Effects of Epstein’s TARGET on adolescents’ intentions to be physically active and leisure-time physical activity

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Abstract

The aim of this study was to examine the effects of Epstein’s TARGET strategies on adolescents’ intentions to be physically active and leisure-time physical activity (LTPA) levels. A total of 447 secondary education students (193 females and 254 males), range age 12–17 years, were divided in two groups: control (N = 224) and experimental (N = 223). Epstein’s TARGET strategies were applied by especially trained teachers only to the experimental group in their physical education (PE) classes during 12 consecutive weeks. Participants’ intentions to be physically active and their LTPA levels were assessed prior to the intervention (pre), at the end of it (post-1) and 3 months after the intervention (post-2). Significant increases were observed only in the experimental group in post-1 and post-2 on both variables. PE interventions based on TARGET strategies seem to be effective increasing adolescents’ intentions to be physically active, as well as time spent in LTPA. As most adolescents participate in PE, these interventions could lead to substantial public health benefits.

Introduction

There is strong evidence to support the health benefits of engaging in regular leisure-time physical activity (LTPA) in the early stages of life [1]. However, research has showed that its levels decrease significantly during adolescence [2]. Motivating adolescents to be physically active, understanding what drives them to LTPA, seems to be an urgent necessity. In response, the fundamental role of physical education (PE) programmes has been highlighted [3]. Since most adolescents participate in PE, specific programmes could lead to significant public health benefits. Unfortunately, PE can lead students to maladaptive achievement strategies (i.e. seek easy tasks, reduce effort and give-up when facing difficulties) when it is not correctly oriented [4]. Nevertheless, authors such as Lonsdale et al. [5] have indicated that specific interventions can increase the amount of time students spend in moderate-to-vigorous physical activity during PE. The goal would be to design interventions that could also increase children’s LTPA.

The achievement goal theory [6] has been a major theoretical framework used to understand motivation. In educational contexts, teachers have been assessed as key agents in the construction of motivational climates [7]. Research has distinguished two major climates: mastery and performance [8]. In mastery climates, success is defined in terms of skill mastery and individual improvement. In a recent meta-analysis, Braithwaite et al. [7] linked mastery climates with positive outcomes such as health/fitness [9], motor skills [10] and perceptions of ability and effort [11], whereas performance climates were linked to negative consequences such as anxiety or boredom.

Therefore, there has been an interest in creating mastery motivational climates when working with youngsters. Epstein [12] identified six dimensions as fundamental in any classroom learning environment (TARGET): task (design of activities), authority
(location of decision-making), recognition (use of rewards), grouping (group formation), evaluation (assessment criteria) and time (pace of instruction). Treasure [4] identified strategies that promote mastery achievement goals in PE settings (mastery-oriented class climates and students’ task orientation) and included them into Epstein’s six TARGET areas to link both frameworks. Finally, Cecchini et al. [13] developed several procedures to encourage mastery involving situations in educational contexts.

The goal of this study was to assess the effects that an intervention programme based on Epstein’s TARGET strategies can induce in a group of adolescents’ intentions to be physically active and their LTPA levels in three timepoints: pre-intervention, post-intervention and 3 months post-intervention.

**Method**

A total of 447 students (193 females and 254 males), age range 12–17 years \( M = 14.34, \ SD = 1.90 \), from eight different high schools in northern Spain agreed to participate. They all belonged to several intact PE classes. Participants were divided in two groups: control \( n_1 = 224 \) and experimental \( n_2 = 223 \). They were recruited through their PE teachers, and both (educators, students and/or their tutors) signed a written consent approved by the researchers’ university ethical committee. Fortunately, all participants (teachers and students) completed the intervention programme.

During 12 weeks, a specifically designed programme based on Epstein’s TARGET strategies was applied to the experimental group by specially trained PE teachers. It was elaborated adapting the model developed by Treasure [4] and adding the procedures suggested by Cecchini et al. [13] to encourage mastery involving situations. The strategies used in this research project were as follows:

1. **Task**: teachers used open-ended tasks for the students to solve a wide variety of problems in changing contexts, which highlighted the process (not the product) and transmitted the importance of work and effort.

2. **Authority**: students actively participated in decision-making processes in class regarding tasks to increase their self-referenced perceptions.

3. **Recognition**: individual progress was recognized and rewarded by the teachers, which held similar expectations for all students, independently of their skill level.

4. **Grouping**: small cooperative working groups were established from the beginning, trying to promote a working climate where the students could help each other solve tasks and improve their abilities.

5. **Evaluation**: students’ individual progress and participation were evaluated privately and self-referenced.

6. **Time**: students were allowed to take part in the decision-making process related to the pace of instruction and the time assigned to complete each task.

Participating teachers were required to be professionally certified with a minimum of 5 years of teaching experience. The teachers randomly assigned to the experimental group also had to be willing to learn to apply the TARGET strategies attending a specific seminar prior to the beginning of the implementation phase. It consisted of 20 hours of theoretical and 10 hours of practical training, which included pre-designed lessons to be analysed and discussed. During implementation, teachers had to attend a weekly seminar to share their experiences with other participants and the university researchers. One lesson per week of every group was videotaped and analysed for feedback. Therefore, a combination of training seminars, pre-designed sessions and video analysis was used to provide an adequate training to the participant teachers [7]. Furthermore, the implementation of the intervention programme was closely supervised by the researchers. They tried to establish fidelity of the TARGET approach through teachers’ preparation, reflective practice and comparison between planned materials and observation of the implementation through video analysis [14].
Participants’ intention to be physically active was measured through a five-item internationally validated scale ([15, 16]; e.g. after graduation, I would like to be physically active). It showed adequate internal consistency (α = 0.90). Participants’ LTPA levels were measured using the following question: ‘How often have you participated in physical activities for 20–30 min per session during your free time over the past three months?’ [17]. Response choices offered were: 1 = never, 2 = about once per month, 3 = about two to three times per month, 4 = about once per week, 5 = about two times per week, 6 = about three times per week and 7 = about four times or more per week. This question has been used in different international studies on exercise adherence [18].

Statistical analysis

All data were analysed using SPSS 19.0. Prior to the intervention, a multivariate analysis of variance (MANOVA) using group and gender as independent variables and intention to be physically fit and LTPA as dependent variables was conducted to assess initial homogeneity among groups. Subsequently, a 2 × 3 repeated measures MANOVA, using group and time as independent variables and intention to be physically fit and LTPA as dependent (within-subjects) variables was conducted to assess the effects of the TARGET programme. Finally, linear contrast was performed to determine how each group changed along the three assessment timepoints (pre, post-1 and post-2). Independent and/or paired samples t-tests were also conducted.

Results

Group and gender were considered as independent variables, and intention to be physically fit and LTPA-dependent variables. Pre-intervention differences between groups were examined through a MANOVA. No significant differences were found based on gender (Wilks’ lambda = 0.994, $F_{(2, 422)} = 1.28, P = 0.278$) or in the interaction group × gender (Wilks’ lambda = 0.988, $F_{(2, 422)} = 0.516, P = 0.597$). Therefore, groups could be considered as homogeneous prior to the intervention.

To assess the possible effects generated by the intervention programme, a 2 × 3 (group × time) repeated measures MANOVA was conducted using intention to be physically fit and LTPA as dependent (within-subjects) variables. A significant multivariate effect emerged for the variable group: Wilks’ lambda = 0.393, $F_{(4, 442)} = 181.46, P < 0.001, \eta^2 = 0.62$. Subsequent univariate analysis showed statistical significant differences in both variables: intention to be physically active ($F_{(2, 890)} = 407.76, P < 0.001, \eta^2 = 0.48$) and LTPA ($F_{(2, 890)} = 231.78, P < 0.001, \eta^2 = 0.34$).

Results from both MANOVAs showed statistical significant differences ($P < 0.001$) between the control and the experimental groups in both dependent variables after the intervention programme in post-1 and post-2 (see Table 1). In the experimental group, results showed significant increases in intention to be physically fit and LTPA between pre and post-1, and between pre and post-2. Furthermore, no significant differences were found between post-1 and post-2. In the control group, no significant differences were found between pre-test, post-1 and post-2 in any dependent variable (see Fig. 1).

Discussion

The goal of this study was to assess the effects of an intervention programme (based on Epstein’s TARGET strategies) in adolescents’ intentions to be physically active as well as their LTPA levels in three timepoints: pre-intervention, immediately post-intervention and 3 months after the end of the intervention. Results showed that the programme, carried in the PE class, was successful. In a relatively short period of time (3 months), the TARGET strategies were able to significantly increase adolescents’ intentions to be physically active as well as their LTPA levels. Previous studies have linked TARGET structures to an increase in students’ perceptions of ability and effort [11], competence [19] and motor skills [10], which can lead individuals to physical activity. Certainly, Bowler [9]
also found that mastery target structures had a significant positive effect on students’ activity levels, health and fitness. Similarly, Braithwaite et al. [7] reported that different TARGET programmes have had noteworthy effects on students’ health and fitness such as heart rate, cardiovascular fitness, exercise frequency and nutrition behaviours.

Our results indicate that PE teachers can play a significant role promoting LTPA if they provide their students with positive physical activity experiences. Epstein’s TARGET strategies seem to be adequate to achieve this goal since they have been linked to students’ enjoyment and perceived competence [20]. Within the TARGET structure, teachers allowed students to participate in the design of tasks and activities and other managerial decisions, increasing their locus of control. This shift demands a new role from teachers: the role of helper and the role of teaching to learn. Similarly, the students must learn to self-direct their lives, to manage their time. Our results show that this apprenticeship should be the consequence of exercising their autonomy and their decision-making in mastery climates structured around Epstein’s TARGET strategies, which leads to an improvement in the students’ intention to be physically active, as well as their LTPA.

Although there is a personal predisposition that determines the probability to follow a particular behavioural pattern [21], our results showed that teachers can have a significant impact over their students’ intentions and physically activity levels, if they use the strategies previously described within a TARGET framework. These included actions regarding the tasks (open-ended), class’ authority (student–teacher shared), recognition (acknowledge students’ effort and progress), grouping (small cooperative working groups), evaluation (self-referenced and private) and time (adequate pace). Similar intervention programmes could be applied in other schools, and/or extracurricular settings with adequate teacher training and minimal costs.

However, students’ pre-intervention LTPA levels could be considered so low (almost two times per

Table I. Mean (M), standard deviation (SD), effect size (ES) and sample size power (Power) of all variables in the experimental and control groups prior (Pre) and after the intervention (Post-1 and Post-2) and based on gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>Experimental Group</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post-1</td>
<td>Post-2</td>
<td>Pre</td>
<td>Post-1</td>
<td>Post-2</td>
<td>Pre</td>
<td>Post-1</td>
</tr>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
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<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Intention</td>
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<td>0.92</td>
<td>4.53b</td>
<td>0.68</td>
<td>4.51b</td>
<td>0.70</td>
<td>3.85a</td>
<td>0.89</td>
</tr>
<tr>
<td>Male</td>
<td>3.74a</td>
<td>0.79</td>
<td>4.57b</td>
<td>0.57</td>
<td>4.55b</td>
<td>0.59</td>
<td>3.81a</td>
<td>0.85</td>
</tr>
<tr>
<td>Female</td>
<td>3.79a</td>
<td>1.06</td>
<td>4.48b</td>
<td>0.79</td>
<td>4.46b</td>
<td>0.81</td>
<td>3.89a</td>
<td>0.95</td>
</tr>
<tr>
<td>LTPA</td>
<td>4.41a</td>
<td>1.09</td>
<td>5.72b</td>
<td>1.31</td>
<td>5.74b</td>
<td>1.35</td>
<td>4.58a</td>
<td>1.08</td>
</tr>
<tr>
<td>Male</td>
<td>4.43a</td>
<td>0.97</td>
<td>5.73b</td>
<td>1.16</td>
<td>5.76b</td>
<td>1.19</td>
<td>4.67a</td>
<td>0.92</td>
</tr>
<tr>
<td>Females</td>
<td>4.39a</td>
<td>1.22</td>
<td>5.70b</td>
<td>1.46</td>
<td>5.72b</td>
<td>1.51</td>
<td>4.48a</td>
<td>1.23</td>
</tr>
</tbody>
</table>

Notes: Means in the same row that do not share superscripts differ at P < 0.001. Hedges g was selected as the measure of effect size to provide an estimate of effect due to sample sizes. Sample size power calculations are based on G*Power 3.1.
week) that one might argue that any intervention programme would produce a significant effect. The experimental group (TARGET structure) showed a significant increase (higher than three times a week) following the intervention and maintained 3 months after the cessation of the programme. These results do show that the TARGET framework is effective to increase students’ LTPA. Finally, no differences based on gender were observed.

In conclusion, our results indicate that a 12-week PE intervention programme based on TARGET strategies can increase adolescents’ intentions to be physically active and the amount of time they spend in LTPA. A major finding was that these positive effects were maintained 3 months after the conclusion of the programme. As most adolescents participate in PE, this type of interventions could lead to substantial public health benefits. The programme had minimal costs (just teacher training) and it could have a positive impact in the current educational system.

The present study also holds several limitations. First, the sampling could be considered convenient. However, initial homogeneity among groups was tested and there were found no differences. The robust sample size could also be considered a positive element of the study. Second, the age range of the subjects could be considered too large. The results could be different with other age groups. Third, 3 months could be considered a very short retention period. The effects of the intervention programme should be tested after longer periods of time to assess its real effectiveness. Future studies should use the TARGET framework in other populations (older and/or younger), in other settings (educational and/or extracurricular) and for longer or shorter periods of time to assess its effects to promote individuals’ physical activity for active participation, to mitigate the sedentary problem of our society.

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**Conflict of interest statement**

None declared.

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**References**


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