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A PHYSICAL FITNESS INTERVENTION PROGRAM
WITHIN A PHYSICAL EDUCATION CLASS ON
SELECTED HEALTH-RELATED FITNESS AMONG
SECONDARY SCHOOL STUDENTS

Shabeshan Rengasamy
Department of Science & Mathematics, Faculty of Education, University Of Malaya, Jalan Pantai Baru

Abstract

The aim of the study was to investigate the effect of a physical fitness intervention program within a physical education class on selected health-related fitness components among Malaysian secondary school girls. A quasi experimental design was adopted for the study. Two Schools in a district were randomly selected. In each school, two classes were randomly assigned intact to the experimental group (n=48) and the other was the control group (n=38). Pretest data was collected on cardiovascular endurance, flexibility and muscular strength. The experimental and the control groups underwent regular physical education classes twice a week for ten weeks. Apart from the regular physical education classes, the experimental group underwent the treatment of four exercises in a form of a circuit immediately after the warm-up session. After ten weeks, posttest data was collected. ANCOVA indicated that there was a main effect in cardiovascular endurance F(1, 83) = 44.69, p<0.05 and for flexibility F(1,83) = 46.80, p<0.05. As for muscular strength, the result was not significant F(1,83) = 3.54, p>0.05. The results indicate that a ten week physical fitness program within a physical education class was effective in enhancing cardiovascular endurance and flexibility among Malaysian secondary school girls.

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Key words: health-related fitness, cardiovascular endurance, strength, flexibility, intervention

1 Corresponding author. Tel.: 60- 03-79675066
E-mail address: Shabes@um.edu.my
1.0 Introduction

Reports abroad indicate that the state of aerobic fitness and other health related fitness among school going children is not very satisfactory (Derri, Aggeloussis, & Petraki, 2004; Gutin et al., 1990, 1994; Hatano et al., 1997; Tomkinson, Olds, & Gublin 2003; US Department of Health & Human Services, [USDHHS] 1996; 2001). Among children ages between 12-21 only half of them participate in vigorous physical activity (PA), and one-fourth of this population reported that did not participate in any physical activity (USDHHS 1996). In view of this, many physical educators are of the opinion that being physically inactive and leading a sedentary lifestyle is one of the reasons for dramatic increase in the prevalence of overweight and obesity, thus attributing to risk factors for cardiovascular diseases (CVD) in adults and even among children (Denke, Sempos, & Grundy, 1993; USDHHS, 2001, 2008; Young & Steinhardt, 1995; Gutin et al., 1999). The American Heart Association (1992) indicated that a sedentary lifestyle is a modifiable risk factor for coronary heart disease (CHD). Conversely, there is evidence that both increased physical activity (PA) and physical fitness are associated with improved risk factors for (CVD) (Caspersen, Nixton, & DuRant, 1998; Despres, Bouchard, & Malina, 1990; Sallis et al., 1997; USDHHS, 1996, 2001, 2008). In view of this problem and to modify the above situation, all school going children should be encouraged and motivated by the teachers to participate in PA through quality physical education programs conducted in schools to educate and enhance health-related fitness components (Levin et.al., 2001; USDHHS 1996; 2001, 2008). These school based physical education programs that are effective would have the potential to increase PA levels and the knowledge of fitness and therefore plays an important role in promoting health-related fitness components and contribute to public health (Wallhead & Buckworth, 2004).

In Malaysia, CVD posed the greatest threat beginning the late 1990s. In 2001 it was reported that 20-30 % of total death in Malaysia was contributed to CVD (Khor, 2001). The findings from National Health Morbidity Survey III (MOH, 2008) indicate the prevalence of physical inactivity to be 43.7% among adults and sedentary lifestyles among Malaysian children. A study by Lim (2005) indicated that about 44% of the 75 adolescents studied were sedentary. Further, Dan, Mohd Nasir and Zalilah (2011) reported that one third of the respondents between the ages 13-14 years were in the low physical activity level category. Further, the status of Malaysian school going children undergoing regular physical education in schools indicate low mean scores for health-related fitness components (Balakrishnan, 2003; Kasmini et al., 1997; Rengasamy, 2003, 2006 2008; Singh, 2005; Sinnapan, 2006). It is recommended that proper intervention programs with sufficient intensity levels be implemented at the school level (Council for physical Education, [COPEC] 1998; Dan, Mohd Nasir & Zalilah, 2011; USDHHS, 1996; 2001). Intervention programs have indicated enhancement of health-related fitness among school children, however most of the intervention studies were carried outside the physical education classes. (Derri et al., 2004; Faigenbaum & Mediate, 2006; Faigenbaum, Milliken, Loud, & Burak, 2002; Flanagan, et al., 2002; Ignico & Mahon 1995; Singh, 2005).

There is a need to study and understand intervention programs within a physical education class as local research have indicated low health-related fitness components among
The lack of published research locally and abroad on intervention programs towards girls within the physical education classes in enhancing health-related fitness components prompted the current study. The purpose of this study was to investigate the effect of a physical fitness intervention program within a physical education class towards selected health-related fitness components among Malaysian secondary school girls.

2.1 Participants

Two schools in the district of Banting, in the state of Selangor were randomly selected for the study. There were a total of seven Form Four classes in each of the selected school. Two classes in each school were randomly selected and randomly assigned intact for the experimental and the control group. The experimental group consisted of forty eight (n=48) girls, and the control group consisted of thirty eight (n=38) girls respectively and their mean age was 16.1; $SD = 0.42$

2.2 Design and Procedure

A quasi-experimental design with a pretest-posttest design was adopted for the study (Gay, 1992). The experimental and the control groups followed their regular physical education conducted for 40 minutes twice a week in addition the experimental group underwent the intervention program.

2.3 Treatment

The present study was conducted for ten weeks. In the present study, a treatment of four exercises in a form of a circuit was utilized to improve health-related fitness as suggested by Morgan and Adamson (1972). Once the experimental group had assembled, they would undergo the warm-up and stretching exercises for about eight minutes and followed by the treatment. As for the control group, they followed their regular physical education classes conducted 40 minutes twice a week. After ten weeks, posttest data were collected and analyzed for between group differences using analysis of covariance (ANCOVA).

2.4 Testing

A common pretest was given using 12-Minute Cooper’s Test for cardiovascular endurance with a reliability of 0.95 and the validity coefficients of .65 (Byrd, 1980). The Test was conducted in a 400 meter track in the school field as recommended by Baumgartner and Jackson (1991).

Flexibility was assessed using the Sit and Reach Test using a specially constructed box and this protocol was supported in studies by Faigenbaum et al. (2002), Hatano (1994) and Singh (2005).

The measure of the hand strength was carried out by a hand dynamometer as seen in study by Faigenbaum et al. (2002). The reliability reported is .90 (Bargartner & Jackson). The hand dynamometer was adjusted before the test to check the suitability of the grip to ascertain the right grip size by adjusting the grip lever.

3.0 Results and Discussion

ANCOVA was utilized in the present study as the design employed was a quasi experimental design with intact sampling method. Data were analyzed for normality using the test for skewness and kurtosis. The data indicated that the groups were approximately distributed.
Further, linearity and regression slopes assumption for ANCOVA were met. For the statistical analysis, the level of confidence was set at 0.05. To ascertain the effect of the treatment between the experimental and the control group, ANCOVA was computed using the posttest score as the dependent score and the pretest score as the covariate. Effect size was calculated for each comparison using Cohen’s delta to evaluate the size of mean differences. The result of ANCOVA in Table 2 indicates that there was a significant main effect in cardiovascular endurance \( F(1,83) = 44.69, p < 0.05; \) Cohen \( d = 0.35 \), and for flexibility \( F(1,83) = 46.80, p < 0.05; \) Cohen \( d = 0.36 \). There was no significant difference for muscular strength \( F(1,83) = 3.54, p > 0.05 \). Table 1 indicates the adjusted posttest mean scores for the selected health-related fitness components for the experimental and the control groups respectively. The result showed that treatment in the experimental group was effective in enhancing the cardiovascular endurance and flexibility among the experimental subjects.

Table 1: Mean, Standard Deviation and Adjusted Posttest Mean Scores for the Health-Related Fitness Components of the Groups

<table>
<thead>
<tr>
<th>Health-Related Components</th>
<th>Experimental (n=48)</th>
<th>Control (n=38)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Cardiovascular Endurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(m)</td>
<td>Mean 1344.68</td>
<td>1597.91</td>
</tr>
<tr>
<td></td>
<td>SD 181.24</td>
<td>157.08</td>
</tr>
<tr>
<td>Flexibility(cm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean 30.78</td>
<td>33.10</td>
</tr>
<tr>
<td></td>
<td>SD 6.13</td>
<td>5.47</td>
</tr>
<tr>
<td>Muscular Strength(kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean 21.28</td>
<td>21.71</td>
</tr>
<tr>
<td></td>
<td>SD 4.63</td>
<td>4.29</td>
</tr>
</tbody>
</table>
The present study was aimed at investigating the effect of a ten week physical fitness intervention program within a physical education class towards selected health-related components among secondary school girls. The results indicate that there was a statistically significant difference (p < 0.05) towards cardiovascular endurance and in flexibility between the groups when posttest scores were compared (Table 2). As for muscular strength the result was not significant (p > 0.05).

The significant differences in cardiovascular endurance in the present study are in agreement with similar studies reported by Singh (2005), Ignico and Mahon (1995), Derri et al. (2004), and Sallis et al. (1997). In the present study, four exercises were carried out during the intervention period which lasted for about four minutes. The intervention and the warm-up sessions were carried out for about twelve to thirteen minutes twice a week increased the intensity levels. This would have probably increased the training volume among the intervention group which contributed to the significant improvement among them.

As for flexibility, the result indicated a statistically significant difference (p < 0.05) between the experimental and control group of girls (Table 2). Similar studies implementing intervention programs have reported significant improvements in flexibility (Derri et al., 2004; Ignico & Mahon, 1995; Faigenbaum & Mediate, 2006).

The significant result in the present study can be attributed to the treatment and exercises in the warm-up, treatment, class activity and the cool down session. The treatment in the present study was carried out twice a week and this would have increased the training volume and indirectly enhanced flexibility.

The between group results for muscular strength between the experimental and the control groups for girls was not significant (Table 2). The result is consistent with a similar finding by Faigenbaum et al. (2002). In contrast to the insignificant result in the present study, other intervention studies on muscular strength have shown vast improvements as reported by Flanagan et al. (2002) and Faigenbaum and Mediate (2006). The insignificant result in the present study can

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Table 2: Summary of ANCOVA for the Selected Health-Related Fitness Components

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Endurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>1132664.8</td>
<td>1</td>
<td>1132664.8</td>
<td>44.69*</td>
<td>0.35</td>
</tr>
<tr>
<td>Error</td>
<td>2103258.9</td>
<td>83</td>
<td>25340.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3235923.7</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>257.62</td>
<td>1</td>
<td>257.62</td>
<td>46.80*</td>
<td>0.36</td>
</tr>
<tr>
<td>Error</td>
<td>456.83</td>
<td>83</td>
<td>5.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>714.45</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscular Strength</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between</td>
<td>9.68</td>
<td>1</td>
<td>9.68</td>
<td>3.54</td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>226.60</td>
<td>83</td>
<td>2.73</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>236.28</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* P < 0.5
be attributed to the insufficient intensity and the noncompliance of the progressive overload principle.

4.0 Conclusion

The aim of the study was to investigate the effectiveness of an intervention program towards the enhancement of selected health-related fitness components among Malaysian secondary school girls. It indicated that an intervention program within a physical education class had a positive effect towards cardiovascular endurance and flexibility. Consequently, such intervention programs can be incorporated in the physical education curriculum to have better benefits among the girl.

References


Surgeon General’s Report on Physical Activity and Health [SGRPAH], (1996). U.S Department of Health and Human services; Centers for Disease Control and Prevention; National Center for Chronic Disease Prevention and Health Promotion; The President’s Council on Physical Fitness and Sports.


