Original Article

Active snacks for the promotion of physical activity in Southern Italy: preliminary results

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Abstract:

The Active Snacks project (2019/2020) is aimed both at studying the motor development of the child and opening new opportunities for the practice of physical activity in primary and secondary schools. The purpose of this study is to evaluate the effects of active breaks on enjoyment and perceived self-efficacy, showing preliminary results of the project. The sample is made up of 56 primary and secondary school children ($M = 31$, $F = 25$, age = 9.64 ± 1.40 , weight = 41.80 ± 23.3 kg, height = 1.42 ± 0.10 m, BMI = 20.26 ± 4.09 kg / m²) from an Apulian province. The intervention protocol provided for the proposal of 3-5-minute active breaks, carried out in the classroom for a week during school hours. Psychological factors were assessed with two self-reports: PSP_C and PACES. Besides descriptive statistics ($M \pm SD$), the analysis of ANOVA and Pearson's correlation coefficient were performed to measure pre-and post-intervention differences related to BMI. The significance index was set at $p < .05$. The results highlighted: (a) overweight children achieved higher scores in terms of perceived self-efficacy and enjoyment than those of normal weight and obese, both in pre- and post-intervention; (b) statistically significant differences in the level of self-efficacy (Nw vs Ob; Ow vs Ob) post intervention; (c) moderate to high correlations between BMI and perceived self-efficacy post intervention in overweight and obese groups. Preliminary results proved useful and effective for increasing levels of self-efficacy and fun in normal weight groups. Further studies are needed to evaluate the effects in the medium to long term.

Keywords: Active Breaks; Primary School; Self-Efficacy; Enjoyment; Playtime

Introduction

The WHO guidelines (WHO, 2018) recommend a daily practice of at least 60 minutes of moderate to vigorous physical activity (MVPA) for children and adolescents. Unfortunately, about 85% of girls and 78% of boys aged 11-17 do not meet WHO recommendations, and the number of obese children and adolescents has increased exponentially over the last 40 years: in 2016, over 50 million girls and 74 million boys (about the 6-7% of teenagers) were overweight or obese (Guthold et al., 2019).

Higher levels of physical activity have a positive impact not only on BMI management and physical fitness (Casolo et al., 2019), but also on the development of cognitive functions and socio-relational factors associated with the practice of motor activity (Singh et al., 2019).

Recently, several educational projects have been structured to promote active lifestyles and analyze the connections between the increase in physical activity levels (PAL) and the effects on cognitive functions, school performance and psychological factors (Clemes et al., 2020).

Although the hours of physical education provided in primary and secondary schools has been increased, active breaks represent a didactical-educational intervention capable of significantly improving children's cognitive and physical-motor development, with important benefits on the general state of health (Rizal et al., 2019).

A recent review (Vaquero-Solis et al., 2020) highlights how important is the motivation to be physically active and its positive impact on active lifestyles, on the emotional-affective and socio-relational areas, contributing to the global development of the person. Particular attention was paid to the effects of physical activity on psychological correlates, and how their changes can influence the attitude towards physical activity.

Perceived self-efficacy and enjoyment are important factors to achieve personal success, especially in motor and sporting activities. Perceived self-efficacy enhances the ability to successfully master a skill, the body self-perception and the factors that make up motor competence (Bandura, 1997; Bardid et al., 2016).

Barnett et al. (2017) define enjoyment as a positive affective response that reflects motivation and interest in a particular activity, influenced by the difficulty and the levels of perceived self-efficacy of the participant, as well as by intrapersonal factors such as age, gender, race and ethnicity.

These factors contribute to the promotion of healthy and active lifestyles, supporting the commitment and adherence to motor and sporting activity programs in adolescent and adult age (Estevan & Barnett, 2018).

Regular and organized practice of motor activity is closely related to the definition of the levels of perceived self-efficacy and enjoyment, promoting and generating further learning. Correlated factors can be considered as a mediating factor for children's motor learning process.

"Active Snacks" (2019/2020) is the pilot project aimed at studying the motor development of the child. The project was carried out by the Didactic Laboratory of Motor Activities of the University of Foggia and consisted in the proposal of short active breaks during the curricular hours.

Materials and Methods

Aim

This study aims to evaluate the effects of active breaks on enjoyment and perceived self-efficacy among primary and secondary school students. The hypothesis is that the proposal of physical activity in the classroom has different effects on the enjoyment and perception of students' self-efficacy according to BMI.

Sample

The sample consists of 56 primary and secondary school first grade students ($M = 31$, $F = 25$, age = 9.64 ± 1.40 , weight = 41.80 ± 23.3 kg, height = 1.42 ± 0.10 m, BMI = 20.26 ± 4.09 kg / m²) of an Apulian province. Table 1 summarizes the descriptive statistics of the sample.

Table 1. Sample divided according to BMI

Group		Age			Sample Weight			Height			BMI		
		M	D	S	M	D	S	M	D	S	M	D	S
Nw	3	,85	,39	1	5,04	,88	,41	,01	7,40	,75	1		
Ow	3	,23	,48	1	3,90	,87	,42	,12	1,31	,46	2		
Ob	0	,40	,35	1	8,86	2,31	,45	,01	7,58	,96	2		

Procedure

The project was introduced and proposed to the school in November 2019, after verification and availability of the educational-organizational structures. The pilot project was carried out in December 2019 for a week. The intervention protocol provided for the proposal of 3-5-minute active breaks, made in the classroom, daily, during recreation. The activities were proposed using the L.I.M. (Interactive Multimedia Whiteboard).

The videos have been structured and selected, drawing not only from the repertoire of basic motor skills, activities related to the world of fitness, sport-specific skills, traditional dances and popular games, etc., but integrating elements related to food education, health education and basic curricular learning.

The task of the experts was not only to assist the curricular teacher and supervise the progress of the activities: they played an active role, as they mediated the transposition of the contents from the video to the class, using different teaching styles (Mosston & Ashworth, 2008).

Measures

The sample was divided into three groups according to BMI differences: normal weight (Nw), overweight (Ow) and obese (Ob) (Cole, 2000). The data relating to the psychological factors related to the motor experience (perceived self-efficacy and enjoyment) were evaluated and compared before and after surgery.

Enjoyment was assessed by "PACES" questionnaire, acronym for "Physical Activity Enjoyment Scale" (Carraro et al., 2008), which consisted of 16 items based on children's perception during physical activity practice. Children had to choose if they "completely disagree, disagree, are uncertain, agree or completely agree" to each item and assign a score ranging from a 5-points Likert Scale. The questionnaire provided two scales: PACES_P indicates higher enjoyment and satisfaction during PA practice, while PACES_N denoted a lower degree of pleasure. Only the positive scale PACES_P was considered in this study.

Perceived self-efficacy was assessed through the Self-efficacy scale for children (PSP_C), (Colella et al., 2008). The questionnaire provided 6 questions concerning personal strength, speed and coordination skills. For each item, children had to choose one of the four sentences that best represent their personal beliefs. Scores were calculated by assigning 1 to 4 points for each answer, for a maximum of 24 points. Higher scores indicate greater perceived self-efficacy, while lower scores would reflect a weak belief in one's own abilities and fine motor skills. The data were collected in the schools by the Researchers and Collaborators of the Didactic Laboratory of Motor Activities, after the informed consent of the parents was obtained.

Statistical Analysis

Besides the descriptive statistics ($M \pm SD$), the ANOVA variance analysis was performed to analyze the pre- and post-intervention differences intra- and inter-group in relation to BMI. The Pearson's correlation coefficient was calculated to identify relationships between questionnaires and BMI. The significance index was set at $p < .05$. "SPSS-Statistical Package for the Social Sciences" (ver. 25.0) was used for data analysis.

Results

Table 2 shows the descriptive statistics obtained from the questionnaires according to BMI.

Table 2. Results according to BMI

Group	N	Questionnaires							
		PACES_P t ₀		PSP_C t ₀		PACES_P t ₁		PSP_C t ₁	
		M	SD	M	SD	M	SD	M	SD
Nw	33	31,37	15,12	15,53	7,71	37,39	4,94	19,15	3,34
Ow	13	33,93	12,01	19,23	2,55	37,29	5,37	19,29	2,26
Ob	10	32,71	14,82	13,29	6,37	36,50	13,01	14,90	6,00

Figures 1-2 show a graphic representation of the results.

Figure 1. Results intra-group (t₀ vs t₁) according to BMI

Figure 2. Results inter-group (Nw vs Ow vs Ob) t₀/t₁ (* = Ow vs Ob; * = Nw vs Ob) $p < .05$ * $p < .01$ *

Table 3 reports psychological factors and BMI correlations.

Table 3. Correlation between BMI and questionnaires (* = $p < .05$; ** = $p < .001$)

	Nw	Ow	Ob
PACES_P t ₀	-.113	-.131	-.666
PACES_P t ₁	-.107	-.391	-.607
PSP_C t ₀	-.029	-.469	-.645
PSP_C t ₁	.067	-.594*	-.847**

The analysis of the results shows that: (a) overweight children achieved, on average, higher scores than those of normal weight and obese; (b) statistically significant differences in post-intervention self-efficacy levels (Nw vs Ob; Ow vs Ob); (c) moderate to high correlations between BMI and perceived self-efficacy in t₁.

Discussion

In the present study, overweight children have shown higher self-efficacy perception and enjoyment at baseline compared to the group of normal weight and obese ones. Despite the improvement in post-intervention values, the difference is not as statistically significant in the Ow group as it actually is in the group of Nw.

As far as the Ow-Ob group is concerned, the statistical analysis revealed negative correlations, from moderate to high, between BMI and perceived self-efficacy post-intervention. This would suggest not only the greater effectiveness and impact of the practice of motor activity on the Nw group, but also, and above all, a consequent faster and more immediate (negative) interaction with the related psychological factors in the acute and short-term for the Ow group. Overweight and obese children would require structured protocols and interventions in the medium/long term in order to have a positive and significant impact on the variables considered, especially on the levels of perceived self-efficacy.

As for the differences between the groups (Nw vs Ow vs Ob; M vs F) it is possible to hypothesize that this is partly due to the choice and selection of the contents. According to Li et al., (2018), the "preference" linked to a certain type of activity would represent the factor that more than any other would be able to facilitate positive attitudes towards motor activity, reducing the sedentary behaviour. Therefore, given the wide variety and heterogeneity of tasks proposed in the intervention protocol, it can be assumed that: (a) certain activities and contents are more "preferred" than others and (b) Nw is the group that best manages to adapt to the proposed tasks.

So far, few studies have analysed the impact of active breaks on enjoyment and self-efficacy related to motor activities. The study of Nagy et al. (2017) reveals lower levels of enjoyment in overweight and obese children compared to normal weight ones, as well as an increasing fun during the practice of motor activity.

Findings reveal a better attitude towards physical activity, including physical fitness self-perception, after HOPSports Brain Breaks[®] intervention programme (Bonnema et al., 2020; Mo et al., 2020).

Other studies highlight the effectiveness of active breaks in increasing physical activity levels (Harris & Chen, 2018), intrinsic motivation, perceived self-efficacy and related psychological factors (Glapa et al., 2018; Popeska et al., 2018).

The results of an Australian "ACTI-BREAK" intervention program, based on the proposal of 3x5 minutes active breaks carried out for 6 weeks, (Watson et al., 2018) highlighted an improvement in classroom behaviour, especially for children. Calvert et al. (2018) highlight an increase in PAL and a decrease in sedentary habits as a result of a two-year program of active breaks in a sample of primary school children.

Interventions based on active breaks contribute to a significant increase in PAL in primary school children, both in terms of MVPA and steps number (Masini et al., 2020). The positive effects also extend to cognitive factors, such as attention and concentration, which allow a greater and better predisposition to learn the following disciplines, and to behavior in the classroom (Masini et al., 2020).

Conclusion

The integration of physical activity into the school day is a key aspect for the promotion of complete school physical activity programs with a broader perspective on body and movement education. The proposal of short active breaks not only embraces the contents of physical education itself (motor skills learning, coordination and conditional skills development, improved physical fitness, etc.), but also enriches the motor experience with contributions and elements of other disciplines (e.g., mathematics, chemistry, foreign language, etc.) re-oriented in the classroom context.

Learnings can be contextualized and adapted to create motor tasks setting, expanding, and strengthening the relationship between teachings.

An actual developmental perspective concerns the use of technologies: physical education could be promoted by projecting videos in the classroom that could integrate traditional contents and adapted organizational methods. The use of technologies in curricular teaching can therefore be envisaged not only to expand the set of contents and equipment traditionally used in physical education and school motor activities, but also, and above all, to develop students' motivations and perception of self-efficacy. From this perspective, technologies would acquire an important didactic and methodological value, especially for more sedentary populations.

The pilot project proved useful and effective in increasing levels of self-efficacy and enjoyment, although there are differences between groups.

The interruption of the teaching activities and the consequent proposal of motor activity represents an important and significant strategy both to improve students' behaviour and concentration during the following class hours, generating a favourable, motivating and competence-oriented environment.

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