

IMPACT OF PHYSICAL ACTIVITY ON THE HEALTH STATUS AND QUALITY OF LIFE OF CHILDREN AND SCHOOL ADOLESCENTS

Snezana Stavreva Veselinovska, Sonja Petrovska, & Despina Sivevska
Faculty of Educational Sciences, Goce Delcev University (North Macedonia)

Abstract

Healthy behavior during the day is very important for the improvement of the quality of life of children and adolescents. However, not all behaviors are equally important in the perception of well-being among adolescents of different sexes (boys and girls). The incidence of physical activity on the quality of life for children and school-aged adolescents stands out as the main behavior. Furthermore, it is necessary to promote these healthy habits from the educational context from an early age. Regular assessment of the impact of healthy behaviors that include diet, physical activity, and sleep time with various psychosocial benefits should be done. It is also necessary to study different sedentary activities separately (use of mobile phones, video games, computers) and assess whether they all have a negative impact on the psychosocial well-being of children and adolescents. A growing number of studies have highlighted the health benefits of greater physical activity, less screen time, and optimal sleep duration in school-age children and adolescents. **Objective:** This paper aims to examine the individual and combined association between physical activity, screen time and sleep time on the quality of life in boys and girls. **Method:** A total number of 220 students from primary and secondary schools on the territory of the municipality of Probishtip participated in the research. The results obtained for physical activity, time spent in front of the screen, and duration of sleep on the quality of life were analyzed. **Results:** Descriptive, correlational, and regression analyzes were conducted to determine the significance of the health-related behaviors of all participants. The results revealed a significant positive association between physical activity and sleep time on quality of life. Finally, regression models showed that physical activity outcomes improve quality of life, especially in children. It was also concluded that movement is particularly important for a healthy and qualitative life, and the impact of physical activity on the quality of life is emphasized as the main factor for the health condition, and for the improvement of the quality of life of the school adolescent population.

Keywords: *Physical activity, health status, quality of life, children, school adolescents.*

1. Introduction

One of the important domains of quality of life is health. Health can also be viewed as a subjective representation of function and well-being, as stated earlier in the WHO definition, which shifted from a purely biological model to a bio-psycho-social model in which the well-being and quality of life of individuals were assessed. The WHO definition (1948) (WHOQOL Group, 1995) holds an important expansion of the view of health, which is not only understood by somatic indicators, but comprises how a person feels, psychologically and physically, and how she or he manages with other persons and copes with everyday life. Health related quality of life is described as a multidimensional construct covering physical, emotional, mental, social, and behavioural components of well-being and function as perceived by patients and/or other individuals. The WHO quality of life group extends this definition and includes the cultural perspective: quality of life is defined as an individual's perception of their position in life in the context of the cultural and values systems in which they live, and in relation to their goals, expectations, standards and concerns. Meanwhile, researchers in the fields of psychology, medicine and public health have developed useful techniques that have helped to conceptualise and measure these multiple domains and how they relate to each. To date, the importance of measuring health-related quality of life in individuals or groups of patients is well accepted. This is true for adults and increasingly for children and adolescents, although the utility of generic health-related quality of life measurement in population health of children and adolescents has only recently begun to be explored. Health-related quality of life questions about perceived health and function are thought to be an important component of health surveillance and should be routinely included as an indicator. Health-related quality of life measures can aid in identifying subgroups of children and adolescents who are at-risk for health problems, and can assist in determining the burden of a particular disease or disability. Results of such an evaluation can be used to influence public policy decisions, promoting policies and legislation related to children's and adolescents' health, and aiding in the allocation of healthcare resources. Monitoring the

health status of the population allows public health professionals to improve the health of populations, by tracking health trends, identifying discrepancies in health, and planning health promotion activities and interventions.

2. Materials and Methods

2.1. Participants

The research was conducted in primary and one secondary school in the territory of the municipality of Probishtip, Republic of North Macedonia. The students ranged in age from 10 to 16 years old (14.25) including children ($n = 115$) and adolescents ($n = 95$), participated in the study. Individuals ranged in age from 10 to 16 years old (14.25 ± 1.32 years), including 102 boys (13.14 ± 1.24 years) and 118 girls (13.75 ± 1.24 years). The selection of the students was carried out through an intentional student for convenience according to the distance of the schools to the research staff in charge of data collection, the willingness to collaborate on the part of the teaching staff, and the time required for the researchers to travel. Likewise, all subjects consented to their participation in the study.

2.2. Measuring physical activity and screen time

Physical activity and screen time was measured using the Youth Activity Profile Questionnaire. This report instrument, designed to measure physical activity and screen time in youths (was validated in Macedonian children and adolescents).

The instrument comprises 15 items related to the practice of physical activity in different domains (inside and outside of school and sedentary time) every day of the week. Each answer is scored on a 5-point Likert Scale ranging from 1 to 5. The questionnaire divided into three sections: activity at school, activity out of school, and screen time.

Physical activity was measured as the average of activity at school (as activity during physical education class, lunch, and recess) and out of school (activity before school, activity right after school, activity during the evening, and activity on each weekend day). Screen time was calculated by inverting values from positive to negative according to the nature of the variable and calculating the average value of all responses related to screen media (watching television, playing video games, using the computer, and using a cell phone).

Sleep duration was measured using the sleep questionnaire. This instrument is a valid and reliable measure to assess sleep duration among adolescents. The questionnaire has four questions about usual week-day and weekend bedtimes and wake-up times. Daily sleep time was calculated by weighting weekdays and weekend days using a ratio of 5:2, i.e., daily sleep duration on weekdays $5 +$ daily sleep duration on weekend days $2:7$.

2.3. Health-related quality of life

Participants were assessed using the Serbian version of the Kidscreen-10 questionnaire [The Kidscreen Group, 2004]. The Kidscreen-10 is a valid and reliable measure to assess health-related quality of life in youths. The Kidscreen-10 index was developed from the Kidscreen-10 and operationalizes general health-related quality of life in a single scale (Ravens-Sieberer et al., 2010).

With only 10 items, the Kidscreen-10 index is the shortest version of the Kidscreen-1 Kidscreen-10 questionnaires and measures general health-related quality of life. It then provides a useful global measure of health-related quality of life. The scale comprises 10 items assessing the subjective perception of health and well-being. Each statement is scored on a 5-point Likert scale ranging from 1 (never/not at all) to 5 (always/extremely). The reliability analysis showed acceptable reliability for the present sample ($\alpha = 0.71$).

Health-related quality of life refers to an individual's perception and subjective evaluation of their health and well-being within their unique cultural environment. Generic questionnaires for children and adolescents can be useful in identifying subgroups of children and adolescents who are at risk for health problems, and can assist in determining the burden of a particular disease or disability (Ravens-Sieberer et al., 2010). Assessing the health-related quality of life of children and adolescents could also help to detect hidden morbidity and health care needs which are not identified using traditional medical indicators (Eiser et al., 1999; Seid et al., 2004). Although it is important to obtain responses via self-reports whenever possible, this may not be practicable in very young children or children with developmental delay or mental retardation (Gopinath et al., 2012). In that case, health-related quality of life may only be ascertained via proxy (parent) reports.

3. Results

Table 1 shows the results of the statistical processing of the data through a bivariate correlation between the examined variables (Physical activity, Screen Time, sleep duration (h/day), quality-of-life (1–5)). The descriptive analysis showed a significantly higher percentage in boys compared to girls (all, $p < 0.01$), except for time spent sleeping ($p > 0.05$).

Table 1. Descriptive statistics and bivariate correlations of the variables studied.

Variables of Study	Total n = 210		Boys n = 102		Girls n = 118		P	Correlation	
	M	DT	M	DT	M	DT		1	2
Point A								3	4
1. Physical activity (1-5)	2.30	0.56	2.25	0.52	2.19	0.67	0.00	-	0.05
2. Screen Time	2.24	0.45	2.19	0.48	2.35	0.75	0.00	0.03	0.14
3. Sleep duration (h/day)	7.65	0.91	7.95	0.91	8.12	1.23	0.25	-	-
4. Quality-of-life (1-5)	3.10	0.56	2.98	0.52	2.95	0.55	0.00	0.16	0.11
								-	-
								0.13	
								—	—

bold = significance; p * < 0.05; p ** < 0.01.

When analyzing the correlation, a significant association between physical activity and quality of life was obtained (p < 0.01). However, time spent sleeping was significantly negatively related to screen time (mobile phone and computer use).

Table 2 shows the association between individual and combined performance of a specific physical activity and their impact on quality of life in boys and girls. It shows the results of the statistical processing through a three-step regression analysis. In the first step, the results of a single linear regression analysis between physical activity, screen time, and sleep duration are presented. In the second step, a multiple regression analysis was performed of the results obtained from physical activity and screen time, physical activity and sleep duration, and screen Time activity and sleep duration. In the third step, a multiple regression analysis was also performed between physical activity, screen time, and sleep duration. The results obtained show that the beta value varies every time a new activity was introduced into each step. More specifically, the first step presents the regression analyses of each of the variables that make up movement and behavior in predicting the quality of life, showing a unique significance in PA behavior (p < 0.01). In the second step, several different and possible combinations were made and it was monitored how the beta values varied when only two physical activities were analyzed. Finally, in step three, the variation in beta values was evaluated by the combination of the three activities, resulting in a significant value (p < 0.05) that can explain the impact on the quality of life.

Table 2. Correlation between physical activity, screen time, and sleep duration and quality of life in the samples by sex.

Models	Bois				Girls			
	R ²	β	p	CI95%	R ²	β	p	CI2%
<i>Unadjusted</i>								
Step1								
PA	0.087	0.293	0.004	{0.091,0.257}	-0.005	-0.038	0.541	{-0.113,0.065}
SC	0.010	-0.108	0.149	{-0.138,0.019}	0.003	-0.038	0.524	{-0.116,0.058}
SD	0.002	0.048	0.425	{-0.050,0.117}	0.015	0.128	0.085	{-0.011,0.158}
Step2								
PA+SC	0.121	0.285 -0.109	0.006 0.126	{0.090,0.253} {-0.138,0.017}	0.000 0.110	-0.038 -0.042	0.575 0.534	{-0.112,0.058} {-0.119,0.058}
PA+SD	0.091	0.298 0.065	0.000 0.112	{0.084,0.259} {-0.155,0.010}	0.020	-0.048 0.138	0.532 0.074	{-0.019,0.059} {-0.146,0.041}
SC+SD	0.016	-0.294 -128 0.008	0.000 0.078 0.186	{0.087,0.245} {-0.149,0.009} {0.028,0.148}	0.025	0.008 -0.088 0.157	0.434 0.264 0.045	{-0.127,-0.055} {-0.146,0.044} {0.000,0.174}
Step3								
PA+SC+SD	0.013	0.302 -128 0.098	0.000 0.082 0.188	{0.090,0.260} {-0.152,0.010} {-0.028,0.145}	0.028	-0.056 -0.088 0.163	0.398 0.257 0.050	{-0.128,-0.057} {-0.152,0.040} {0.00,0.178}

<i>Adjusted</i>								
Step1								
<i>PA</i>	0.049	0.284	0.000	{0.069,0.238}	0.054	-0.065	0.384	{-0.127,0.049}
<i>SC</i>	0.048	-0.097	0.162	{-0.135,0.022}	0.058	-0.101	0.196	{-0.159,0.031}
<i>SD</i>	0.040	0.051	0.174	{-0.054,0.128}	0.051	0.042	0.612	{-0.072,0.120}
Step2								
	0.138	0.288	0.000	{0.079,0.236}	0.068	-0.070	0.327	{-0.136,0.048}
		-0.114	0.120	{-0.145,0.015}		-0.108	0.179	{-0.158,0.030}
	0.124	0.274	0.000	{0.000,0.002}	0.057	-0.058	0.436	{-0.128,0.058}
		0.070	0.299	{-0.042,0.128}		0.041	0.498	{-0.071,0.022}
Step3								
	0.138	0.284	0.000	{0.062,0.220}		-0.065	0.325	{-0.135,0.046}
		-0.126	0.068	{-0.177,0.009}	0.066	-0.124	0.112	{-0.177,0.016}
		0.095	0.194	{-0.026,0.164}		0.063	0.364	{-0.058,0.139}

PA (physical activity), SC (screen time), SD (Sleep duration), bold (significance)

4. Discussion

The research that was conducted aimed to determine the individual and combined association between movement behavior (physical activity, time spent in front of screens - mobile phone and computer, and time spent sleeping) and quality of life in boys and girls. The obtained results showed that higher physical activity has a positive effect on the quality of life, especially among boys. And the research results of Gopinath et al. (2012) and Wanner et al. (2014) showed that changes in physical activity levels were associated with positive changes in quality of life. These results could explain the positive benefits of physical activity on physical and psychosocial health, thereby influencing the quality of life of adolescents. Also, the results showed that sleep time was positively and significantly related to quality of life. In this sense, some studies have shown a negative association between sleep quality with poorer quality of life and quality of life in children (Mireku et al., 2019). The results also showed that only individual physical activity behavior and combined sleep and screen time predicted quality of life.

Research by Zurita-Ortega et al. (2018) showed that when the level of physical activity increases, there is an overall increase in quality of life. In this regard, poor sleep timing can have consequences on mood and the immune system (Foerster & Rösli, 2017), in addition to causing problems related to weight gain, which can be caused by increased use of television, video games and mobile phones (Stiglic & Viner, 2019). Also, in the unadjusted model for the entire sample, where the three behaviors (physical activity, screen time, and sleep time) were taken together, our results showed that the sum of them all predicted quality of life; these results are similar to those found by Marques et al. (2019) where healthy behaviors such as physical activity, healthy diet and sleep time were inextricably linked to quality of life. Considering the unadjusted regression model for children, our results showed that only physical activity behavior had a significant role on quality of life. However, for girls in unadjusted regression models, our findings highlighted that only sleep time combined with physical activity and screen time was important for quality of life.

In contrast to our results, the research of Guimarães et al. (2020) and Hesketh et al. (2017) showed higher adherence to movement behavior. Guimarães states that girls show greater ease in complying with sleep recommendations compared to their peers. A possible explanation for this fact is that not all healthy behaviors are equally important for the quality of life in different sexes. It may happen that children with fewer hours of sleep are also those who spend more time in front of the screen due to the influence of new technologies (smartphones, video games, computers) that can cause sleep difficulties, fatigue and headache (Mireku et al., 2019). However, parenting style and home conditions may also affect their quality of life (Dong et al., 2020). Our results showed significance for physical activity and screen time in combination of the three behaviors in the total sample and for physical activity among men. In this sense, our results are consistent with those found in previous studies (Ravens-Sieberer et al., 2007) where the magnitude and intensity of physical activity are associated with a better quality of life. On the other hand, individual or combined healthy behaviors did not show significance for predicting quality of life in this adolescent population.

5. Conclusions

From the research results, it can be concluded that a healthy lifestyle is very important for a better quality of life for adolescents. However, not all behaviors are equally important in the perception of the well-being across genders. Hence, the general conclusion is that the incidence of physical activity significantly affects the quality of life and is emphasized as the main behavior in predicting the quality of life for children and school-aged adolescents. Furthermore, the need to promote these healthy habits in an educational context from an early age is emphasized. Future studies that aim to assess the impact of

healthy behaviors should include behavioral eating habits, in addition to physical activity, sleep time, and sedentary time in order to link them to various psychosocial benefits. It would also be good to study different sedentary behaviors separately (use of mobile phones, video games, computers) to assess whether they all have a negative impact on the psychosocial well-being of children and adolescents. All this contributes to a new perspective on promoting healthy behaviors and improving the well-being of children and adolescents. In this sense, future intervention activities should focus on promoting healthy habits during the day, developing activities that promote the development of adequate sleep habits, avoiding sedentary rest and complying with the recommendations for moderate to vigorous physical activity in children and adolescents, through the use of active teaching methods in primary and secondary schools. In this sense, health should be promoted from a global perspective in the educational context, using active methodologies and development of projects that encourage greater involvement of students and their families, which will favor the cooperation with teachers, students and families in the development of activities that promote healthy habits, such as the correct use of new technologies, appropriate sitting habits and compliance with the recommendations for moderate to vigorous physical activity among children and adolescents

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