.14	0.06	-19.68	.01*			
Mid-test	Pre-test	0.87	0.06	-14.29	.01*	3.24 ± 0.14	231	.01*
	Post-test	-2.27	0.05	5.84	.01*			
Post-test	Pre-test	3.14	0.06	19.68	.01*	3.99 ± 0.14		
	Mid-test	0.87	0.06	14.29	.01*			
Social Engagement total								
Pre-test	Mid-test	-0.69	0.04	-7.37	.01*	2.96 ± 0.13		
	Post-test	-3.09	0.04	-23.67	.01*			
Mid-test	Pre-test	0.69	0.04	-19.53	.01*	3.20 ± 0.13	350	.01*
	Post-test	-2.40	0.04	7.37	.01*			
Post-test	Pre-test	3.09	0.04	23.67	.01*	3.99 ± 0.09		
	Mid-test	2.40	0.04	19.53	.01*			
Boldness total								
Pre-test	Mid-test	-0.96	0.06	-4.78	.01*	2.92 ± 0.14		
	Post-test	-3.32	0.06	-19.97	.01*			
Mid-test	Pre-test	0.96	0.07	-12.20	.01*	3.24 ± 0.13	173	.01*
	Post-test	-2.36	0.06	4.78	.01*			
Post-test	Pre-test	3.32	0.06	19.97	.01*	4.03 ± 0.14		
	Mid-test	2.36	0.07	12.20	.01*			
Acceptance of Feedback total								
Pre-test	Mid-test	-0.85	0.06	-4.64	.01*	2.90 ± 0.31		
	Post-test	-3.27	0.05	-19.85	.01*			
Mid-test	Pre-test	0.85	0.06	-12.28	.01*	3.2 ± 0.16	171	.01*
	Post-test	-2.42	0.06	4.64	.01*			

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Dependent variables / Test		Bonferroni				$\overline{X}$ ±SD	F	p
		Mean Difference	Std. Error	t	p			
Post-test	Pre-test	3.27	0.05	19.85	.01*	4.0 ± 0.14		
	Mid-test	2.42	0.06	12.28	.01*			

*p<.05

Results from both self-report (SDQ-II-S) and behavioral ratings (BOC) consistently indicate that participation in the structured physical activity program was associated with significant improvements in self-confidence and social-confidence–related behaviors. Improvements followed a progressive pattern from baseline to Week 4 and to Week 8 in the experimental group, whereas the control group remained relatively stable. Baseline equivalence was supported by non-significant pre-test differences in behavioral outcomes, and post-test results demonstrated clear advantages for the experimental group across outcome domains.

Discussion

The findings of this study provide clear evidence that the structured physical activity program significantly enhanced secondary school students' self-confidence across multiple domains. Improvements were observed not only in self-reported measures of self-confidence, including academic, physical, and social dimensions, but also in observable behavioral indicators such as initiative, communication, persistence, social engagement, and acceptance of feedback. The experimental group demonstrated progressive improvement from pre-test to mid-test and from mid-test to post-test, whereas the control group showed relatively stable patterns. These findings suggest that participation in the 8-week structured physical activity program played an important role in promoting adolescents' self-confidence and social participation.

The results are consistent with the theoretical perspective of self-efficacy theory, which emphasizes that individuals' beliefs in their own capabilities are strengthened through mastery experiences, social encouragement, and successful task performance (Bandura, 1997). In the present study, the intervention program incorporated activities that allowed students to experience progressive skill development and repeated success during physical activity tasks. These mastery experiences likely enhanced students' perceptions of competence, which contributed to improved self-confidence. In addition, cooperative activities and team-based sports provided opportunities for social interaction, peer support, and communication, which may have further strengthened adolescents' confidence in social contexts. Previous research has similarly reported that participation in sports activities can promote adolescents' psychological

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development by improving self-efficacy and encouraging positive social interaction (Son et al., 2021).

Another important finding of this study is the progressive improvement in self-confidence observed across the intervention period. The repeated measures indicated that improvements occurred gradually from baseline to Week 4 and continued to increase by Week 8. This pattern supports the view that confidence development is a cumulative process that emerges through sustained engagement in meaningful activities rather than through short-term experiences. Similar findings have been reported in recent studies suggesting that continuous participation in structured physical activity programs contributes to the gradual strengthening of adolescents' psychological competence and self-belief (Kokandakar et al., 2024; Laurier et al., 2024). The structured design of the program, which included progressive skill challenges and cooperative tasks, may have created an environment in which students were able to build confidence through repeated participation and positive feedback.

The behavioral observation results further strengthen the conclusions of this study. In addition to improvements in self-reported self-confidence, both teacher-rated and peer-rated behavioral observations showed significant increases in initiative, communication, persistence, and social engagement among students in the experimental group. These behavioral outcomes suggest that the intervention influenced not only students' perceptions of themselves but also their observable behaviors in social and learning contexts. This finding aligns with previous research indicating that physical activity can improve adolescents' psychological resilience and emotional regulation by strengthening self-efficacy and reducing stress-related psychological difficulties (Peng et al., 2025; Zhang et al., 2024). Participation in structured physical activity may therefore contribute to broader psychosocial development by promoting positive behavioral patterns and increasing adolescents' willingness to engage in social and academic activities.

From an educational perspective, the findings highlight the importance of integrating structured physical activity programs into school environments. Schools provide an ideal context for implementing interventions that combine physical development with psychological and social learning opportunities. Programs that include both individual skill mastery and cooperative team activities may be particularly effective in promoting adolescents' self-confidence, as they simultaneously support personal competence development and social interaction. In urban educational environments characterized by high academic pressure, such programs may also help students maintain psychological balance and improve overall well-being.

Based on these findings, several practical implications can be suggested. First, educators and school administrators should consider incorporating structured physical activity programs as part of regular school curricula to support adolescents' psychological development. Second,

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physical education teachers should design activities that combine individual skill development with cooperative tasks to promote both competence and social interaction. Third, policymakers and educational institutions should recognize the role of physical activity not only in improving physical health but also in enhancing adolescents' psychological well-being and social competence.

In conclusion, the present study demonstrates that an eight-week structured physical activity program can significantly enhance adolescents' self-confidence and observable confidence-related behaviors. By integrating individual skill mastery and cooperative team activities, the program created opportunities for mastery experiences, peer support, and positive social interaction. These findings provide empirical support for the use of structured physical activity as an effective strategy for promoting psychological development among secondary school students and highlight the value of incorporating such programs into school-based educational practices.

Recommendations

Practical Recommendations for Educators and Schools

Based on the findings of this study, several practical recommendations can be proposed for educators, school administrators, and policymakers.

First, schools should consider implementing structured physical activity programs that incorporate multiple types of activities, including team sports, skill-based exercises, and cooperative movement tasks. Such multi-activity programs can provide students with opportunities to develop physical competence, social interaction skills, and confidence through diverse and engaging experiences.

Second, physical education teachers should receive professional development training in psychologically informed coaching strategies. By integrating principles from sport psychology—such as positive feedback, mastery-oriented learning environments, and supportive peer interaction—teachers can more effectively promote students' self-confidence and motivation during physical activity sessions.

Third, schools are encouraged to adopt multi-method assessment approaches when evaluating students' psychological development. Combining self-report questionnaires with behavioral observations from teachers and peers can provide a more comprehensive understanding of students' self-confidence and social engagement during physical activity programs.

Recommendations for Future Research

Several directions for future research are suggested.

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First, longitudinal and follow-up studies should be conducted to examine the long-term effects of structured physical activity programs on adolescents' self-confidence and psychological well-being. Such studies would help determine whether the improvements observed in this study are sustained over time.

Second, future research should explore the differential effects and underlying mechanisms through which physical activity influences adolescents' psychological development. Investigating factors such as gender, skill level, motivation, and social support may provide deeper insights into how physical activity programs affect self-confidence.

Finally, researchers should expand the diversity of samples and cultural contexts in future studies. Conducting research in different regions, school types, and socio-cultural environments would enhance the generalizability of findings and contribute to a broader understanding of how physical activity programs can support adolescent development across diverse educational settings.

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