

A CRITICAL STUDY OF INTERVENTIONS TO INCREASE PHYSICAL ACTIVITY OF CHILDREN

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Abstract. *During the last decades, the physical activity (PA) of children decreased. Outdoor games have been replaced by the activities indoors that require less physical exercise and involve spending more time on sedentary behaviours. This article discusses not only the possible consequences of physical inactivity but also the possibilities of increasing PA. Related to this is the need to learn lessons from previous interventions to increase PA. The aim of this study is to critically investigate the interventions to increase PA of children. In order to reach this aim, the review and analysis of the scientific literature were carried out. The review has revealed that intervention can include educational programmes, new or improved policies, environmental improvements, or a health promotion campaign. The interventions that include several strategies are usually the most effective and result in a long-term change. They can be implemented in a variety of environments, including communities, workplaces, schools, healthcare and religious organizations. Those that involve a number of forms and multiple strategies are most effective. Physical education intervention programmes are increasingly recognized as a means of encouraging PA among children. Such programmes aim to expand the attractive environment for PA; reduce children's obesity; increase their physical capacity, and emphasize the importance of a systematic approach to increasing family and community engagement in the overall school physical activity programmes.*

Keywords: *children, physical activity, intervention*

Introduction

During the last decades, scientists pointed out that the active activities of children at their leisure time are more often replaced by less physically active activities indoors playing games on a computer or a mobile phone (Grund et al., 2000). Besides, children are more often taken to school by car or go by bus instead of walking or cycling. Therefore, concern rises over the physical activity (PA) of children. Recent studies show that 66.6 per cent of adolescents are inactive (López-Sánchez et al., 2018). In addition, a similar percentage (66.4 per cent) of primary schoolchildren are not physically active (Rutkauskaite & Bukauske, 2016).

Studies revealed that the deficiency of PA is a risk factor for many diseases (Booth, Roberts, & Laye, 2012; Lee et al., 2012). The analysis of children's leisure time ascertains that schoolchildren's health is getting worse every year, with only one-third of healthy children coming to the first grade (Stukas, Kalibatiene, Vingras, Dobrovolskij, & Savickaja, 2011). Primary schoolchildren do not only lack sufficient PA and spend too little time outdoors but also suffer from disorders such as increased nervousness, flatfoot and spinal distortion (Stukas et al., 2011). Systematic reviews also revealed that sedentary behaviour of schoolchildren is related to unfavourable body composition, higher cardio metabolic risk scores, and lower fitness (Carson et al., 2016). Meanwhile, sufficient PA is positively associated with physical, psychological, social, and cognitive health of children (Donnelly et al., 2016; Poitras et al., 2016).

Scientists note that it is important to engage children in PA as early as possible in their development (El Rayess, Gandhi, & Mennillo, 2017). The attention is drawn to the fact that children spend about 1300 hours a year at school (Adkins, Bice, Heelan, & Ball, 2017). Therefore, the school should ensure the children a sufficient level of PA for their consistent personal development. For this reason, the educational environment of the school is increasingly becoming a target for PA interventions (Burns, Fu, & Podlog, 2017). Therefore, it is not only the results of various intervention programmes used to promote PA of children's but also the content and improvement possibilities of such programmes are important. Moreover, the development of new innovative PA intervention programmes requires a careful analysis of previous programmes.

The aim of this study is to critically investigate the interventions to increase PA of children. In order to reach this aim, the first step was to explore the importance of the context for an intervention programme to be applied and, secondly, review and summarize the selected intervention programmes.

The concept, complexity and contextuality of the interventions that encourage PA

In general, the concept of intervention can be defined as a combination of elements or strategies of a programme to promote a change in behaviour or health improvement among individuals or population. Intervention can include educational programmes, new or improved policies, environmental improvements or health promotion campaigns. Interventions that involve several strategies are usually most effective and lead to long-term changes. Interventions can be implemented in a variety of environments, including communities, workplaces, schools, healthcare organizations, religious organizations or homes.

Increasingly, while evaluating the effectiveness of interventions, the importance of the context is emphasized, which allows investigating the processes

of the implementation of an intervention. The context may explain why certain aspects of intervention do not work and reveal the reasons why an intervention has different effects at different locations. According to P. Hawe, interventions may sometimes not work because they are not adapted to the circumstances in which an individual or a community lives (Hawe, 2015).

Therefore, the context is crucial for planning (or creating) appropriate intervention health programmes and assessing their effectiveness. In recent years, while investigating the effectiveness of health promotion interventions, researchers increasingly focus on the context and its potential impact on the effectiveness of the intervention itself (Shoveller et al., 2015). It has been noticed that different contextual variables are taken into account when evaluating health promotion intervention programmes. Such relevant variables as *the geographic location, the social and structural features of the context, social stratification, cultural norms, traditions, the stereotypes based on gender, ethnicity or age* have been identified, and *the need to assess how the context may affect the implementation of the intervention* is emphasized (Fast, Shoveller, Small, & Kerr, 2013). Emphasizing the importance of the context, Hawe (2015) argues that the impact of the programme is a very complicated and complex phenomenon that is influenced by both the intervention itself and the complexity of the context, and their interaction. The complexity enhances unpredictable effects, which requires a new approach to modelling and explaining the impact of interventions and their differences. The results of the intervention should be interpreted taking into account the dynamics of the whole system in which the intervention takes place and combining different variables and their changes.

To sum up, it can be noted that the context and the complexity of the intervention should be taken into account at all stages of the intervention: planning and implementing it, evaluating its impacts, explaining the differences, and planning its improvement. Therefore, it is important to assess the interaction between the intervention and the context. All context variables can be grouped into three broad context groups, that is the socio-political, community and local context, which are relevant while developing health promotion programmes, assessing their effectiveness as well as explaining the differences (Shoveller et al., 2015).

Methodology

The sources that analyze the theories of physical activity and the educational PA intervention programmes were searched for in the databases *Pubmed, EBSCO, Scholar Google, and the Electronic Catalogue of the Lithuanian University of Health Sciences*. The keyword combinations used for search included *physical activity, educational PA intervention programmes, PA motivation, PA theory, the*

effectiveness of the intervention of educational PA. The scientific articles were selected taking into account the following criteria: 1) they analyze the theories and attitudes that explain physical activity; 2) the implemented educational PA intervention programmes were based on relevant theoretical provisions that explain physical activity; 3) the complexity of PA intervention programmes.

Children's physical activity intervention programmes and their peculiarities

While promoting schoolchildren's PA, physical education intervention programmes are increasingly recognized (Zarrett, Abraczinskas, Cook, Wilson, & Ragaban, 2018). Intervention programmes aim to expand the amount of PA; reduce children's obesity; increase physical capacity. They emphasize *the importance of a systematic approach* to increasing family and community involvement in overall school PA programmes.

While analyzing the programmes promoting the PA of schoolchildren, it is appropriate to pay attention to the components that are important to the effectiveness of the programme including the motivational climate; the physical and psychological security; the optimal development of PA skills; an effective physical preparation; a possibility to choose an appropriate structure of PA; a possibility to form positive social relationships (peers, parents, teachers), and providing a support that encourages PA (Schenker, 2018; Zarrett et al., 2018).

The time spent at school plays an important role. The environment changes, the social network is different and the agenda varies. One of the main reasons for the lack of children's physical activity is the lack of time, huge learning load, unwillingness to exercise, the lack of support, and the peculiarities of the school environment and culture. School sports and physical culture traditions, the community engagement and support as well as the development of infrastructure can create favourable or not environment for PA (Deliens, Deforche, De Bourdeaudhuij, & Clarys, 2015).

Promoting internal motivation is one of the key factors for greater PA. Therefore, some of the intervention programmes are oriented towards promoting the enjoyment and pleasure in PA. It is worth mentioning the programmes such as Sports, Play, and Recreation for Kids (SPARK), Middle School Physical Activity and Nutrition (M-SPAN), Born to Move, Sports Education Model, etc. The study of the interventional PA promotion programmes that aimed at increasing children's emotional satisfaction in PA reveals that they can be effective in increasing their engagement in PA (Burns et al., 2017). Such programmes are more effective for the children with a light or moderate level of PA. Children are more likely to engage in PA when they feel satisfied. Moreover, the emotional satisfaction during PA is associated with long-term PA. The

SPARK and Sports Education Model programmes are based on the independent decision of a schoolchild regarding PA rather than the decisions of teachers or trainers. This creates a sense of autonomy and, therefore, leads to long-term impacts of intervention.

The structured fitness programme Born to Move was designed to increase children's enjoyment and engagement in PA by providing all of them with an opportunity to participate regardless of their level of skills. In addition, the programme sought to improve health. In the classroom, music and songs were played to enhance the enjoyment experienced. It has been revealed that within 6 weeks the level of pleasure alongside with the level of PA increased from light to moderate, which can be considered to be a medium to high impact of the intervention (Fairclough et al., 2016). The motivational constructs such as independence, perceived competence and pleasure have a complicated but significant interrelationship that can affect the ability to engage in PA (Cairney et al., 2012). Therefore, in order to increase schoolchildren's emotional satisfaction, it is necessary to use long-term stimuli of emotional joy (interest in activities, honours, the joy of communication, and etc.). However, attention should also be paid to the variables related to the nature of the PA itself (for instance, the type of an activity, the variety of PA forms); the social support, beliefs in efficacy, and attitudes towards PA, which may all influence PA enjoyment levels (Burns et al., 2017). Therefore, while applying and developing new programmes that encourage PA, it is advisable to promote the experience of pleasure during PA.

Since the feeling of pleasure by the participation in an activity is important for promoting schoolchildren's PA, no wonder that some of the PA intervention are based on the self-determination theory. It emphasizes two types of environment, the one that supports autonomy and another that controls (Ryan & Deci, 2000). The environment supports autonomy in case the interpersonal style of the persons with a certain power (that is an educator, parents) considers the perspective of an individual. Besides, the environment supports autonomy when such persons clearly explain why a certain behaviour is important. The explanation and understanding, that is providing positive feedback, can help understand the direction and enhance the sense of competence (Ryan & Deci, 2000). Finally, the environment that supports autonomy satisfies the need for independence by providing choices through personal communication using a neutral language (for instance, using the verbs such as "you could" rather than "should") (Deci, Eghrari, Patrick, & Leone, 1994). Meanwhile, a controlling environment prevails when two of the three important factors that comprise an autonomous environment (justification, choice, or perspective) are absent from the environment, and the power-holders (teachers, parents) do not provide meaningful explanation, use pressure in communication (for instance, use "have to" instead of "should") and/or force their approach (Deci et al., 1994).

Only a few interventions that were based on self-determination theory will be discussed. Vansteenkiste, Simons, Soenens, and Lens (2004) sought to increase schoolchildren's participation in the Taibo programme that encourages PA by short, convincing remarks highlighting the benefits of Taibo while creating an autonomous or controlling environment. The results obtained revealed that the environment that supported the autonomy enhanced children's understanding of the support of independence, the autonomy of motivation and participation in PA. The effectiveness of the programme ranged from low to medium (Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). However, the researchers did not evaluate the degree of the impact that the changes in children's behaviour outside the school.

Chatzisarantisa and Haggerb (2009) compared the effectiveness of two interventions in both the school environment and at leisure time. The first was the intervention that supported autonomy by using all of the required components such as the explanation of actions, feedback, options and recognition of the difficulties related to PE classes. The second was the intervention that supported autonomy less, that is only a logical explanation of actions and the feedback were used. The results revealed that the schoolchildren better understood the teachers whose interpersonal style of communication was supporting. They felt more motivated to be independent and more self-motivated. Therefore, it is not only the activity itself but also the explanation of the motives to be PA as well as feedback that is important while promoting children's PA. Meanwhile, under control, children's perception regarding the support of autonomy and motivational styles have not changed over time. Schoolchildren failed to change their understanding of autonomy and motivational orientation because personal feelings and perspectives were not recognized, and in the context of autonomy nobody talked about motivation and there was no feedback (Chatzisarantisa & Haggerb, 2009).

In the context of health education, the Ecological Model is discussed. The Ecological Model originated from the science of biology and is based on the interaction between the organism and the environment. Having introduced this model in the fields of behavioural and public health sciences, the focus was on the nature of the individual's interaction with the physical and socio-cultural environment (Stokols, 1996). The main difference between the eco-model and other widely used behavioural theories that focus on individual characteristics, skills and the impact of the immediate social environment (family, friends) is that it also involves a wider context, that is the community, organization, or political environment (Glanz, Rimer, & Viswanath, 2015). It is worth mentioning one of the intervention programmes of the project 4 PREVIENE that was designed to increase children's PA through an active cycling to/from school strategy (Chillón, Evenson, & Vaughn, 2011). This intervention involved school, family and community activities mainly focusing on individual factors such as children's

perception (perception of the safety of travelling to school) and attitudes (independence or motivation to walk).

The activities were organised in the classroom as well as in the neighbourhood of the school. Alongside with these activities, active cycling to/from school was promoted and its advantage was emphasized. Besides, during the intervention, additional encouraging information (as text or images) by WhatsApp messages was sent to families. The aim was to explain the most important ideas related to the achievements of active cycling to school as well as mental and physical health of a child. Moreover, throughout the intervention, teachers tried to encourage possible lifestyle changes using positive enhancement (for instance, children's walking to school together) as a motivational strategy. The purpose of this enhancement was to remind the children to go actively to and from school. The results revealed that the children and parents assessed the increase in PA of children and the motivation to continue this PA rather subjectively.

The Comprehensive school PA programme is based on the Whole-of-School Approach (Centeio, Erwin, & Castelli, 2014) for the whole school to improve youth's PA. The Comprehensive school PA programme model is based on five main areas: high level quality physical education classes as the basis (for instance, by emphasizing knowledge, skills and the provision to be physically active throughout life); the PA itself during the classes; before and after school PA programmes (for instance, active transportation and sports clubs); staff participation (for instance, staff health promotion programmes including PA as a priority result), and family and community engagement (for instance, active family trips, the school as a community PA centre) (Moore et al., 2017). Such interventions are often focused on increasing the physical movement of the school by expanding, developing, or enhancing existing opportunities in all aspects of the intervention (Beets et al., 2016). The interventions that include only a few components of the PA have been identified to be less effective (Russ, Webster, Beets, & Phillips, 2015).

It is worth noting the use of information technologies in intervention programmes. Although playing games on a computer or mobile phone are associated with the occupation that is barely PA, the new technologies can be exploited to encourage the PA. Various new technologies are more attractive to children than adults. For instance, PA can be promoted at schools by applying video games. Interactive games encourage children to be PA by using arms, legs or whole body movements. Such games illustrate the movements of various sports or other activities of daily life. An interactive video game is closely related to the reality, and playing such a game results in stimulation of active daily habits (Maddison et al., 2001). It has been ascertained that playing interactive games improves eye-hand coordination, agility and many other motor skills that require

physical features (Latham, Patston, & Tippett, 2013). In addition, while playing these games, arms and legs are used actively. Moreover, while playing in virtual environments, there is less risk of injury than while engaging in traditional PA (Schwebel & McClure, 2010). It has also been stated that interactive games can improve children's PA by consuming much more energy than sitting in one position and playing simple electronic games (Graves, Ridgers, & Stratton, 2008).

The analysis of the research experience (Evans, Abrantes, Chen, & Jelalian, 2017; El Rayess et al., 2017; Lind et al. 2018; Zarrett et al., 2018; Howie, Daniels, & Guagliano, 2018; Tercedor et al., 2017; Centeio et al., 2014; Moore, 2017; Glanz et al., 2015; Chatzisarantisa & Haggerb 2009, etc.) allowed distinguishing the following directions of the school intervention programmes meant to promote children's PA and the forms of the PA: *the PA before school; the PA in the classroom; the PA during breaks; the coordination of after-school PA programmes; increasing the engagement of teachers; the participation of family members; the promotion of the community sports practice and games; the engagement of parents; the encouraging influence of the peers regarding PA, organizing inter-school sports events and competitions*. The focus should be laid on the motivational constructs such as emotional satisfaction, the experience of joy and success, autonomy, and perceived competence.

Conclusions

The study revealed that intervention can include educational programmes, new or improved policies, environmental improvements, or a health promotion campaign. The interventions that include several strategies are usually the most effective and result in a long-term change. They can be implemented in a variety of environments, including communities, workplaces, schools, healthcare and religious organizations. Those that involve a number of forms and multiple strategies are most effective. Physical education intervention programmes are increasingly recognized as a means of encouraging PA among children. Such programmes aim to expand the attractive environment for PA; reduce children's obesity; increase their physical capacity, and emphasize the importance of a systematic approach to increasing family and community engagement in the overall school physical activity programmes.

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