Original Article

A Comparison of Two Physical Activity Education Programs for Eighth-Grade Students: Effects on Awareness, Performance, and Self-Efficacy

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Abstract

Background: Physical activity is a key determinant of adolescent health. However, many female adolescents do not meet the recommended levels of activity. Although educational interventions have been implemented to address this issue, the role of maternal involvement in such programs has not been thoroughly examined. This study aims to bridge this gap by comparing the effects of two physical activity education programs on eighth-grade students' awareness, performance, and self-efficacy. **Materials and Methods:** This semi-experimental study was conducted in 2020 on eighth-grade female students in Khomein, Iran. Six schools were randomly selected, and participants were randomly assigned to three groups: student, student-and-mother, and control. A total of 165 participants were included, with 55 individuals in each group. Data were collected using three questionnaires assessing physical activity awareness, self-efficacy, and performance. Data analysis was conducted using SPSS version 25. Statistics analysis, including one-way ANOVA, Kruskal-Wallis test, paired *t*-test, and Wilcoxon test were used to compare the groups. $p < 0.05$ was considered statistically significant. **Results:** There were no statistically significant differences in demographic characteristics among the three groups. The changes in knowledge scores within the student and student-and-mother groups were not statistically significant ($p = 0.288$); however, both groups demonstrated significantly higher scores compared to the control group ($p < 0.001$). Regarding performance scores, the student-and-mother group showed a statistically significant improvement over the student group ($p < 0.039$), and both groups outperformed the control group significantly ($p < 0.001$). The difference in self-efficacy score in the student-and-mother group was more than that in the student group and was statistically significant, and was higher in both groups than in the control group ($p < 0.001$). **Conclusions:** This study highlights the effectiveness of educational interventions in improving students' awareness, performance, and self-efficacy, with maternal involvement serving as a key factor in enhancing these outcomes.

Keywords: *Adolescents, exercise, health education, knowledge, performance, self-efficacy*

Introduction

Physical activity refers to any bodily movement that is associated with increased muscle work and the burning of calories. Regular physical activity is one of the most important factors in maintaining and improving the physical, mental, and social health of individuals.[1] Regular exercise is associated with a decreased incidence of cardiovascular disease, diabetes, hypertension, colon and breast cancer, depression, and osteoporosis.[1,2]

The alarming rise in sedentary lifestyles among adolescent girls poses a significant threat to public health. Research consistently demonstrates that a substantial portion of teenage girls fail to meet the recommended physical activity guidelines in Iran.[3-5] Given the pivotal role of adolescence in shaping lifelong health habits, it is imperative to explore effective interventions to counteract this concerning trend.[6]

Children with higher levels of social support, especially from family, are more likely to have adequate levels of physical activity.[7] Families are a factor encouraging adolescents' adherence to physical activity and can influence even the amount, type of physical activity, and the balance between physical activity and sedentary habits.[8,9] Evidence shows that strategies for promoting physical activity among adolescents should be focused on

How to cite this article: Ashtarian H, Bagheri P, Jalilian F, Almasi A. A comparison of two physical activity education programs for eighth-grade students: Effects on awareness, performance, and self-efficacy. Iran J Nurs Midwifery Res 2025;30:600-5.

Submitted: 18-Dec-2024. **Revised:** 27-Apr-2025. **Accepted:** 28-Apr-2025. **Published:** 24-Jul-2025.

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Access this article online

Website: https://journals.lww.com/jnmr

DOI: 10.4103/ijnmr.ijnmr_434_24

Quick Response Code:

increasing parental participation, improving levels of family cohesion and parent-child communication, and increasing self-esteem.[10-12]

The family environment, particularly the influence of mothers, plays a pivotal role in children's health behaviors. Emerging evidence suggests that maternal involvement can be a potent catalyst for promoting physical activity in adolescent girls. By modeling healthy behaviors, providing unwavering support, and creating opportunities for physical engagement, mothers can exert an impact on their daughters' adoption of active lifestyles.[11]

While the influence of parents on children's health is well-established,[13-15] a notable gap exists in the research examining the specific impact of mothers' involvement in educational programs designed to enhance physical activity among adolescent girls. Such programs may offer a promising avenue for empowering mothers with the knowledge, skills, and resources necessary to foster their daughters' engagement in exercise. This study aims to bridge this gap by comparing the effects of two physical activity education programs on eighth-grade students' awareness, performance, and self-efficacy.

Materials and Methods

This semi-experimental study was conducted on female eighth-grade middle school students in the city of Khomein, Iran, during the period from September to October 2020. The target population of the research comprised female students enrolled in the eighth grade at public middle schools within the city. Initially, six public schools were randomly selected from the pool of eligible institutions. From these, four schools were assigned as experimental groups, while the remaining two schools were designated as control groups. The inclusion criteria for participation in the study were as follows: (1) being a female student in the eighth grade, (2) having no medical history of conditions that would impede regular physical activity, and (3) expressing a willingness to participate in the research. The exclusion criteria included: (1) failure to complete the required questionnaire, (2) the onset of any illness during the study period, (3) absence from more than two training sessions, or (4) relocation to a different city or school.

The sample size was determined based on previous studies, including Taymoori's research[16] on physical activity among high school girls and Ghotbi's study on family empowerment.[17] With a 95% confidence level, an 80% test power to detect differences, and the mean standard deviation of changes in physical activity levels, the required sample size was calculated using PASS software. Accordingly, 55 students were allocated to each of the three groups, resulting in a total sample size of 165 participants.

A researcher-developed questionnaire comprising 15 four-choice questions was utilized to measure physical activity awareness. Content validity was assessed using the Content Validity Ratio (CVR) and Content Validity Index (CVI). The questionnaire was reviewed by 10 experts in health education and physical education, and questions with CVR exceeding 0.62 were retained. Reliability was tested using the test-retest method on 25 students who were not participants in the main study. The results showed a relative repeatability rate of 0.83 and an absolute repeatability rate of less than 10%, demonstrating the questionnaire's good reliability.[18]

The short version of the International Physical Activity Questionnaire IPAQ), comprising seven questions regarding physical activity during the last 7 days, was utilized. The physical activities were classified into three intensity categories: vigorous, moderate, and light. These categories were determined based on the sum of each activity over a 7-day period. Activities with a sum exceeding 3000 units were classified as vigorous, those ranging from 600 to 3000 units were classified as moderate, and those below 600 units were classified as light. The units are based on the metabolic equivalent values assigned to different activities in the IPAQ, multiplied by the duration and frequency of the activities. The validity and reliability of this tool were confirmed by another study.[19]

The Physical Activity Self-Efficacy Questionnaire, originally developed by Pekmezi *et al*.,[20] was utilized in this study. The questionnaire underwent a rigorous translation and back-translation process to ensure accuracy. It was then reviewed by 10 experts in the fields of health education and physical education to assess its content validity. Items with CVR above 0.62 were retained for the final version. Reliability analysis demonstrated a Cronbach's alpha of 0.836 across all three groups, indicating excellent internal consistency. Five questions in this questionnaire were, "I am confident that I can exercise, when: I am tired, I am in bad mood, I feel I don't have time, I am on vacation, the weather is rainy or snowy."

The educational content for this study was designed following a preliminary assessment of the learning needs of students, drawing on established scientific resources. To ensure the validity and relevance of the content, consultations were conducted with five experts in the fields of educational sciences and health education. The intervention program was structured to address multiple objectives, including cognitive, behavioral, and self-efficacy outcomes. Based on these objectives, a comprehensive plan was formulated, consisting of four educational sessions for students and one session for mothers, each session lasting 45–60 minutes. An outline of behavioral objectives is presented in Table 1.

The intervention was implemented uniformly across two groups: one with maternal participation and one without. The only distinction between the groups was the inclusion of a 1-day workshop for mothers in the maternal participation

Table 1: An outline of behavioral objectives and topics of all sessions

	Session 1	Session 2	Session 3	Session 4	Session for mothers
Behavioral objectives	1. Define physical activity. 2. List types of physical activities. 3. State three reasons for its importance. 4. Describe a personal experience of a friend who does not engage in physical activity. 5. Explain the recommended amount and type of activity for adolescents. 6. Describe physical activity.	1. Explain cardiorespiratory endurance using a pamphlet. 2. Describe the importance of cardiorespiratory endurance using a pamphlet. 3. List three benefits of cardiorespiratory endurance. 4. Perform two aerobic exercises. 5. Demonstrate enthusiasm for physical activity. 6. Choose four aerobic exercises from a list of ten. 7. Calculate heart rate intensity. 8. Identify exercises suitable for preventing osteoporosis.	1. Explain flexibility using a pamphlet. 2. Describe the importance of flexibility. 3. List three benefits of flexibility. 4. Share an example of joint stiffness in a close relative and its associated healthcare costs. 5. Explain the difference between static and dynamic stretching. 6. Demonstrate two static and two dynamic stretching exercises with 10 repetitions each. 7. Demonstrate five flexibility exercises within 5 minutes using a pamphlet.	1. Explain muscular strength and endurance using a pamphlet. 2. List four benefits of muscular strength and endurance. 3. Demonstrate at least one isometric and one isotonic exercise practically. 4. Compare isometric and isotonic exercises. 5. State the recommended amount of strength training per week. 6. Specify the required number of repetitions for practical exercises.	1. Explain the importance of physical activity for adolescents. 2. Describe the recommended amount and type of physical activity for adolescents. 3. Discuss the role of mothers in promoting physical activity among their children. 4. Explain how to encourage children to be active even in apartments or cold weather.
Topics	General principles of physical activity	Physical activity and cardiorespiratory endurance	Static and dynamic stretching	Muscular strength training	Role of mothers in promoting physical activity of children.
Time (min)	60	60	55	50	45
Methods	Lecture, group discussion	Lecture, group discussion, film	Lecture, group discussion, poster, pamphlet, role modeling, song	Lecture, group discussion, poster, pamphlet, role modeling, song	Lecture, group discussion, poster, pamphlet

group. The instructional methods employed in the program were diverse and interactive, incorporating lectures, group discussions, instrumental exercise music, posters demonstrating proper exercise techniques, and the distribution of educational pamphlets. The primary delivery of the educational content was managed by the second researcher, while certified physical education instructors demonstrated correct exercise movements and facilitated practice sessions, encouraging participants to replicate the exercises.

Following data collection, the data were entered into SPSS statistical software version 25. Frequency and percentage were employed to characterize qualitative data, while mean and standard deviation were used to describe quantitative data. In the analytical statistics section, one-way analysis of variance (or Kruskal-Wallis test) was used to compare quantitative variables between groups, and analysis of covariance was applied to compare quantitative or ranking variables before and after the intervention. The *t*-test or Wilcoxon test was for paired comparisons. In all statistical tests, a *P* value of less than 0.05 was deemed statistically significant.

Ethical considerations

In this study, approval (ethic code: IR.KUMS.REC.1398.467) was obtained from the ethics committee of Kermanshah University of Medical Sciences. The purpose of the study was explained in the questionnaire, and all the rights of the participants were observed during and after the research.

Results

The average age of students in groups first (only students), second (students and mothers), and control was 13.92, 14.01, and 13.92, respectively [Table 2]. The literacy of students' fathers (80%) and mothers (94%) was at the level of diploma or below. The three groups did not differ significantly with respect to education level ($p = 0.981$), age ($p = 0.564$), family size ($p = 0.588$), mother's occupation ($p = 0.770$), father's literacy ($p = 0.628$), and family income level ($p = 0.985$) based on Fisher's exact test [Tables 3 and 4].

The knowledge score changes in the first and second groups were statistically insignificant ($p = 0.288$), but were higher in both groups than in the control group ($p < 0.001$). The difference in performance score in the second group was more than that in the first group and was statistically significant ($p < 0.039$), and was higher in both groups than in the control group ($p < 0.001$). The difference in self-efficacy score in the second group was more than that in the first group and was statistically significant, and was higher in both groups than in the control group ($p < 0.001$) [Table 5].

Discussion

The findings of this study demonstrate that the implementation of an educational intervention significantly enhanced awareness, performance, and self-efficacy among students, both with and without the presence of their mothers, compared to the control group. Notably, while the increase in awareness within both intervention groups did not reach statistical significance, the improvements in scores of performance and self-efficacy among students whose mothers participated were statistically significant relative to the group consisting solely of students. This suggests that maternal involvement may play a critical role in amplifying the effectiveness of educational interventions.

The fact that both intervention groups showed improved awareness compared to the control group suggests that the educational intervention was effective in enhancing students' knowledge and understanding of the subject matter. For instance, Simbar *et al*. (2017)[21] demonstrated that skill-based training had a more significant impact on knowledge and physical activity behavior among girls compared to lecture-based methods. It is possible that the essence of the instructional design, which incorporated multiple pedagogical approaches and emphasized the practical application of exercises, contributed to its effectiveness. This highlights the importance of intervention design in influencing outcomes. However, the lack of a statistically significant difference in awareness between the two intervention groups indicates that maternal involvement may not have played a decisive role in this particular outcome.

Table 2: Distribution of descriptive statistics of age and number of family members

Groups		Age	Number of family members
Only students	Mean (SD)	13.92 (0.54)	4.20 (0.65)
	Min (Max)	13 (15)	3 (6)
Students and mothers	Mean (SD)	14.01 (0.53)	4.18 (0.79)
	Min (Max)	13 (15)	3 (6)
Control	Mean (SD)	13.92 (0.47)	4.27 (0.71)
	Min (Max)	13 (15)	2 (6)
Total	Mean (SD)	13.95 (0.5)	4.21 (0.68)
	Min (Max)	13 (15)	2 (6)
Significance		p=0.564	p=0.588

Table 3: Frequency of mothers' education levels in the three study groups

Groups		Mothers' education level				
		Illiterate	Under diploma	Diploma	Graduate	Total
Only students	*n* (%)	1 (1.80)	23 (41.80)	29 (52.70)	2 (3.60)	55 (100)
Students and mothers	*n* (%)	1 (1.80)	22 (0.40)	30 (54.50)	2 (3.60)	55 (100)
Control	*n* (%)	1 (1.80)	27 (49.10)	25 (45.50)	2 (3.60)	55 (100)
Fisher's exact test				p=0.981		

Table 4: Frequency of fathers' education levels in the three study groups

Groups		Fathers' education level				
		Illiterate	Under diploma	Diploma	Graduate	Total
Only students	*n* (%)	1 (1.80)	21 (38.20)	28 (50.90)	5 (9.10)	55 (100)
Students and mothers	*n* (%)	1 (1.80)	20 (36.40)	26 (47.30)	8 (14.50)	55 (100)
Control	*n* (%)	3 (5.50)	26 (47.30)	20 (36.40)	6 (10.90)	55 (100)
Fisher's exact test				p=0.628		

Table 5: Descriptive statistics of variables of knowledge, performance and self-efficacy before and after the intervention in all three groups

Groups		Performance		Self-efficacy		Awareness	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Only students	Mean (SD)	1.42 (0.60)	1.89 (0.78)	11.16 (3.15)	14.38 (2.40)	49.5 (1.27)	12.92 (0.65)
	Minimum score	1	1	6	10	3	12
	Maximum score	3	3	18	18	9	14
Students and mothers	Mean (SD)	1.42 (0.57)	2.19 (0.65)	10.73 (2.92)	18.17 (2.81)	5.31 (1.86)	13.15 (0.56)
	Minimum score	1	1	5	11	0	12
	Maximum score	3	3	18	23	10	14
Control	Mean (SD)	1.36 (0.56)	1.34 (0.59)	11.22 (2.67)	10.42 (3.02)	5.13 (1.66)	5.74 (1.53)
	Minimum score	1	1	6	6	1	3
	Maximum score	3	3	18	19	8	12

Several factors may explain why the two intervention groups did not differ significantly in terms of awareness. First, the intervention itself may have been the primary driver of increased awareness, with maternal involvement playing a secondary or supplementary role.[22] Second, the measurement of awareness in this study may not have captured the nuanced ways in which maternal involvement influences learning. For instance, while both groups may have acquired similar levels of factual knowledge, the group with maternal involvement might have developed a deeper understanding or better retention of the material, which was not reflected in the assessment tools used. This highlights the need for more comprehensive and multidimensional measures of awareness in future research. Third, the cultural context of the study may have influenced the results. In Iran, where education is highly valued and mothers often play an active role in their children's academic lives, the baseline level of awareness among students may already be relatively high. As a result, the additional impact of maternal involvement on awareness may have been marginal. This interpretation is consistent with the findings of Rezaei-Dehaghani *et al*. (2018),[23] who noted that the strong emphasis on education in Iranian families often leads to high levels of academic engagement among students, regardless of the degree of parental involvement.

The results showed that self-efficacy increased in both the student group and the student-with-mother group compared to the control group, and this increase was even greater in the student-with-mother group. These findings can be explained by the fact that family support, particularly from the mother, significantly enhances students' confidence in their abilities and improves their academic performance. Additionally, this improvement may be attributed to the positive interactions between students and their mothers, which contribute to boosting intrinsic motivation and commitment to learning. Mothers may actively contribute to the learning process by reinforcing concepts, providing encouragement, and creating a supportive home environment that complements formal education.

Bandura (1997)[24] emphasizes that mastery experiences are the most influential source of self-efficacy. When students engage in regular physical activity, they gain firsthand experience of overcoming challenges, improving skills, and achieving goals. These successes strengthen their belief in their ability to perform physical tasks. A study by Lubans *et al*. (2016)[25] supports this, showing that students who participated in structured physical activity programs reported higher levels of physical activity self-efficacy due to repeated practice and skill development.

Evidence shows that as individuals transition from adolescence to adulthood, the level of physical activity tends to decrease, and the design of educational programs is essential.[26] Raising awareness about the benefits of physical activity helps students understand its importance for their physical, mental, and academic well-being. This knowledge acts as a motivational factor, encouraging them to engage in physical activities. According to a study by Ghaffari *et al*. (2024)[27] conducted in Iran, educational interventions that increase awareness about the benefits of physical activity significantly improve females' attitudes and self-efficacy toward exercise. Studies also show that increasing parents' awareness about children's physical activity, particularly regarding its benefits, is an important first step for a parent-centered intervention in this context.[28] Awareness programs can also help students identify and overcome barriers to physical activity, such as lack of time, resources, or confidence. By addressing these barriers, students feel more empowered to engage in physical activities.

While the results are promising, several limitations must be acknowledged. First, the study did not explore the specific mechanisms through which maternal involvement contributed to the observed improvements. Future research could employ qualitative methods to gain deeper insights into the ways mothers support their children's learning. Second, the study focused solely on maternal involvement, overlooking the potential contributions of other family members, such as fathers or siblings. Expanding the scope of family involvement in future studies could provide a more comprehensive understanding of its impact. Longitudinal studies with larger and more diverse samples are needed to validate these results and explore the long-term effects of maternal involvement on academic outcomes.

Conclusion

In conclusion, this study highlights the effectiveness of educational interventions in improving students' performance and self-efficacy, with maternal involvement serving as a key factor in enhancing these outcomes. However, a critical approach to these results reveals the need for further exploration of the underlying mechanisms and contextual factors influencing these outcomes. By integrating family-centered strategies into educational interventions, policymakers and educators can create more effective and inclusive learning environments that empower students to achieve their full potential.

Acknowledgments

This study was conducted at Kermanshah University of Medical Sciences. We would like to extend our sincere gratitude to all the students and mothers who participated in this study. Their cooperation and contributions were invaluable to the successful completion of this research.

Financial support and sponsorship

Kermanshah University of Medical Sciences

Conflicts of interest

Nothing to declare.

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