

# *A Study on the Factors Influencing Physical Activity among Children and Adolescents under the "Double Reduction" Policy—Based on A Socio-Ecological Model*

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**Keywords:** Social ecology; physical activity; health; community; children and adolescents

**Abstract:** In recent years, some indicators of adolescents' physical fitness continue to decline, and the rates of myopia and obesity are increasing. In order to solve the problems of adolescent health, the state has also introduced several policies such as "double reduction". This paper aims to analyze the factors influencing the physical activity of children and adolescents based on the social-ecological model. This article searched the full text of reviews published between 2000 and 2022 was systematically searched through PubMed, Scopus, Web of Science, Academic Search Ultimate, Medline, and SPORTDiscus with full text via the EBSCO platform, a systematic search was conducted. A total of five studies that met the inclusion criteria were reviewed. The findings indicate that self-efficacy, friends, parental support, parental exercise, sports facilities, and school policies were positively correlated with the impact of physical activity on children and adolescents. Activity barriers and neighborhood crimes showed a negative correlation. Further research is needed on the effects of parental education, park trails, and government policies on children and adolescents' physical activity. Therefore, the following conclusions are drawn: Physical activity among children and adolescents is affected by a variety of factors, schools are considered to be the main place to implement interventions. The promotion of physical activity among children and adolescents requires the joint participation of the government, communities, schools, families, and scientific research institutes, and requires the introduction of a more comprehensive policy synergy and guarantee system.

## 1. Introduction

The physical health of children and adolescents is the basis for the development of their future abilities, which to a large extent affects the future level of national health and is related to the revitalization of the nation and the development of society [1]. In recent years, some indicators of

students' physical fitness have continued to decline, and the rates of myopia and obesity have continued to increase, so that the issue of students' physical fitness and health has received more and more attention from the State and society. The Report on Nutrition and Chronic Disease Status of Chinese Residents (2020) released by the National Health and Health Commission shows that the overweight and obesity rate of children and adolescents aged 6-17 years old in China is close to 20%, and that the overall myopia rate of children and adolescents in China will be 52.7% in 2020, with primary school students at 35.6%, junior high school students at 71.1%, and senior high school students at 80.5%, making the problem of myopia very prominent [2]. The lack of time for outdoor activities and physical exercise is one of the major causes of children and adolescents health problems.

Physical activity, as the main tool to improve the physical health of children and adolescents and to promote their overall development, plays a key role in the healthy growth process of children and adolescents [3]. Regular physical activity is essential for the healthy development of children and adolescents, and has a positive effect in controlling obesity, reducing the prevalence of type II diabetes, as well as mental health promotion [4]. On July 24, 2021, the General Office of the Central Committee of the Communist Party of China (CPC) and the General Office of the State Council issued the Opinions on Further Reducing the Burden of Homework for Students in Compulsory Education and the Burden of Out-of-School Training (referred to as the "double-reduced" policy), which allows primary and secondary school students to strengthen their physical fitness activities outside of school hours to improve the physical fitness and health of primary and secondary school students. In recent years, although scholars in China have strengthened the research on physical activity promotion for children and adolescents, it started late compared with foreign countries. Through the literature search, it was found that social ecology theory research has been conducted in and out of China, with less research on specific implementation paths. In the context of "human and natural community of life", "healthy China", "National Fitness" and "integration of sports and education", and further exploration is needed to address the issue of insufficient youth activity, promote the healthy growth of young people, and promote a system of sports activities for young people. The main aim of this review is to examine the factors influencing physical activity in adolescents within an ecological model.

## 2. Socio-ecological model

Since physical activity is influenced by a variety of factors, behavioral theories and models were used to guide the selection of variables for the study [5]. The integration of thoughts from several theories into ecological models (including the interrelationships between individuals and their social and physical environments) is common [6]. According to the ecological model, there are multiple levels of influence on physical activity, i.e., personal (e.g., gender, motivation), social (e.g., friend support, family support), and environmental (e.g., equipment and physical activity programs in the community) [7]. As multilevel interventions have been found to be more effective in changing behavior [7], a social-ecological approach is needed in order to promote PA within and outside of sports and school settings.

## 3. Materials and Methods

Search for relevant literature based on the research topic, Exploratory searches were conducted in five databases (Pubmed, PsycINFO, Sportdiscus, ERIC, and CNKI, the date of the last search was 15 August 2023. English search terms were used as follows: «physical activity» OR «physical exercise» OR «health behaviour» AND «correlates» OR «determinants» OR «mediators» OR «associated factors» OR «psychosocial» OR «physical education» OR «environment» AND «childhood» OR «adolescence» OR «children» OR «adolescents» AND «review» OR «systematic review» OR «meta-analysis» OR «research synthesis».

## 4. Result

Through screening, 5 articles met the entry criteria [8-11], covering the years 1970-2020, including 1 separate policy analysis [12], and the number of included studies was 25. 5 articles ended up containing 29 reviews and 81 papers, which were included to look at the full coverage of the time period and the number of articles included, and 2 reviews analyzed Chinese children and adolescents [10, 11].

### 4.1 Analysis of factors influencing physical activity in adolescents under the socio-ecological model

Table 1: Factors influencing children and adolescents' participation in physical activity in the socio-ecological model

Factor	variables	Related research															summarize													
		Stuart J.H. Biddle 2011 <sup>[9]</sup> (n = 9)			Martins J 2017 <sup>[10]</sup> (n = 20)				Donglin Hu 2021 <sup>[11]</sup> (n = 14)			Congchao Lu 2017 <sup>[12]</sup> (n = 42)			Woods C B 2021 <sup>[13]</sup> (n = 25)			totals												
		N			N				N			N			N			N												
		+	-	+ -	+	-	+ -	0	+	-	+ -	0	+	-	+ -	0		+	-	+ -	0	+	-	+ -	0					
personal level	Gender (male)(+)	3/2			6/6						6	1	7/11			4/2								<b>16/19</b>		6/6	5/3	+/+		
	Age		0/2		0/1	0/6		1/0			3	1	2/0	0/3	3/5									2/1	<b>0/11</b>	3/3	5/5	?/-		
	Ethnicity	0/2			0/6			1/2			2	2															1/2	?/+		
	Self-efficacy	1/1		1/2	4/6	2/1	0/2				6		0/4												5/11	2/1	<b>7/10</b>	+/-/+		
interpersonal level	Friend Influence	0/3			3/4	0/1				5	5														<b>8/12</b>	0/1	5/5	+/+		
	Parental Influence	5/6			7/10			1/1	3	3															<b>15/19</b>		3/3	1/1	+/+	
	Parents' Education				0/3			2/1			3		0/1	0/1	4/3										0/4	0/1	3/3	<b>6/4</b>	0/?	
	Parents' PA	6/7			4/5			2/4			1	1	3/5		1/1										<b>13/17</b>		1/1	4/6	+/+	
Environmental level	PA Facilities	3/3			7/4			2/3	1	2	3														<b>10/7</b>	2/2	3/3	2/3	+/+	
	Distance to school		1/1					2/2			2	1														1/1		2/2	3/3	?/?
	Outdoor PA time	3/2			4/0																									+/?
	Neighborhood crime		2/2			3/2	3				3	3															<b>8/7</b>		3/3	-/-
	Parks, trails	1/1																								1/1				?/?
Public policy level	School Policy	1/1			1/0			1/1	1								<b>6</b>	<b>2</b>							<b>9/8</b>	2/2		3/2	+/+	
	Government Policies								2																	2/2				?/?

“+” positive correlation; “-” negative correlation; “+ -” both positive and negative factors are correlated; “0” no correlation; “?” uncertain association. Symbols to the left of “/” indicate children, and symbols to the right indicate adolescents; PA: physical activity.

The explicit data of five articles on the systematic evaluation of the factors affecting the physical activity of children and adolescents were summarized, including four items of personal factors, four items of interpersonal relationships, five items of environmental factors, and two items of policies. As shown in Table 1, and due to the different coverage of some of the indicators, they were analyzed in relation to the specific expressions in the literature, in particular, the +- indicator.

#### 4.1.1 Personal level

At the personal level includes biological and psychological factors, as shown in Table 1, (1) biological factors include age, gender, and ethnicity. In terms of gender, most of the findings are consistent, with children (N = 16), and adolescents (N = 19) perceiving boys to be more active than girls. For age, there was little difference in results for children, with adolescents (N = 13) showing an inverse association. "Race/ethnicity" and/or cultural background, (N = 8) were considered as factors influencing PA participation for adolescents as well. (2) Psychological factors, (N = 11) showed

positive associations and (N = 10) showed both positive and negative associations.

#### 4.1.2 Interpersonal level

At the interpersonal level, the high percentage of associations among the factors is shown in Table 1, where the influence of friends is positive for children (N = 8) and positive and negative for (N = 5). Adolescents (N = 12) are positively associated and (N = 5) are positively and negatively associated; parental influence (N = 15) is positively associated in children and (N = 19) adolescents, showing overall positive associations. For parental education, children (N = 3) were positively and negatively associated and (N = 6) were unrelated, while adolescents (N = 3) were positively and negatively associated and (N = 4) were unrelated. Parental physical activity (N = 13) was positively associated for children and (N = 17) positively associated for adolescents.

#### 4.1.3 Environmental level

There are large differences in the analysis of environment-related factors in the relevant literature. The analysis of the content of the literature summarizes that the physical activity environments created by the family, the community, and the school are the 3 most important fields for children and adolescents. As shown in Table 1, physical activity facilities were positively associated with children's (N = 10) and adolescents' (N = 7) physical activity. The effect of distance to school did not differ significantly across the correlations, with time spent outdoors being positively correlated for children (N = 7) and adolescents (N = 2). Neighborhood crime was negatively associated with children (8 items) and adolescents (N = 7). Parks and trails were less studied for children and adolescents.

#### 4.1.4 Public policy level

School physical activity policies were positively associated with children (N = 9), and adolescents (N = 8) with physical activity. Empirical studies on the impact of government policies on children's (N = 2), and adolescents' (N = 2) physical activity were fewer, but only positively associated.

### 5. Discussion

The aim of this systematic review was to refer to the social-ecological model developed by Sallis & Owen (2015) [7], to screen existing relevant studies, and to analyze the influences affecting adolescents' physical activity in terms of the five dimensions of social ecology. Through literature analysis, we found that gender, ethnicity, friends and parental support, physical activity facilities, and school policies were significantly associated with physical activity among children and adolescents. The associations of parental education, distance to school, park trails, and government policies on children and adolescents were inconclusive and require further research.

Firstly, at the personal level, relevant studies have shown that boys are more active than girls [8-11], and the effect of age on physical activity in children is controversial, with adolescents showing an inverse correlation. Older age in adolescents as a barrier, while younger age as a facilitator [8-10]. Psychological factors include self, cognitive, conceptual, motivation. The literature analyzes the scope of the psychological factors in different ways. This paper analyzes physical activity disorders and inside self-efficacy. Self-concept is one of the strongest predictors of adolescents' participation in physical activity [13]. And when adolescents have a high level of self-concept, they tend to adhere to and actively participate in physical activities [10]. Motivation/goal orientation has a facilitating effect on physical activity in adolescents [9], while on the contrary, low levels of self-efficacy are seen as a hindrance [10]. This finding suggests that physical educators and health promoters should pay attention to the effects of gender and age on physical activity and should work to continually

improve students' self-concept while encouraging children and adolescents to adopt and maintain regular physical activity.

Secondly, the interpersonal dimension and social support are important dimensions that reflect the interpersonal dimension and are one of the most critical ecological factors influencing physical activity in adolescents [14]. Parental and friend support, as well as parental exercise, have been shown to significantly promote physical activity in children and adolescents [8-11]. Research has shown that support from parents and friends promotes regular physical activity and helps children and adolescents to develop and maintain an active lifestyle [10]. Lack of support from friends or parents has been identified as a barrier to physical activity in children and adolescents [12]. Moreover, children and adolescents are less autonomous in their behavior and are more susceptible than adults to direct (through parents or peers) or indirect influences from their environment. The aspect of parental qualifications remains somewhat controversial and more research studies are needed. Parental and peer support need to be taken into account when promoting physical activity in children and adolescents in the future.

At the third environmental level, environmental intervention for physical activity in adolescents is a process of interacting with many different environments such as the community, the family, and the school, which has been identified as an important site for promoting middle and high levels of physical activity and sedentariness, especially because children spend 40% of their waking hours at school [15]. A multilevel, global review highlighted the important relevance of the local school environment to children's physical activity [16], with higher levels of physical activity associated with the availability of school facilities, including permanent play structures, and with life in the school neighborhood [9]. Other correlates of related studies noted that teacher support for physical activity participation was a significant positive predictor and that support from physical education teachers can positively contribute to student participation in physical activity [10]. Children and adolescents in suburban/rural areas are less active than those in urban areas, especially adolescents, due to differences in physical activity between rural and urban areas. Unlike studies in western countries, this is related to the limited number of playgrounds for children in rural areas and the lack of facilities for physical activity compared to urban schools [11]. The community physical activity environment is the primary site for community sport and is an important arena for enriching the means of sport participation and socialization of children and adolescents, and facility accessibility has been found to be an important factor in students' active participation in physical activity [17, 18]. Building safer neighborhoods and providing more accessible facilities within communities is often beyond the capacity of physical educators and health promoters [10]. In addition, whether the built environment for children and adolescents' physical activities is suitable is one of the determinants of the amount and intensity of children's physical activities. Establishing safe, well-spaced, and walkable communities can provide children and adolescents with frequent opportunities for outdoor physical activities, which will increase their motivation to participate in moderate- to vigorous-intensity physical activity [19]. Through the above analysis, we found that the school facility environment, including teachers, and community facilities are important factors for children and adolescents to engage in high-intensity physical activity.

Finally, at the level of public policy, as an external driver influencing individual participation in physical activity, social-ecological theory emphasizes that the outermost level of policies and regulations, educational policies, and public health policies have a significant impact on individual behavior [7]. Schools are the practical place where policies are implemented and play a key role in the enhancement of physical activity among adolescents. As shown through studies that school policies are significantly associated with physical activity among children and adolescents [9-11, 13]. It has been suggested that schools should improve the effectiveness of adolescent physical activity by making policy improvements in the safety of physical education and exercise, teaching staff,

adequacy of physical activity facilities, extracurricular physical activities, transportation to and from school, and community outreach [20]. At present, China has also introduced the "Double Reduction" and other relevant policies to improve the health of children and adolescents, but since the physical activity of children and adolescents is affected by many factors, it requires the joint participation of the Government, communities, schools, families and scientific research institutes, and in the future, it will be necessary to introduce a more comprehensive policy guarantee system in coordination with different organizations.

## 6. Conclusions

Through a systematic review, physical activity in children and adolescents is influenced by a variety of factors, higher levels of self-efficacy, and family, school, and community support can be effective in promoting physical activity in children and adolescents. Schools were identified as the primary site for implementing interventions, with families as an important adjunct, and community environments as important arenas for increasing moderate- and high-intensity physical activity in children and adolescents. Promoting physical activity among children and adolescents requires the participation of the government, communities, schools, families and research institutions, which also increases the difficulty of implementing interventions and requires the introduction of a better system of synergistic guarantees.

## Acknowledgement

**Funding:** Please add: This research was funded by Yunnan Provincial Department of Education Science Research Fund Project, grant number 2022J1286.

We would like to thank to Yunnan College of Business Management for supporting this research.

**Author Contributions:** “Conceptualization, J.S. and H.L.; methodology, J.S.; software, J.S.; validation, J.S., H.L., J.L, TG ; formal analysis, J.S.; writing—original draft preparation, J.S.; writing—review and editing, J.S.; visualization, J.S.; supervision, H.L.; All authors have read and agreed to the published version of the manuscript.”

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