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The Role of Lifestyle Behaviors on Depressive Symptoms in Children during the COVID-19 Pandemic

Marjan Asadi[1], Leila Zameni[1*]

[1] Faculty of Humanities, Sari Branch, Islamic Azad University, Sari, Iran.

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Abstract

Background: *The lifestyle behaviors such as consumption of fruit and vegetables, along with time spent in physical activities and screen time are crucial for weight management, and improving these behaviors may be a key role in increasing mental health. This study aimed to investigate the role of lifestyle behaviors on depressive symptoms in children during the Covid-19 pandemic.*

Methods: *This was a descriptive correlational study. The statistical population included male and female elementary school students (grades 4-6) in public schools in the eastern cities of Mazandaran province in 2020, among which 530 people were selected by random cluster sampling. Data collection tools included questionnaires of children's physical activity, fruit and vegetable consumption, children's depression, screen time, and socioeconomic status. Data were analyzed using Mann-Whitney U, Kruskal-Wallis, Spearman correlation coefficient, and multiple linear regression tests.*

Results: *The findings showed that just 13.3% of children had sufficient consumption of fruits and vegetables and 57.6% of students sufficient physical activity did not have.in addition, screen time was increased with age and be more in males. Regression analysis showed that the consumption of fruits and vegetables and physical activity both have the inverse effect on depressive symptoms, with the coefficient of effects-0.191 and -0.21 respectively; while screen time has a positive effect with an effective coefficient of 0.25 (Pvalue<0.05).*

Conclusions: *It seems that in addition to physical activity and consumption of fruits and vegetables, the important role of screen time in the design of interventions to promote mental health in children, especially during the outbreak of Covid-19 should be considered.*

Keywords: Depressive symptoms, Fruit & vegetable, Physical activity, Screen time, COVID-19.
***Corresponding to:** L Zameni, **Email:** l_zameni@yahoo.com
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Introduction

The world health organization (WHO) has identified the outbreak of Coronavirus disease (Covid-19) as a major threat to physical and mental health because it has affected the lifestyle of families.[1] With the epidemic of this disease, the best way to control the sources of infection is considered to be the implementation of a confinement and social isolation plan, and based on this, children were required to stay at home.[2] Restrictions on staying at home due to the spread of the coronavirus may lead to an increase in unhealthy behaviors, including overeating, inactivity, and screen time, and decreased physical activity, which is associated with non-communicable diseases and can disrupt the immunity system.[3] However, a balanced diet and adequate physical activity are essential for the healthy development of children and adolescents and are important factors in health throughout life.[4]

Regular physical activity is a prerequisite for healthy physical and mental development; which can not only act as a protective factor for the prevention and management of chronic diseases caused by mobility but also has a positive effect on mental health.[5] To achieve these benefits, participation in the minimum recommended age-specific activity is essential.[6] It is best to consider this from childhood because participation in sports activities in childhood and adolescence is associated with physical activity in adulthood.[7] However, Covid-19 restrictions such as the closure of schools, sports clubs, and lack of access to parks may prevent children from reaching the recommended level of physical activity.[8] In addition, among dietary habits, the consumption of fruits and vegetable is of particular importance; due to its important sources of micronutrients and fiber, it is considered a valuable part of the diet and improving the consumption of fruits and vegetables as a key point of healthy nutrition has been recommended in the prevention of chronic diseases.[9] So that WHO recommends consuming at least 400 grams of fruits and vegetables per day (equivalent to 5 units) to prevent these diseases.[10]

Unhealthy lifestyles such as low physical activity and insufficient consumption of fruits and vegetables, which are very common in children and adolescents, play an important role in the development of obesity[11] that obesity and overweight not only increase the risk of cardiovascular and metabolic diseases.[12] It is also associated with mental disorders.[13] Also, lockdown, school closures and restricting children to play at home away from school, classmates, friends and teachers, job and financial problems, and consequently pressure on families threatened children's mental health.[14] In critical situations, especially disease pandemics, children are more likely to have psychological problems, and the prevalence of Covid-19 can lead to feelings of insecurity, anxiety and depression, sleep disturbance, post-traumatic stress disorder, irritability, and practical obsession in children.[15] Excessive screen time is associated with health risks such as cardiovascular disease, insomnia, increased duration of sedentary behavior,[16] and negative mental health outcomes such as depression.[17]

Although some previous studies, such as Ahn & Fedewa's metanalysis have ashown a significant effect of physical activity on children's mental health,[18] a systematic review by

Rodriguez-Ayllon et al. showed that the effect of physical activity on children's mental health was not significant.[19] Given the contradictory results of previous research and the lack of studies on children, Rodriguez-Ellen et al. suggested further research to investigate the effect of physical activity on children's mental health, which may be more important during the Covid-19 outbreak. In addition, the role of fruit and vegetable consumption in strengthening mental health has been recently examined[20] that is better be studied in children. In addition, changes in screen time may increase the risk of attention deficit, anxiety, depression, and suicide in children and adolescents, which may be necessary for the event of a coronavirus disease outbreak.[16] Selected lifestyle behaviors seem to play a role in the management of mental disorders;[21] therefore, the present study aimed to investigate the role of lifestyle behaviors on depressive symptoms in children during the outbreak of Covid-19.

Materials and Methods

The cross-sectional study design and research method were descriptive-correlational. The statistical population of the study included male and female elementary school students (grades 4-6) in public schools in the eastern cities of Mazandaran province in 2020. 530 children based on Morgan's statistical table with random clusters sampling method were selected according to the following steps: First, the eastern cities of Mazandaran province were identified according to the division of the provincial education office. In the next step, a list of all public elementary schools in the selected cities was obtained and schools were randomly selected in each statistical area. In the last stage, a class was randomly selected from each school in each 4-6 grade. To collect data from questionnaires of physical activity in older children, fruit and vegetable consumption, screen time, Bearlson children's depression, and socio-economic status used. Also, demographic characteristics were recorded with questions such as date of birth, educational level, disease, height, and weight. Based on the obtained height and weight, body mass index (BMI) was calculated based on the formula of weight (kg) divided by height (m2). Standard values of underweight (equal percentile and less than 5, normal weight (5-85 percent), overweight (85-95 percent), and obesity (equal percentile and above 95) were used to group body mass index.[22]

After obtaining a authorizations from the education office of Mazandaran province and with the assistance of the physical education teacher of the school, using the Porseline website, the questionnaires are available electronically in the cyberspace groups of the schools. Ethical standards were observed including obtaining informed consent from students and their parents, ensuring privacy and confidentiality. Inclusion criteria was satisfaction with the study and exclusion criteria were children who did not have their habitual physical activity in the past week, and students who included it were not physically healthy. According to the exclusion criteria after the elimination of 32 people, due to the abnormal distribution of data resulting from the Kolmogorov-Smirnov test, data analysis using Mann-Whitney U, Kruskal-Wallis, Spearman correlation coefficient, and multiple linear regression test with $SPSS_{25}$ software was developed.

Results

Demographic characteristics including total number of participants, frequency percentage, age, height, weight, body mass index are presented in table 1.

Kruskal-Wallis test showed that fruit and vegetable consumption and physical activity were higher in students with high socioeconomic status and screen time and depressive symptoms were higher in groups with low socioeconomic status (Pvalue<0.05). In addition, the level of physical activity in normal and low BMI children was significantly different from obese children and had a lower level of depressive symptoms score than other groups (Pvalue<0.05). According to table 2, the results of the Man-Whitney U test shows that although fruit and vegetable consumption was higher in female than male and the level of physical activity was higher in males than females, but the average fruit and vegetable consumption and physical activity in females and males were not significantly different. Depressive symptoms were more common in females than males, but this difference was not significant. Screen time was in females less than males and this difference was significant (Pvalue<0.05).

Table 3 presents the correlation matrix of the research variables. The relationship between research variables calculates by Spearman correlation coefficient that there were depressive symptoms have a negative relationship between fruit and vegetable consumption and physical activity and a positive relationship with screen time.

The results of regression analysis show that at the error level of 0.05 by F test, the assumption of a linear relationship and the presentation of a predictive model for depressive symptoms were confirmed (Table 4).

The study of each of the variables in the regression model shows that the consumption of fruits and vegetables and physical activity both have an inverse effect, and screen time has a direct effect on depressive symptoms. The coefficient of the effect of fruit consumption and vegetables, physical activity, and screen time display -0.19, -0.21, and 0.25, respectively in table 5.

Table 1. Demographic characteristics in females, males and total

Gender	Number	Percentage frequency	Age (M±SD)	Height (M±SD)	Weight (M±SD)	BMI (M±SD)
Females	247	49.6%	11.38±1.00	138.58±11.92	40.61±10.00	20.70±2.94
Males	251	50.4%	11.36±0.86	142.78±12.79	42.18±11.00	20.47±2.98
Total	498	100%	11.37±0.93	140.68±12.35	41.39±10.50	20.58±2.96

Table 2. Assessing the status of research variables in students by gender

Variable		Variable status				Quantitative Indicators		Pvalue
		have		Not have				
	Gender	Frequency	Percentage	Frequency	Percentage	Mean	SD	
Consumption of fruits & vegetables	Males	221	51.2	30	45.5	3.23	1.10	0.06
	Females	211	48.8	36	54.5	3.38	1.09	
Physical activity	Males	131	45.6	116	55.0	2.70	0.78	0.07
	Females	156	54.4	95	45.0	2.56	0.74	
Depressive symptoms	Males	184	50.4	66	49.6	12.43	4.97	0.13
	Females	181	49.6	67	50.4	13.22	5.10	
Screen time	Males	110	46.2	145	55.7	11.42	4.14	0.04
	Females	128	53.8	115	44.3	10.54	4.58	

Table 3. Correlation matrix between research variables

	Consumption of fruits & vegetables	Physical activity	Depressive symptoms	Screen time
Consumption of fruits & vegetables	1			
Physical activity	0.490	1		
Depressive symptoms	0.306	0.317	1	
Screen time	0.155	0.286	0.346	1

Table 4. Multiple linear regression analysis between life style behaviors with depressive symptoms

Model	Sum of squares	df	Mean square	F	sig	Correlation coefficient	R square	Adjusted R squared
Regression	1501.72	3	750.86					
Residual	11139.4	494	22.50	33.36	0.00	0.424	0.18	0.17
Total	12641.1	497						

Table 5. Estimation of model coefficients between life style behaviors with depressive symptoms

Model	Unstandardized coefficients		Standardized coefficients	t	Pvalue
	β	Std.Error	β		
Constant	19.45	0.842		23.10	0.00
Consumption of fruits & vegetables	-0.87	0.222	-0.190	-3.49	0.00
Physical activity	-1.39	0.318	-0.211	-4.37	0.00
Screen time	1.67	0.198	0.251	4.73	0.00

Discussion

Home confinement in COVID-19 may lead to various types of unhealthy behaviors and can interfere with mental health. In this study, findings showed that consumption of fruits and vegetables and participation in physical activity has a reducing role, and screen time has an increasing role in the incidence of depressive symptoms. Consistent with this finding, the results of Yu et al. (2018) showed that high physical activity and adequate consumption of fruits and vegetables were independently associated with a significant reduction in the risks of depressive symptoms.[23] Biddle et al. (2019) also stated that there is evidence for a relationship between physical activity and mental health, especially cognitive function and to some extent depression in children and adolescents.[24] Exercise has been shown to increase brain-derived neurotropic levels in the central nervous system, which may improve symptoms of anxiety and depression. Exercise can also not only improve mood but also protect against mental disorders by increasing concentrations of dopamine, serotonin, and noradrenaline in the brain.[19]

Saghafian et al. (2018) in a systematic review found that there is an inverse relationship between total consumption of fruits and vegetables and the risk of depression in cross-sectional studies. Regression from observational studies showed an inverse linear relationship between fruit and vegetable consumption and the risk of depression; so that every 100 g increase in fruit consumption decreases by 3%, the risk of depression and every 100 grams increase in vegetable consumption associated to decreases 3 % risk of depression in cohort studies and 5% in cross-sectional studies.[25] Also, the findings of Kingsbury et al. (2016), in the relationship between fruit and vegetable consumption and depressive symptoms in longitudinal studies showed that the consumption of fruits and vegetables in each cycle is inversely related to the next cycle of depression and psychological distress.[26] In the relationship between fruit and vegetable consumption and health, the evidence gathered shows that habitual consumption of fruits and vegetables, especially non-starchy ones, has health-promoting properties that are beyond helping individual's access to essential nutrients.[27] Possible causal mechanisms of fruit and vegetable consumption on mental health include complex carbohydrate content (by increasing the entry of tryptophan into the brain and stimulating important neurotransmitters), vitamin B (by synthesizing important neurotransmitters), antioxidant content (as a defense

mechanism against oxidative stress), mineral content, and brain-derived neurotropic factor.[28]

Research evidence shows that when children do not go to school (e.g. weekends or summer vacations), their physical activity decreases, they follow less healthy eating habits, and screen time increases.[29] Although home confinement is a safety measure against the spread of the coronavirus, it disrupts children's physical activity and exercise program and increases the risk of weight gain for children prone to weight gain;[30] while weight control is a preventative measure during the Covid-19 outbreak,[3] physical activity and eating healthy foods are therefore recommended. Confinement at home with factors such as low socioeconomic status of the family, exposure to domestic violence, lack of opportunities for play and entertainment can threaten the mental health of children during the outbreak of Covid-19.[31] The results of this study, in line with the findings of the study of Pombo et al[2] showed that females and males with lower socioeconomic status had less physical activity than their peers with higher socioeconomic status, which may be mental health in children is more at risk.

Lifestyle behaviors can play an important role in depressive symptoms in children during the Covid-19 outbreak. It is suggested that preventive interventions focus on changing children's lifestyles concerning the amount of physical activity, fruit and vegetable consumption, and screen time. Also, programs in the form of training courses to increase awareness, improve attitudes, and monitoring of these lifestyle behaviors to help promote students' mental health. Given that web-based interventions are effective in improving lifestyle, it is better to include such intervention methods in the planning according to the prevalence of Covid-19. One of the limitations of the research is the research community, data collection in a specific period, and the use of self-assessment tools. It is suggested that research with a mixed approach be used to explain the relationships. In addition, it is better to use objective tools such as the use of accelerometers to measure physical activity.

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Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Shen K, Yang Y, Wang T, Zhao D, Jiang Y, Jin R, et al. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' consensus statement. World Journal of Pediatrics 2020; 16(3):223-31. doi:10.1007/s12519-020-00343-7

2. Pombo A, Luz C, Rodrigues LP, Ferreira C, Cordovil R. Correlates of children's physical activity during the COVID-19 confinement in Portugal. Public Health 2020; 189: 9-14. doi:10.1016/j.puhe.2020.09.009

3. Lange KW, Nakamura Y. Lifestyle factors in the prevention of COVID-19. Global Health Journal 2020; 4(4): 146-52. doi:10.1016/j.glohj.2020.11.002

4. Rocha NP, Milagres LC, Longo GZ, Ribeiro AQ, Novaes JFD. Association between dietary pattern and cardio metabolic risk in children and adolescents: a systematic review. Journal de Pediatria 2017; 93(3): 214-22. doi:10.1016/j.jped.2017.01.002

5. Donnelly JE, Hillman CH, Castelli D, Etnier JL, Lee S, Tomporowski P, et al. Physical activity, fitness, cognitive function, and academic achievement in children: a systematic review. Medicine and Science in Sports and Exercise 2016; 48(6): 1197-222. doi:10.1249/MSS.0000000000000901

6. Pescatello LS, Arena R, Reibe D, Tompson P. ACSM's guidelines for exercise testing and prescription. 9th Ed. Lippincott Williams & Wikins 2014.

7. Batista MB, Romanzini CLP, Barbosa CCL, Blasquez Shigaki G, Romanzini M, Ronque ERV. Participation in sports in childhood, adolescence, and physical activity in adulthood: a systematic review. Journal of Sports Sciences 2019; 37(19): 2253-62. doi:10.1080/02640414.2019.1627696

8. Dunton GF, Do B, Wang SD. Early effects of the COVID-19 pandemic on physical activity and sedentary behavior in children living in the US. BMC Public Health 2020; 20:1351.doi:10.1186/s12889-020-09429-3

9. Wang X, Ouyang Y, Liu J, Zhu M, Zhao G, Bao W, et al. Fruit and vegetable consumption and mortality from all causes, cardiovascular disease, and cancer: systematic review and dose-response meta-analysis of prospective cohort studies. BMJ 2014; 349. doi:10.1136/bmj.g4490

10. World Health Organization (WHO). Promoting fruit and vegetable consumption around the world. Available from: http://www.who.int/ 2019.

11. Daly CM, Foote SJ, Wadsworth DD. Physical activity, sedentary behavior, fruit and vegetable consumption and access: what influences obesity in rural children?. Journal of Community Health 2017; 42(5): 968-73. doi:10.1007/s10900-017-0343-6

12. Faienza MF, Wang DQ, Frühbeck G, Garruti G, Portincasa P. The dangerous link between childhood and adulthood predictors of obesity and metabolic syndrome. Internal and Emergency Medicine 2016; 11(2): 175-82. doi:10.1007/s11739-015-1382-6

13. Morrison KM, Shin S, Tarnopolsky M, Taylor VH. Association of depression & health related quality of life with body composition in children and youth with obesity. Journal of Affective Disorders 2015; 172: 18-23. doi:10.1016/j.jad.2014.09.014

14. Wang G, Zhang Y, Zhao J, Zhang J, Jiang F. Mitigate the effects of home confinement on children during the COVID-19 outbreak. The Lancet 2020; 395(10228): 945-7. doi 10.1016/S0140-6736(20)30547-X

15. Ghosh R, Dubey MJ, Chatterjee S, Dubey S. Impact of COVID-19 on children: special focus on the psychosocial aspect. Minerva Pediatrica 2020; 72(3): 226-35. doi:10.23736/S0026-4946.20.05887-9

16. Lissak G. Adverse physiological and psychological effects of screen time on children and adolescents: literature review and case study. Environmental Research 2018; 164:149-57. doi:10.1016/j.envres.2018.01.015

17. Huang Y, Li L, Gan Y, Wang C, Jiang H, Cao S, Lu Z. Sedentary behaviors and risk of depression: a meta-analysis of prospective studies. Translational Psychiatry 2020; 10(1): 1-10. doi:10.1038/s41398-020-0715-z

18. Ahn S, Fedewa AL. A meta-analysis of the relationship between children's physical activity and mental health. Journal of Pediatric Psychology 2011; 36(4): 385-97. doi:10.1093/jpepsy/jsq107

19. Rodriguez-Ayllon M, Cadenas-Sanchez C, Estevez-Lopez F., Munoz NE, Mora-Gonzalez J, Migueles JH, et al. Role of physical activity and sedentary behavior in the mental health of preschoolers, children and adolescents: a systematic review and meta-analysis. Sports Medicine 2019; 49(9): 1383-410. doi:10.1007/s40279-019-01099-5

20. Ocean N, Howley P, Ensor J. Lettuce be happy: A longitudinal UK study on the relationship between fruit and vegetable consumption and well-being. Social Science and Medicine 2019; 222:335-45.

doi:10.1016/j.socscimed.2018.12.017

21. Lange KW. Diet, exercise, and mental disorders a public health challenges of the future. Movement and Nutrition in Health and Disease 2018; 12: 39-59. doi.org/10.5283/mnhd.12

22. Hosseini M, Carpenter RG, Mohammad K, Jones ME. Standardized percentile curves of body mass index of Iranian children compared to the US population reference. International Journal of Obesity 1999; 23(8): 783-86. doi:10.1038/sj.ijo.0800924

23.Yu HJ, Li F, Hu YF, Li CF, Yang XH, Yuan S, et al. Associations of physical activity and fruit and vegetable intake with well-being and depressive symptoms among obese schoolchildren in Wuhan, China: a cross-sectional study. BMC Public Health 2018; 18(1): 986. doi:10.1186/s12889-018-5779-9

24. Biddle SJ, Ciaccioni S, Thomas G, Vergeer I. Physical activity and mental health in children and adolescents: an updated review of reviews and an analysis of causality. Psychology of Sport and Exercise 2019; 42: 146-55. doi:10.1016/j.psychsport.2018.08.011

25. Saghafian F, Malmir H, Saneei P, Milajerdi A, Larijani B, Esmaillzadeh A. Fruit and vegetable consumption and risk of depression: accumulative evidence from an updated systematic review and meta-analysis of epidemiological studies. British Journal of Nutrition 2018; 119(10): 1087-101. doi:10.1017/S0007114518000697

26. Kingsbury M, Dupuis G, Jacka F, Roy-Gagnon MH, McMartin SE, Colman I. Associations between fruit and vegetable consumption and depressive symptoms: evidence from a national Canadian longitudinal survey. Journal of Epidemiology Community Health 2016: 70(2): 155-61. doi: 10.1136/jech-2015-205858

27. Wallace TC, Bailey RL, Blumberg JB, Burton-Freeman B, Chen CO, Crowe-White KM, et al. Fruits, vegetables, and health: A comprehensive narrative, umbrella review of the science and recommendations for enhanced public policy to improve intake. Critical Reviews in Food Science and Nutrition 2020: 60(13): 2174-211. doi:10.1080/10408398.2019.1632258

28. Rooney C, McKinley MC, Woodside JV. The potential role of fruit and vegetables in aspects of psychological well-being: a review of the literature and future directions. Proceedings of the Nutrition Society 2013; 72(4): 420-32. doi:10.1017/S0029665113003388

29. Brazendale K, Beets MW, Weaver RG, Pate RR, Turner-McGrievy GM, Kaczynski AT, et al. Understanding differences between summer vs. school obesogenic behaviors of children: the structured days hypothesis. International Journal of Behavioral Nutrition and Physical Activity 2017; 14(1):1-4. doi:10.1186/s12966-017-0555-2

30. Calcaterra V, Vandoni M, Pellino VC, Cena H. Special attention to diet and physical activity in children and adolescents with obesity during the coronavirus disease-2019 pandemic. Frontiers in Pediatrics 2020; 8:407. doi:10.3389/fped.2020.00407

31. Fegert JM, Vitiello B, Plener PL, Clemens V. Challenges and burden of the Coronavirus 2019 (COVID-19) pandemic for child and adolescent mental health: a narrative review to highlight clinical and research needs in the acute phase and the long return to normality. Child and Adolescent Psychiatry and Mental Health 2020; 14:1-11. doi:10.1186/s13034-020-00329-3