

Elementary School Children's Lifestyles in Toyama, Japan, Before and During the COVID-19 Pandemic

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Introduction

Children's daily habits are known to affect their physical and mental health. Children who like to exercise and spend time outside their homes have better moods and lifestyles than sedentary children.¹ Limiting children's screen use to the recommended duration and ensuring the recommended amount of sleep reduces depressive symptoms and has been associated with good mental health.² The coronavirus disease 2019 (COVID-19) pandemic outbreak in the winter of 2019 heavily impacted the daily lives of people globally. In Japan, to prevent the spread of COVID-19, primary schools across the nation were closed in March 2020 for approximately 3 months. Measures to reduce close contact between people continued for approximately 3 years until May 2023. These measures affected children's daily habits and mental health status.^{3–6} However, most studies do not compare school-going children's lifestyles before and during the pandemic, and 1 study focuses on eating habits before and during the pandemic in Japan.³ Moreover, most studies deal with a single lifestyle item, such as watching TV, playing video games,⁴ eating habits,³ social relationships,⁵ and depressive symptoms.⁶ Furthermore, the children who participated in those studies were limited to first- to third-graders⁴ or fifth-graders.³ In studies using randomly selected children, response rates were approximately 50%.^{3,5,6} Data on a wide range of lifestyles and the mental health status of elementary school children in the first through sixth grades in a single area in Japan are unavailable. Thus, we compared the changes in the daily habits and mental health of primary school children in a regional Japanese city before and during the COVID-19 pandemic.

Brief Report

The participants of this report were elementary school students in the Toyama Prefecture in the middle of the Japan

archipelago, which faces the Japan Sea. The populations of the prefecture in 2015 and 2022 were 1066328 and 1016323, respectively. The study design was cross-sectional, and self-administered Internet questionnaires were used to collect data. Five elementary schools in Takaoka City participated in the pre-pandemic studies in July 2014 and January 2016. In these studies, 1936 completed data from 2057 participants (Response rate: 94.1%)^{7,8} and 1882 completed data from 2129 participants (Response rate: 88.4%)⁹ were obtained, respectively. In the study conducted during the COVID-19 pandemic, in March 2022, 77 elementary schools in Toyama Prefecture, including 32 schools in Toyama City, 6 schools in Takaoka City, 8 schools in Tonami City, 5 schools in Uozu City, 4 schools in Himi City, 3 schools in Oyabe City, 3 schools in Kurobe City, 2 schools in Nanto City, 1 school in Imizu City, and 13 schools in 4 towns participated. A total of 3156 completed data from 3784 participants were obtained (Response rate: 84.2%) for this study. In the 3 studies, written informed consent was obtained from all the schoolchildren and their parents, and participation was voluntary. The questionnaire included a wide range of children's daily habits that had been categorized as favourable and unfavourable based on the previous findings (ie, bedtime (<22:00, ≥22:00),⁹ waking time (<7:00, ≥7:00),⁹ breakfast consumption (every day, skipping),⁹ playing outdoors (often, not often),⁹ screen time (<120 minutes, ≥120 minutes),⁹ and communication with parents (very often, rarely),⁸ and mental health status (ie, enjoying attending school [yes, no],⁷

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irritability [very often, not often],⁸ daytime sleepiness [no, yes],⁹ and self-esteem [high, low].⁸ The prevalence of variables before and during the COVID-19 pandemic was tested with an χ^2 test. To evaluate the effect of school closure on changes in lifestyle (ie, daily habits) between before and during the COVID-19 pandemic, multivariate analyses with daily habits as a dependent variable and period (ie, a dummy variable for school closure), gender, and school grade as independent variables were performed. To examine the predictors of children's mental health, a logistic regression model with mental health as a dependent variable and gender, school grade, and daily habits as independent variables was performed.

Table 1 compares the children's daily habits and mental health before and during the COVID-19 pandemic, along with the results of the χ^2 test for categorical data. The proportion of students who reported unfavourable lifestyles was significantly higher for all items regarding daily habits—except communication with family—during the pandemic than before the pandemic. Conversely, the proportion of children who answered that they communicated often with their parents was significantly higher during the COVID-19 pandemic than before. Furthermore, across all indices related to mental health, the proportion of children with poor mental health increased significantly during the pandemic compared to before the pandemic.

Discussion

Restrictions on outings and school closures during the COVID-19 pandemic negatively affected a wide range of school children's daily habits and mental health in a regional, local town in Japan (Japanese overall population density: 338 persons/km²). Multivariate analyses further suggest that school closures have had negative effects on children's lifestyles except regarding communication with parents (odds ratios [ORs] in the 5 models holding a lifestyle variable as the dependent variable, except for "communication with a parent": 0.14-0.78, all P s < .05). This study found that children's lifestyle was related to their mental health status. Specifically, communication with parents was positively associated with all mental health measures (ORs: 1.47 [1.20-1.82] in the "Enjoy attending school" model; 3.94 [3.08-5.02] in the "Self-esteem" model; 2.61 [2.06-3.31] in the "Irritability" model; and 1.45 [1.16-1.81] in the "Daytime sleepiness" model). Playing outdoors was positively related to all mental health measures except for "daytime sleepiness" (ORs: 1.62 [1.40-1.88] in the "Enjoy attending school" model; 1.57 [1.27-1.94] in the "Self-esteem" model; 1.27 [1.04-1.54] in the "Irritability" model). In line with the previous finding concerning the beneficial

Table 1. Comparison of Health Behaviours and Mental Health During and Before the COVID-19 Pandemic.

Variable	During COVID-19		Pre COVID-19		P-value
	n	%	n	%	
Grade					
1st (age 6-7 years)	628	17.89	318	16.9	<.000
2nd (age 7-8 years)	644	18.30	301	16.0	
3rd (age 8-9 years)	600	17.09	314	16.7	
4th (age 9-10 years)	573	16.32	280	14.9	
5th (age 10-11 years)	590	16.81	328	17.4	
6th (age 11-12 years)	475	13.53	341	18.1	
Gender					
Boy	1757	50.06	943	50.11	0.972
Girl	1753	49.94	939	49.90	
Health behavior					
Bedtime					
<22:00	2214	63.1	1338	71.1	<.000
≥22:00	1296	36.9	544	28.9	
Wake-up time					
<7:00	3030	86.3	1797	95.5	<.000
≥7:00	480	13.7	85	4.5	
Breakfast consumption					
Every day	3160	90.0	1731	92.0	.019
Skipping	350	10.0	151	8.0	
Playing outdoors					
Often	2266	64.6	1370	72.8	<.000
Not often	1244	35.4	512	27.2	
Screen time (minutes)					
<120	666	19.0	1120	59.5	<.000
≥120	2844	81.0	762	40.5	
Communication with parents					
Very often	3069	87.4	1422	82.7	<.000
Rarely	441	12.6	297	17.3	
Mental health					
Enjoy attending school					
Yes	1755	50.0	1152	67.8	<.000
No	1755	50.0	546	32.2	
Self-esteem					
High	3068	87.4	1574	91.6	<.000
Low	442	12.6	145	8.4	
Irritability					
Not often	2964	84.4	1505	87.6	.003
Very often	546	15.6	214	12.4	
Day time sleepiness					
No	2600	74.1	1562	83.0	<.000
Yes	910	25.9	320	17.0	

effects of communication with parents,¹⁰ our findings suggest that child-parent communication and playing outdoors were effective in maintaining children's mental health during the pandemic.

Finally, this study had several limitations. The surveys conducted before and during the pandemic used different participants. In addition, the interval between these surveys was long. Accordingly, these factors may have affected the difference in the participating

students' daily habits and mental health between the 2 surveys.

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Author Contributions

S.S. and Y.K. collected data. S.S. and A.H. conceptualized, designed the study, conducted statistical analysis, drafted the initial manuscript. All authors have reviewed, revised the manuscript and agreed to the published version of the manuscript.

Declaration of Conflicting Interests

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Ethical Approval

The survey was approved by the Ethics Committee of the University of Toyama (ethical approval code: R2021151).

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