

Physical Activity

Subjects: **Social Issues**

Contributor: Zachary Crowley-McHattan

Physical activity (PA) refers to any bodily movement produced by skeletal muscles that requires energy expenditure. Participation in regular and adequate levels of PA is an essential contributor to good health, maintenance of healthy weight, and management of risk factors of chronic diseases.

physical activity

children and adolescents

social ecological model

participation in sport and exercise

1. Introduction

The current Physical activity (PA) participation levels in developed countries are generally less than the optimal level recommended to gain health benefits in both adults and children ^{[1][2]}. There is little doubt that participation in PA is inversely related to being overweight and the risks of metabolic and cardiovascular diseases, at least as found in cross-sectional studies ^[3]. There is strong evidence that participating in the recommended amount of PA is beneficial to children and adolescents, improving physical and mental health, sleep quality, brain development, bone health, and social, psychological, and cognitive health ^[4]. Furthermore, existing evidence shows that people's behavior in adulthood stems from the environment they have lived in since childhood, and that the behavioral habits developed in childhood tend to sustain in adulthood ^[5].

Inadequate PA levels and increased prevalence of obesity in children and adolescents has become a global issue ^[1]. Although PA is an essential component of health interventions, various intrapersonal factors and environmental barriers may prevent children and adolescents from participating in adequate levels of PA ^[6]. Some researchers have previously tried to identify and understand factors leading to inadequate PA levels in children or adolescents, but they primarily focused on the factors at the individual level such as self-efficacy ^{[7][8][9]}. A growing body of research, based on social determinants of health perspectives, demonstrates that engaging in health enhancing behaviors such as participating in PA is far from being only a matter of an individual's decision or intention but also influenced by the social and physical environments ^{[10][11]}. To identify the critical factors that influence people's level of participation in PA and understand the relationships between these factors, the application of a social ecological model (SEM) as an organizational framework has been advocated by many researchers ^{[12][13][14][15]}.

2. Factors That Influence Participation in Physical Activity in School-Aged Children and Adolescents

Intrapersonal level: The most frequently cited factors at the intrapersonal level were gender, self-concept, age, ethnicity, and body mass index (BMI). Eleven studies examined these factors and their relationships to PA participation [6][16][17][18][19][20][21][22][23][24][25]. When it came to gender and age, most studies were consistent. Six studies indicated that boys were more active than girls, and boys spent more time on recreational PA [6][17][18][23][24][25]. These gender differences were explained by non-modifiable variables, including girls' biology [26], and by some modifiable variables such as psychological [27] and cultural background factors [28]. In addition, older children were found to be less active than younger children, so in childhood or adolescence, older age could be viewed as a barrier, while younger ages may be considered a facilitator [18][19][24]. This finding had also been demonstrated elsewhere [29]. There was a trend that older children, both boys and girls, preferred playing video games at home and watching TV compared to playing physical games in their leisure time [24]. Several questions can be raised for future studies, e.g., what types of age- and gender-appropriate physical activities are attractive to children and adolescents? How to increase opportunities and the likelihood of children and adolescents participating in PA, taking into account gender and age differences? The answer to these questions will help inform school policy and develop strategies designed to promote PA in school settings.

Self-concept and BMI were additionally reported as influencing factors at the intrapersonal level. Self-concept includes self-efficacy [16][19], perceived health, physical self-perception, participation motives [22], and perceived competence and enjoyment [21]. In these studies, self-concept has been one of the strongest predictors of PA participation in children or adolescents [16]. Consistent with previous studies, when children or adolescents have high levels of self-concept, they tend to persist and actively participate in PA, and vice versa [9][30]. This finding suggested that physical education educators and health promoters should aim to improve students' self-concept continuously and at the same time encourage them to adopt and maintain regular PA. Three studies [19][22][23] showed that BMI was not associated with PA participation. Considering the rate of PA participation in overweight and obese children was similar to that in their normal weight peers [31], these children all might have participated in PA to improve their health. Thus, BMI was not a predictor of PA participation. The directionality of relationships between participation in the PA and measures of physical health still needs more research [1]. Furthermore, two studies [17][25] found that children and adolescents of different ethnic groups had different PA participation levels. Children from visible minority groups were more likely to report more PA barriers than Caucasian children in a study from Canada [25]. Another study from Israel reported that PA participation was different between adolescents from different ethnic backgrounds (Jews and Arabs), which could lead to health disparities [17]. This is in line with the other studies that have found that the differences in PA levels were associated with the ethnic backgrounds in adolescents [32][33]. Therefore, it is suggested that "race/ethnicity" and/or cultural backgrounds should be a consideration in the design of future studies investigating factors that influence PA participation.

Interpersonal level: The most mentioned factor at the interpersonal level was friends' influence. There was consistent evidence across the articles regarding the importance of supports from friends and parents in facilitating PA participation [6][16][34][17][18][19][20][21][22][24]. Additionally, a lack of supports from friends or parents was considered a barrier to PA participation for children or adolescents [6][34][20][21][22]. These findings were consistent with previous research [35][36][37], which suggested that supports from parents and friends could promote regular PA participation among children and adolescents and help them develop and maintain an active lifestyle [16]. Furthermore, it

appeared that parents' educational level may have an additional influence on children's PA participation profile. In Vella, Cliff and Okely [23], lower educational attainment of the parents was identified as a barrier, while D'Angelo, Fowler, Nebeling and Oh [19] and Wilk, Clark, Maltby, Smith, Tucker and Gilliland [18] reported that students whose parents had a college degree or higher levels of education had a moderate to vigorous PA profile. This observation, however, is based on a limited number of studies. Therefore, it is prudent that further investigations are required to investigate the relationship between parents' education level and children's PA participation level.

Organization level: Six studies [38][39][16][34][20][23] examined the relationship between teachers' influence and children's PA participation. Teachers' support was a significant positive predictor of PA participation. Five articles found that support from physical education (PE) teachers could positively promote students' engagement in PA [38][39][16][20][23], and two articles indicated that a lack of teachers' support was a barrier [34][20], which is consistent with previous studies [40][41]. For example, professional PE teachers in primary schools were shown to be able to improve PA levels and fundamental movement skills better compared to untrained teachers [23][42]. It is also found that different types of schools were associated with children's PA participation. Private schools and rural schools appeared to positively promote students' engagement in PA, whereas urban public schools lacked this positive influence. Two studies [22][24] found that boys attending public schools were reportedly participating less in leisure time PA than boys in private schools. In addition, children in rural areas had more leisure time, which was consistent with a previous report [43]. Future studies should explore the reasons for such a difference in PA participation between urban and rural schools and between public and private schools.

Community level: From the analysis of the included studies, there are evidence of the importance of neighborhood safety and accessibility to facilities on PA profiles at the community level. Although three studies [16][19][23] reported that neighborhood safety had no significant effect on PA participation, these samples were predominantly from parents with higher levels of education or from communities with a dominant ethnic group (e.g., Caucasian). Therefore, in future studies it may be prudent to consider other potential influencing factors (e.g., intrapersonal) when investigating the community level. Another three studies [21][24][25] showed that a lack of safety was a significant barrier to PA participation, which was consistent with previous studies [44][45][46]. The discrepancies between studies may be due to differences in settings. Furthermore, facility accessibility was found to be an important factor for students' positive engagement in PA [6][16][34][19][20][25]. Physical educators and health promoters should advocate the needs of accessible facilities at affordable levels to various participants in the community to promote PA participation [47]. However, building safer neighborhoods and providing more accessible facilities within the community are often beyond the physical educators' and health promoters' capacity. Therefore, changes must occur at the policy level. In addition, most school children mentioned that weather was also an important influencing factor [34][20][21][24]. Therefore, it may be beneficial for physical educators to provide children with information on alternative activities to keep them physically active (e.g., adapted skating in winter, indoor PA games on rainy days) when the weather is not promising.

Policy level: There was a limited amount of research focused on the policy level [38][39]. The possible reason for this lack of research focus was that all the studies here were aimed at children and adolescents in which schools were the most common locations for PA participation [20]. Therefore, most school-based PA studies were concerned with

the school environmental factors (e.g., classmates, teachers, PE curriculum, school facilities, etc.), which resulted in examining factors at the SEM's lower levels. In the two studies that addressed the policy level, Langille and Rodgers [38] indicated that the influence of provincial and municipal policies were consistent with SEM, in that they had a top-down influence on the direction taken by the schools. Provincial policies were to provide guidance for the schools to develop overall standards and achieve specific results. Meanwhile, the policies of the municipal government could indirectly influence the decisions of school administrators. The policy level is of the highest level in the SEM structure, and it has a strong influence on the lower levels within the SEM. It is clear that different policies can simultaneously or independently influence the school environment and children's participation in PA. In the other study addressing the policy level, Webster, Andrew and Naoki [39] pointed out that when PA policies lacked accountability, schools might be less inclined to implement these policies because of localized factors, such as principals' and teachers' beliefs. Webster, Andrew and Naoki [39] also indicated that policy leadership for school PA in the U.S.A. mainly came from the district government where the school was located and to a lesser extent from the state and federal governments. It may also be necessary to increase the role of state government and perhaps even the federal government in generating school PA policies. In addition, there is an important relationship between policy and community levels in the SEM. As mentioned above, building safer neighborhoods and providing more accessible facilities require policy makers to address issues at higher levels. Changes must occur at the policy level. Future studies could explore the policy level influences with more in-depth analysis to help improve PA rates, and when possible, address all five levels together. Moreover, future studies should examine what types of policies or practices can successfully provide accessible facilities and increase neighborhood safety.

3. Recommendations

The following recommendations have emerged.

- (1) Strategies should focus not only on children and adolescents at the intrapersonal level but also on other levels in the SEM and the key stakeholders operating within these levels (e.g., friends, teachers, parents, and school administrators).
- (2) At the intrapersonal level, gender was the most commonly reported influencing factor. It is recommended that gender- and age-specific strategies be identified for further interventions to improve PA participation among children and adolescents. Self-concept was the strongest predictor of PA participation in children or adolescents. Therefore, improving students' self-concept is of great significance in the future.
- (3) At the interpersonal and organizational levels, school-based interventions have the potential to improve adolescents' PA participation rates. Schools are the most common location for children and adolescents to participate in PA and the main location for organized PA. Supports from friends, parents, and teachers are all significant and positive predictors of students' PA participation. Whether a holistic universal approach or specific approaches tailored to subgroups or individuals is more effective requires further investigation. There is no consistent evidence on the relationship between parents' education level and children's PA participation, and therefore this requires further study.

(4) At the community and policy levels, accessibility of facilities (and at affordable level) and safe neighborhoods are crucial to ensuring children and adolescents participate in PA. Health promoters and policy makers should advocate and raise awareness of these needs for their communities. Future studies should examine what types of policies or practices could successfully provide accessible facilities and increase neighborhood safety.

Identifying the factors that influence PA participation can provide policy makers, physical educators, and public health officials with essential information to guide the distribution of initiatives and resources to promote PA and reduce or eliminate health disparities.

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