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Effect of structured physical education on attitude of elementary school students towards physical activity

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Abstract
A quasi-experimental study was initiated to find out the effect of structured physical education (SPE) on attitude of the elementary school students towards physical activity, and the differential influence of gender and age on the outcome. Pre-intervention and post-intervention data were collected from 171 elementary school children (age range 10-12 years) from six intact classes, two each from fifth, sixth and seventh grade levels, by administering the Scale of Attitude towards Physical Activity. The participants were separated into control groups (n = 80) and experimental groups (n = 91), comprised of children from different grade levels. The treatment consisted of 48 SPE classes each of 40 minutes duration, given at the rate of three classes per week, ended with post-testing of the measures. Data analysis by employing one-way ANCOVA revealed that SPE is effective in nurturing attitude of the elementary school students towards physical activities. Neither gender nor age of the participants was found to exert any differential influence on the effectiveness of SPE in fostering attitude of the elementary school students towards physical activity.

Keywords: Structured physical education, attitude towards physical activity, elementary school students

1. Introduction
Obesity among children and adolescents has emerged as one of the most serious public health concerns in the 21st century. The worldwide prevalence of childhood obesity has increased strikingly over the past three decades (UNICEF, 2019) [12]. Developing a habit of regular participation in sport and recreational activities at school age is essential for proper health and development of children and adolescents. The World Health Organization (WHO, 2020) recommend that children and adolescents engage in at least one hour of moderate physical activity daily. However, despite the consensus regarding the necessity of regular physical activity in promoting paediatric health, many children and adolescents fall short of these standards. In spite of a well-planned curriculum and provision in school timetable, Physical and Health Education has been mostly neglected in the schools in the state of Kerala. This has resulted in an unprecedented hike in the percentage of obese and overweight children and adolescents, with current estimates at approximately 10% in Kerala (Nair & Chellappan, 2021; Viswambharan, Bina & Raphael, 2020; Abraham & Pillai, 2019) [7, 13, 1]. Decreased physical activity has been identified as a main cause of obesity in children and adolescents (Sallis *et al*., 2012) [10]. Numerous studies indicate that compared to healthy-weight range adolescents, obese adolescents have decreased physical fitness and motor abilities (Graf *et al*., 2004, Korsten-Reck *et al*., 2007) [4, 6], and lower levels of physical activity and exercise (Kim *et al*., 2017) [5].
A person's attitude towards physical activities is one of the important factors that influence his/her participation in spontaneous leisure-time physical activities or organised sports (Elena & Beata, 2017) [2]. Attitudes toward physical activity is important to understand as it can influence an individual's decision to begin or to continue participation in an activity (Silverman & Subramanian, 1999) [11]. Students' attitude toward physical activities have been shown to be associated with various personal and external factors such as gender (Pereira *et al*., 2020) [8], age (Rahman *et al*., 2020) [9], residential locale (Eraslan, 2015) [3] etc. How to instil positive attitude towards physical activity through physical education classes thus becomes one of the important questions before the physical education teachers.

No much research attempt has been, however, made in physical education context to investigate how physical education activities influence the attitude of children and adolescents towards Physical activities. In this context, the present study is a modest attempt to find out the effect of a structured physical education programme on attitude of the elementary school students towards physical activity, and differential influence of gender and age on the effect.

2. Objectives of the Study

The study has the following specific objectives in view:

1. To find out the effect of structured physical education on attitude of the elementary school students of Kerala towards physical activity.
2. To find out the differential influence of gender on the effect of structured physical education on attitude of the elementary school students of Kerala towards physical activity.
3. To find out the differential influence of age on the effect of structured physical education on attitude of the elementary school students of Kerala towards physical activity.

3. Hypotheses of the Study

3.1 The following null hypotheses were tested for the study

1. Structured physical education has no significant effect on attitude of elementary school students towards physical activity.
2. Gender has no significant differential influence on the effect of structured physical education on elementary school students' attitude towards physical activity.
3. Age has no significant differential influence on the effect of structured physical education on elementary school students' attitude towards physical activity.

4. Methodology of the Study

1. **Method:** The quasi-experimental study employed a pre-test – post-test control group design.
2. **Participants of the Study:** A total number of 171 elementary school students (age range 10-12) belonging to six upper primary classes, two divisions each from Standard V, VI and VII (grade levels 5th, 6th & 7th), of the St. Thomas Higher Secondary School, Malayattoor, located in the Angamaly Block of Ernakulum district (Kerala State), constitute the participants of the study.
3. **The Experimental Intervention:** The classes were randomly assigned to the control group and the experimental group in such way that one division each from different grade levels was allotted to the groups. The control groups (n = 80) and the experimental groups (n = 91) were pre-tested for attitude towards physical activity. This is followed by Structured Physical Education (SPE) intervention for the experimental groups, while the control groups were left free. Both the groups, however, were not prevented from getting the routine physical education classes as per the school timetable by the school physical education instructor. The experimental intervention consisted of 48 structured physical education classes each of 40 minutes duration, given at the rate of three classes per week (from 3.30 pm to 4.15 pm) by qualified and experienced teachers of physical education.
4. **Tools and Techniques:** The variable, attitude towards physical activity, was measured by administering the Scale of Attitude towards Physical Activity (SAPA), developed by the authors (Sreejith &, Manoj, 2019) [15]. The SAPA is a 40 item five-point Liker Scale which covers five domains, *viz*., and Physical, Mental, Social, Emotional and Recreational aspects of the construct of attitude towards physical activity. The SAPA has an estimated criterion validity (with Children's Attitude toward Physical Activity Inventory, Simon & Smoll, 1974) [16] of 0.73, and test-retest reliability (four weeks interval) of 0.78.
5. **Statistical Techniques Employed:** Apart from the estimation of descriptive statistical indices such as Mean, Median, Standard deviation, Skegness, Kurtosis and Standard error of mean, the data were subjected to one-way ANCOVA, independent sample t-test, and one way ANOVA.

5. Analysis and Interpretation

The pre-test and post-test scores of attitude towards physical activity obtained for the control group and experimental group, and the gain scores (pre-test score subtracted from the post-test scores) were subjected to descriptive and inferential analyses to test the hypotheses. The analysis done in this context is given under appropriate sub-headings:

5.1 Effect of SPE on Attitude towards Physical Activity

The important descriptive statistical indices such as Mean (M), Median (Mdn), Standard Deviation (σ), Skegness (Sk), Kurtosis (Ku), and Standard error of Mean (SE_M), calculated from the pre-test, post-test, and the gain scores of attitude for the control group (CG) and experimental group (EG) are given in Table 1.

Table 1: Statistical indices pertaining to pre-test-, post-test- and gain scores of attitude towards physical activity of control group and experimental group

Testing	Groups	N	Range	M	Mdn	σ	Sk	Ku	SE_M
Pre-test	CG	80	73	119.89	119.5	16.07	0.19	-0.29	1.80
	EG	91	61	121.70	123.0	13.62	-0.26	-0.39	1.43
Post-test	CG	80	69	121.09	120.5	14.90	0.49	0.08	1.67
	EG	91	61	126.88	127.0	12.90	-0.04	-0.21	1.35
Gain Score	CG	80	23	1.20	1.50	5.07	0.16	-0.56	0.57
	EG	91	36	5.18	6.00	5.76	-0.07	0.75	0.60

The results of the descriptive statistical analyses show that the control group and experimental group are heterogeneous with respect to the distribution of the attitude towards physical activity. The range of distribution of pre-test (R = 73) and post-test (R = 69) scores in the control group is bigger than those of experimental group (R = 61 and 62 respectively). The value of Skegness in all the distributions are small and negligible (between -½ and +½), showing that they are all normal distributions.

In order to find out the effect of structured physical education on attitude of elementary school students towards physical activity, the post-test scores of control group and experimental group were compared after controlling the effect of pre-test scores by employing one-way analysis of covariance. The data and result of the one-way ANCOVA performed in this respect is presented in Table 2.

Table 2: Result of the ANCOVA of the post-test scores of attitude towards physical activity of control group and experimental group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	29561.245a	2	14780.622	565.271	.000	.871
Intercept	887.178	1	887.178	33.929	.000	.168
Pre-test Score	28133.220	1	28133.220	1.076E3	.000	.865
Group	751.987	1	751.987	28.759	.000	.146
Error	4392.837	168	26.148			
Total	2670447.000	171				
Corrected Total	33954.082	170				

Dependent Variable: Post-test scores of attitude towards physical activity
a. R Squared = .871 (Adjusted R Squared = .869)

The one-way analysis of covariance produced an F-ratio which is significant above 99.9% confidence interval ($F_{(1,168)}$ = 28.759; p<.001). It indicates that there is a true difference between control group and experimental group with respect to the post-test scores of SAPA, even after partaking out the effect of the pre-test scores. To put it differently, SPE is effective in nurturing positive attitude towards physical activity in elementary school students. The partial Eta Squared value estimated for the group (η^2_{patial} = 0.146) demonstrates that the pre-test scores of attitude towards physical activity exercise medium effect on the post-test score of SAPA. It also demonstrates that 14.6% of the variance in the post-test score of attitude towards physical activity can be explained by the pre-test scores of attitude.

5.2 Differential Influence of Gender on the Effect of SPE on Attitude towards Physical Activity

The differential influence of gender on the effect of structured physical education on the attitude of elementary school students towards physical activity is examined in this section of analysis by comparing the boys and girls in the experimental group with respect to the gain scores of SAPA.

Table 3: Comparison of the gain scores of attitude towards physical activity of boys and girls in the experimental group

Groups	Statistical Indices				t	Sig
	N	M	SD	SEM		
Boys	44	5.30	5.991	.903	0.191	NS
Girls	47	5.06	5.597	.816		

The t-value estimated on comparing the boys and girls in the experimental group regarding the gain scores of their attitude towards physical activity is not significant (t = 0.191; p>.05). It discloses that gender is not a significant factor that discriminate elementary school students on the basis of the effectiveness of structured physical education in causing changes in their attitude towards physical activity. To put differently, the SPE is almost equally effective in bringing out desirable changes in both the gender groups regarding their attitude towards physical activity.

5.3 Differential Influence of Age on the Effect of SPE on Attitude towards Physical Activity

The differential role played by age on the SPE on the attitude of elementary school students towards physical activity was studied by comparing 10, 11 and 12-years old children in the experimental group with respect to the gains scores of attitude towards physical activity. Table 4 presents the summary of the one-way ANOVA performed in this context.

Table 4: Summary of one-way ANOVA: Gain scores of attitude towards physical activity of children in different ages.

MHS	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	81.890	2	40.945	1.241	.294
Within Groups	2903.296	88	32.992		
Total	2985.187	90			

The F-ratio estimated on comparing the gain scores of attitude of children in different age groups towards physical activity is not significant (F = 1.241; p>.05). It indicates that no true difference exists among children in different age groups with respect to the effect of Structured Physical Education Programme on their attitude towards physical activity.

6. Conclusions

Comparison of the control group and experimental group with respect to the post-test scores of attitude towards physical activity, after partial ling out the effect of the respective pre-test scores, by employing one-way ANCOVA, produced an F-ratio which is significant ($F_{(1,168)}$ = 28.759; p<.001). It shows that the structured physical education is effective in fostering positive attitude towards physical activity in elementary school students. The Hypothesis-1 (structured physical education has no significant effect on attitude of elementary school students towards physical activity) is, therefore, rejected. The independent sample t-test performed to compare the boys and girls in the experimental group with respect to the gain scores of attitude towards physical activity produced a t-value which is not significant (t = 0.191; p>.05). It shows that the structured physical education is equally effective with both the gender groups in nurturing their attitude towards physical activity. The Hypothesis-2 (gender has no significant differential influence on the effect of structured physical education on elementary school students' attitude towards physical activity) is, therefore, accepted. The one-way ANOVA performed to compare children in different age groups with respect to their attitude towards physical activity produced an F-ratio which is not significant (F = 1.241; p>.05). This exposed that age of the participants is not a significant factor in discriminating elementary school students on the basis of the effectiveness of structured physical education in promoting their attitude towards physical activity. The Hypothesis-3 (age has no significant differential influence on the effect of structured physical education on elementary school students' attitude towards physical activity) is, hence, accepted.

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