

## Effects of an Intervention in the Physical Education Class on Physical Activity and Well-Being of Primary School Students

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### Abstract

#### Background

An importance issue for pediatric health is to understand how to enhance the level of physical activity of children and adolescents. The purpose of the present study was to investigate the effects of a physical education-based intervention on promoting physical activity and well-being of primary school's students.

**Materials and Methods:** The present causal-comparative field study was conducted on 300 primary school girls (mean age: 10.72±0.73 years) of Urmia city, West Azerbaijan province, Iran, in 2019. The participants were randomly allocated into two groups including intervention (n=150), and control groups (n=150). Participants of intervention group were exposed to a six months' intervention and 2 sessions per week based on social cognitive and social-ecological theories within the physical education classes, while those in control group followed their regular school tasks. Physical activity behavior and physical and psychological well-being were measured as dependent variables. Data were analyzed using SPSS software (version 16.0).

#### Results:

Age of participants in intervention and control group was not significantly different. Results of pretest showed that the participants of both group had similar physical activity behavior and well-being at baseline. However, the participants in the intervention group reported higher physical activity level ( $F = 17.11, P < 0.001$ ) and physical ( $F = 30.76, P < 0.001$ ), and psychological ( $F = 36.03, P < 0.001$ ) well-being in comparison to those in control group in the posttest.

#### Conclusion

These results highlight the importance of developing physical education-based interventions for improving physical activity level and well-being of primary school-aged children.

**Key Words:** Children, Physical activity, Well-being, Intervention, Primary school.

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## 1- INTRODUCTION

Health benefits of regular physical activity in children and adolescents are well documented (1-2). Moreover, research has shown that regular physical activity at school age tends to track into the latter stages in lifespan (3-4). However, most of children and adolescents have a sedentary lifestyle, particularly in girls, and do not meet World Health Organization (WHO) guidelines of 60 minutes of moderate-to-vigorous physical activity per day (5-6). These facts increase the need to promote physical activity at an early age, particularly in children who have a sedentary lifestyle. Because school provides access to almost all children over extended periods, it can be considered as a potential environment for increasing physical activity of children.

Furthermore, within the school setting, physical education classes provide a unique environment that can provide multiple opportunities for children to be physically active inside and outside school, because it is compulsory for school-aged children and allow them to explore and perform activities that allow them to remain physically active. Although the impact of many socio-psychological variables within the physical education classes on promoting the physical activity level of students have been investigated (7, 8), the effects of school-based interventions within the physical education classes on promoting physical activity of children have been rarely investigated. A number of studies have been designed and implemented to investigate the effects of school-based interventions on increasing physical activity levels of children and adolescents. Most of these studies, which mostly focused on adolescents, are theoretically based on tenets of the Self-Determination Theory (9-10) which aimed to enhance teachers' need supportiveness behaviors, students' basic need satisfaction, motivation and their physical

activity behaviors (11-14). In these studies, physical education teachers were trained to change their teaching style in the physical education classes, and teach in need supportive ways. For instance, Cheon and colleagues (15) trained physical education teachers to teach in an autonomy supportive way by giving choices to students within the physical education classes. Their results revealed that teaching in an autonomy supportive way led to higher motivation and intention to physical activity of middle school and high school students. However, review and meta-analysis studies demonstrated that, although intervention studies enhanced psychological components of physical activity in school-aged students, however, most of them seem to show small or non-significant effects on increasing actual physical activity levels of students (16-18).

Some authors discussed that lack of positive effects of interventions based on self-determination theory might be because of the lack of theoretical behavior change frameworks in the design of school-based interventions (12). Therefore, other research attempted to apply school based interventions based on theories such as social-cognitive (19) and social-ecological (20) theories which emphasize on the role of cognitive, vicarious, self-regulatory, and self-reflective processes in psychosocial functioning. For instance, Sutherland and colleagues (21) applied a school-based intervention based on socio-ecological theory to investigate its effects on physical activity behavior of secondary school students. Their results revealed that a school-based intervention based on socio-ecological theory has increased the level of physical activity of secondary school students. However, the effects of intervention based on social-cognitive and social-ecological theories on physical activity behavior of primary school students and subsequent psychological outcomes still need to be explored.

Therefore, the objective of the present study was to investigate the effects of an intervention based on social-cognitive and social-ecological theories in physical education classes on physical activity behavior and well-being of primary school students.

## **2- MATERIALS AND METHODS**

### **2-1. Study design and population**

The present study utilized a causal-comparative (pretest-posttest) approach. The participants were 300 female students aged 10 to 12 years (mean age of  $10.72 \pm 0.73$  years) in grades fourth and fifth from nine regular primary schools of Urmia city, West Azerbaijan province, Iran, in 2019 who were selected by using a simple random sampling method. The specified sample size was selected according to G\*Power statistical software with an effect size of 80%, a test power of 0.8, and a significant level of 0.05 (22). Via a simple random coin-throwing method, students were randomly and equally assigned into intervention and control groups (each group included 150 students).

### **2-2. Methods**

During the experiment, all participants completed the pretest related to the research variables. Next, the intervention groups trained for six months and 2 sessions per week under the supervision of their physical education teachers within the physical education class. The intervention was designed as a multicomponent school-based programme guide by social cognitive and social-ecological theories. The strategies implemented in the intervention addressed the domains of the WHO's Health Promoting Schools framework targeting the curriculum, school environment and community. The intervention comprised seven physical activity strategies to be implemented in a staged fashion over the

intervention period (21). The strategies were: 'Formal Curriculum' - (1) teaching strategies to maximise activity in the physical education classes, including pedometer-based lessons, (2) development of individual student physical activity plans, (3) enhanced school sport for all students (4) school physical activity policies, (5) offering physical activity in school breaks; 'Partnerships and Services' - (6) linking schools to community physical activity providers, (7) parent engagement (21). The students in the control group did perform their regular activities during the physical education classes. One week after the end of intervention, all participants took the posttest and their scores were recorded for statistical analysis.

### **2-3. Measuring tools**

The dependent variables in the present study were included leisure-time physical activity and well-being. Leisure-time physical activity was assessed using the Physical Activity Behavior in Leisure-Time Scale (23), including three questions scored based on an eight-point Likert scale from zero days (0) to seven days (7). Validity and reliability of this questionnaire was confirmed by previous research (23). In the current study, eleven experts corroborated the validity of this questionnaire and its reliability was assessed where the Cronbach's alpha coefficient was 0.90. Furthermore, physical and psychological well-being were measured using the 7-day recall Kidscreen-27 questionnaire (24). Kidscreen-27 has demonstrated excellent psychometric properties with children aged 8-18 and has received good reliability and validity in previous research (24). Physical well-being was measured by using 5 items which explore the children's perceptions of their physical activity, health and vitality. It includes items that refer to the children's energy and their ability to physically function. Furthermore,

psychological well-being was measured by using 7 items which explores the children's experiences of positive and negative affect. Items are worded to reflect the children's mood, enjoyment and experiences of happiness and loneliness (24). Items are rated on a 5-point Likert scale ranging from 1 = never, 2 = seldom, 3 = quite often, 4 = very often and 5 = always which reflecting the frequency of behaviors or feelings; or 1 = not at all, 2 = slightly, 3 = moderately, 4 = very, 5 = extremely which reflecting the intensity of a belief or attitude in the previous week (24). In the current study, eleven experts corroborated the validity of this questionnaire its reliability was assessed where the Cronbach's alpha coefficient was 0.87.

#### 2-4. Inclusion and exclusion criteria

Inclusion criteria included studying in Urmia primary schools and consent to participate in the study.

#### 2-5. Ethical approval

Ethics Committee of Department of Physical Education of Urmia University approved this study (Code: 25127). The

participants voluntarily participated in the present study and written informed consent was obtained from the subjects and their parents.

#### 2-6. Data analysis

In the current study, descriptive statistics consisted of means and standard deviations were used to describe the research variables. Independent t test was used to compare the means of the groups in the pretest. To compare the pretest and posttest scores, we utilized a 2 (GROUP: including intervention and control)  $\times$  2 (TIME: including pretest and posttest) ANOVA. Data were Analyzed using SPSS software (version 16.0). Significance level was set at  $P < 0.05$ .

### 3-RESULTS

#### 3-1. Pretest

The results of *t*- test indicated no significant difference between the groups in the pretest regarding both physical activity level and well-being (**Table. 1**). Therefore, all study groups had similar conditions prior to intervention.

**Table-1:** Comparing the mean scores of groups in the pretest.

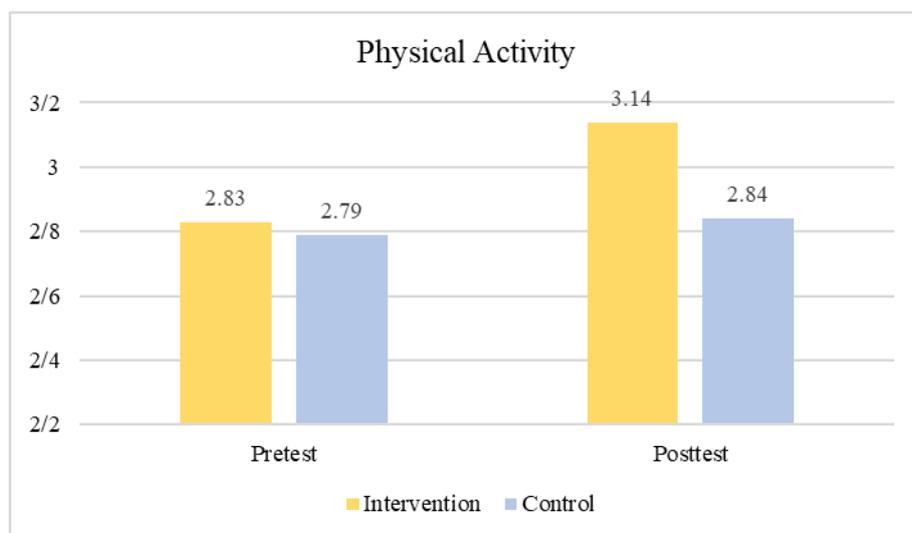
Variables	Pretest		Statistics
	Intervention Mean $\pm$ SD	Control Mean $\pm$ SD	
Physical activity	2.83 $\pm$ 0.41	2.79 $\pm$ 0.34	t=0.917 P=0.298
Physical well-being	2.60 $\pm$ 0.71	2.66 $\pm$ 0.61	t=0.173 P=0.842
Psychological well-being	31.93 $\pm$ 5.41	32.73 $\pm$ 5.33	t=0.156 P=0.856

#### 3-2. Comparison of pretest and posttest

##### 3-2-1. Physical activity

Results of ANOVA indicated significant main effect of physical activity for GROUP ( $F = 17.11$ ,  $P < 0.001$ ,  $\eta^2 = 0.05$ ), TIME ( $F = 65.98$ ,  $P < 0.001$ ,  $\eta^2 = 0.18$ ) and the interaction between GROUP $\times$ TIME ( $F = 31.12$ ,  $P < 0.001$ ,  $\eta^2 =$

0.09). According to the means of the groups (**Figure. 1**), it was observed that the score of intervention group were improved in the posttest. The results showed that the intervention group had significantly higher scores compared with the control group in the physical activity level indicating that intervention improved the level of physical activity of children.

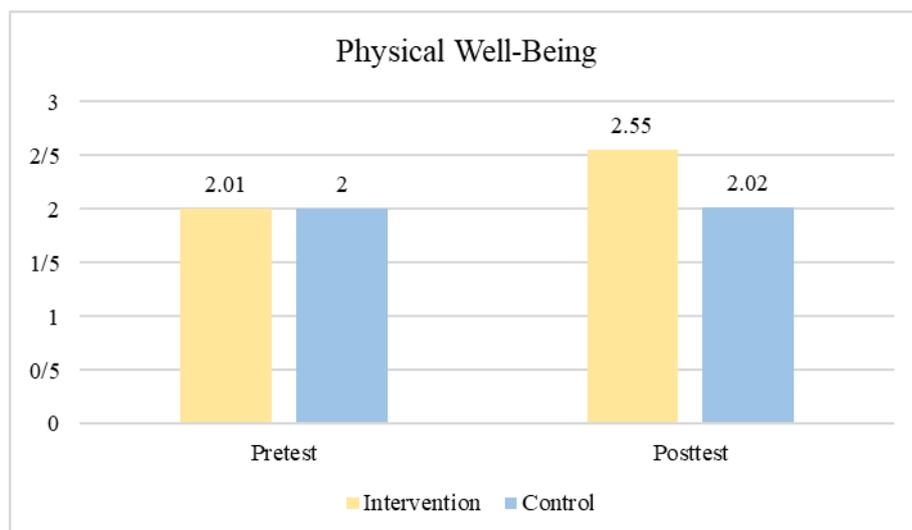


**Fig.1:** Means of physical activity scores of the groups during the pretest and posttest.

### 3-2-2. Physical well-being

Results of ANOVA indicated significant main effect of physical activity on GROUP ( $F = 30.76$ ,  $P < 0.001$ ,  $\eta^2 = 0.09$ ), TIME ( $F = 204.30$ ,  $P < 0.001$ ,  $\eta^2 = 0.40$ ) and the interaction between GROUP×TIME ( $F = 141.87$ ,  $P < 0.001$ ,  $\eta^2 = 0.32$ ). According to the means of the groups (**Figure. 2**), it

was observed that the score of intervention group were improved in the posttest. The results showed that the intervention group had significantly higher scores compared with the control group in the physical well-being status indicating that intervention improved the level of physical well-being status of children.

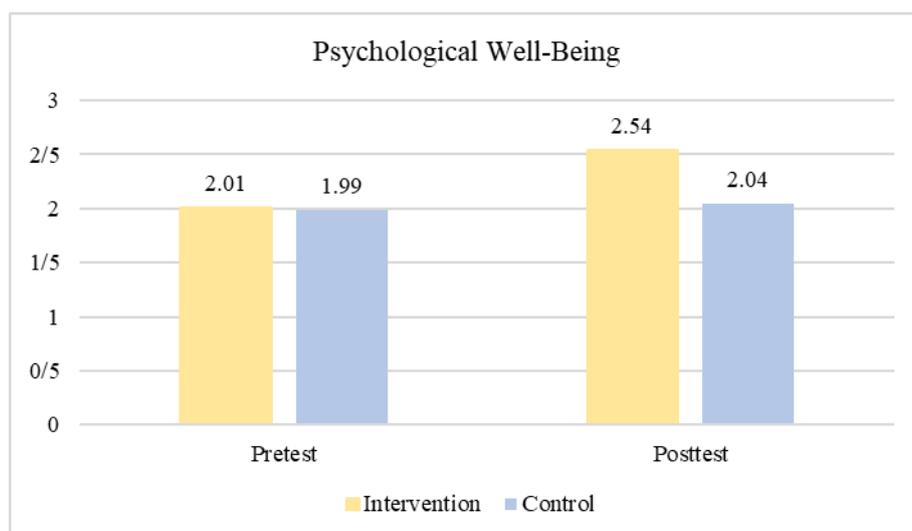


**Fig.2:** Means of physical well-being scores of the groups during the pretest and posttest.

### 3-2-3. Psychological well-being

Results of ANOVA indicated significant main effect of physical activity on GROUP ( $F = 36.03$ ,  $P < 0.001$ ,  $\eta^2 = 0.63$ ), TIME ( $F = 212.40$ ,  $P < 0.001$ ,  $\eta^2 = 0.83$ ) and the interaction between GROUP×TIME ( $F = 33.64$ ,  $P < 0.001$ ,  $\eta^2 = 0.61$ ). According to the means of the groups (**Figure. 3**), it was observed that the score of intervention

group were improved in the posttest. The results showed that the intervention group had significantly higher scores compared with the control group in the psychological well-being status indicating that intervention improved the level of psychological well-being status of children.



**Fig.3:** Means of psychological well-being scores of the groups during the pretest and posttest.

## 4- DISCUSSION

School-based interventions are important in promoting participation of children and adolescents in physical activity as well as its subsequent health outcomes. Therefore, the present study attempted to investigate the effects of an intervention in the physical education classes on promoting physical activity and well-being of primary school-aged children. This research was based on the theoretical foundations of social cognitive and social-ecological theories (19-20) which emphasize on the role of cognitive, vicarious, self-regulatory, and self-reflective processes in psychosocial functioning. In the present study, it was assumed that the students in the intervention group will report higher

physical activity level and well-being compared with control group in the posttest. Regarding physical activity, the results revealed no significant difference between the groups in the pretest, indicating the same baseline conditions for all participants. However, the comparison of pretest and posttest showed that participants of the intervention group reported significantly higher scores of physical activity level compared with control group. These results might indicate that exposure of primary school students to a school-based intervention increased their physical activity level which is consistent with the assumptions of social cognitive and social-ecological theories (19-20). These results confirm the first part of the hypothesis in this study and are consistent with the results of previous research (21).

Our findings indicate that the creating a sense of self-regulatory and self-reflection in the physical education classes of primary schools might have led to an increase in their participation in physical activity and exercise. In other words, reducing external controlling created by the physical education teacher during class induced greater physical activity and exercise participation. We suggest that the change in physical activity level from pretest to posttest in children is meaningful from a health perspective and may lead to healthy outcomes such as reducing chronic disease and obesity in later periods of life. This result can be very useful for physical educators and families as they can increase the participation of their students in physical activity through a school-based intervention in physical education classes, which are based on cognitive, vicarious, self-regulatory, and self-reflective processes. Concerning the well-being, the results showed that the study groups did not significantly differ in the pretest.

However, participation in an intervention in the physical education classes, which were based on the social cognitive and social-ecological approach, resulted in higher scores of both physical and psychological well-being in the intervention group compared with the control group. These results are consistent with previous research (24) and confirm the second part of the research hypothesis. Our findings further indicated that giving the students the sense of self-regulatory could significantly increase their both physical and psychological well-being compared to traditional and regular teaching methods in the physical education classes. Among limitations of the present study, due to the fact that we used only girls in this study, results should be interpreted with caution when one wants to generalize them to boys. We did not measure social-economic status of the students, so further research with

emphasize on socio-economic status of students are needed to present a more comprehensive view of the effects of school-based intervention on physical activity behavior and well-being of children and adolescents. However, among the strengths of the present study, it should be noted that this study used a multicomponent intervention based on the social cognitive and social-ecological theories which was rarely used by previous research. So, the results of this study can be added to the small body of research investigating interventions based on the social cognitive and social-ecological theories rather motivational theories such as self-determination theory on promoting physical activity behavior and well-being of school-aged children.

## **5- CONCLUSION**

To conclude, the present study showed that compared with traditional and regular teaching methods, a school-based intervention in the physical education classes based on the social cognitive and social-ecological theories was more capable to increase physical activity level and well-being of primary school students. These results may indicate that the feeling of self-regulatory during the physical education classes encompass positive effect on both participations in physical activity and well-being which are both related to health of school students. Our findings can have many practical implications for physical educators and parents. Based on the results of the present study, it is recommended that physical educators use school-based interventions based on social cognitive and social-ecological theories to increase the participation of primary school students in physical activity. For example, increasing social games within the physical education classes would be a good example of strategies that physical education teachers can apply within the physical education classes. Finally, future research should

examine the impact of other intervention methods such as autonomy- and competence-based interventions for increasing motivation, physical activity behavior, and other psychological components in students and across different age periods (including middle and high schools).

## 6- ACKNOWLEDGMENTS

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**7- CONFLICT OF INTEREST:** None.

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