Received: 27 June 2022 / Accepted: 15 August 2022 / Published online: 31 August 2022

DOI 10.34689/SH.2022.24.4.007

UDC 371.8

EFFECTS OF LIFESTYLES IN ELEMENTARY AND JUNIOR HIGH SCHOOL STUDENTS THAT WARRANT CONSIDERABLE ATTENTION

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Abstract

Background: The lifestyles of elementary and junior high school students and their effects on mental and physical health are issues garnering attention in countries around the world, including Japan. The focus on lifestyles covers a broad range of topics.

Objective: With this in mind, we summarize the results to a lifestyle survey of their students.

Materials and Methods: We administered to the responses elementary and junior high school students (6th–9th graders in Izumo, Japan; n=714) in 2018. The survey asked about being in a good mood when waking, the time that the student woke up, the time that the student went to bed, the hours of TV watched per day, the hours of games played per day, the hours of smartphone use per day, the hours of PC or tablet PC use per day, how often the student turned off the TV during meals, and the number of times the student ate breakfast per week. The responses were compiled, and our analyses revealed the following.

Results: The 9th graders woke up significantly later than the other students. The junior high school students of all grades went to bed significantly later. Seventh graders watched significantly fewer hours of TV per day than 6th graders but used a smartphone for significantly more hours per day; the 7th graders also ate breakfast significantly fewer times per week.

Conclusions: Especially, attention must be focused on the duration of sleep so that students do not start going to bed later in junior high school. In addition, relevant personnel need to devise and improve education regarding these actions for students of all grades.

Keywords: *waking up; going to bed; breakfast; smartphone; TV.*

Резюме

ВЛИЯНИЕ ОБРАЗА ЖИЗНИ НА УЧАЩИХСЯ МЛАДШИХ КЛАССОВ НАЧАЛЬНОЙ ШКОЛЫ

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Актуальность: Образ жизни учащихся младших классов начальной школы и его влияние на психическое и физическое здоровье являются вопросами, привлекающими внимание в странах по всему миру, включая Японию. Акцент на образе жизни охватывает широкий круг тем.

Цель: Оценка образа жизни учащихся младших классов начальной школы.

Материалы и методы: Проведен опрос учащихся младших классов начальной школы (6-9 классов в Идзумо, Япония; n=714) в 2018 году. Опрос подразумевал сбор информации об эмоциональном состоянии при пробуждении, о времени, когда респондент просыпался, ложился спать, выделяемом для просмотра телевизора в день, игр, смартфона, работы с ПК или планшетом, как часто респондент выключал телевизор во время еды и сколько раз респондент завтракал в неделю. Ответы были обобщены, и результаты исследования показали следующее.

Результаты: Учащиеся 9-класса просыпались значительно позже других. Ученики младших классов начальной школы ложились спать значительно позже. Обучающиеся 7-класса проводили время за просмотром телевизора значительно меньше часов в день, чем 6-классники, но пользовались смартфоном значительно больше часов в день; 7-классники также завтракали значительно меньше раз в неделю.

Выводы: Особое внимание должно быть сосредоточено на продолжительности сна, чтобы учащиеся младших классов начальной школы не ложились спать позже назначенного времени. Кроме того, соответствующий персонал должен разработать и улучшить алгоритм информированности учащихся относительно профилактических мероприятий на всех уровнях обучения.

Ключевые слова: *пробуждение; отход ко сну; завтрак; смартфон; телевизор.*

Түйіндеме

БАСТАУЫШ СЫНЫП ОҚУШЫЛАРЫНА ӨМІР САЛТЫНЫҢ ӘСЕРІ

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Өзектілігі: Бастауыш сынып оқушыларының өмір салты және оның психикалық және физикалық денсаулығына әсері бүкіл әлем елдерінде, соның ішінде Жапонияда назар аударатын мәселелер бірі болып табылады. Өмір салтына баса назар аудару көптеген тақырыптарды қамтиды.

Мақсаты: Бастауыш сынып оқушыларының өмір салтын бағалау.

Материалдар мен әдістер: 2018 жылы бастауыш сынып оқушыларына (Жапонияның Идзумо қаласында 6-9 сынып; n=714) сауалнама жүргізілді. Сауалнама ұйқыдан ояну кезіндегі эмоционалды жағдай туралы, респонденттің ұйқыдан оянған, ұйықтаған кездегі уақыты, күніне теледидар көруге, ойындарға, смартфонға, компьютермен немесе планшетпен жұмыс істеуге бөлінген уақыты, респондент тамақтану кезінде теледидарды қаншалықты жиі өшіргені және аптасына қанша рет таңғы ас ішкені туралы ақпаратты қамтиды. Жауаптар қорытындыланып, зерттеу нәтижелері мынаны көрсетті.

Нәтижелері: 9-сынып оқушылары басқаларға қарағанда әлдеқайда ұйқыдан кеш оянды. Бастауыш сынып оқушылары кейінірек ұйықтаған. 7-сынып оқушылары теледидар көруге 6-сынып оқушыларына қарағанда күніне бірнеше сағаттан аз уақыт жұмсады, бірақ смартфонды күніне бірнеше сағаттан көп пайдаланды; 7-сынып оқушылары аптасына бір реттен аз таңғы ас ішті.

Қорытынды: Бастауыш сынып оқушылары белгіленген уақыттан кейін ұйықтамауы үшін ұйқының ұзақтығына ерекше назар аудару керек. Сонымен қатар, тиісті қызметкерлер оқытудың барлық деңгейлеріндегі профилактикалық іс-шараларға қатысты оқушылардың хабардар болу алгоритмін әзірлеуі және жақсартуы тиіс.

Түйінді сөздер: ұйқыдан ояну; ұйқыға кету; таңғы ас; смартфон; теледидар.

Bibliographic citation:

Inoue K., Fujita Ya., Takeshita H., Kamura M. Effects of lifestyles in elementary and junior high school students that warrant considerable attention // *Nauka i Zdravookhranenie* [Science & Healthcare]. 2022, (Vol.24) 4, pp. 51-60. *doi 10.34689/SH.2022.24.4.007*

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Introduction

Mental and physical problems specifically in younger people have been examined in a variety of settings in various countries. In a study of 8th–10th graders in Norway, *Kleppang et al.* found that physical activity at a sports club was associated with significantly lower odds for symptoms of depression [14]. Pascoe et al. contend that physical activity and exercise interventions to promote mental health or treat mental illness in young people have not been described in sufficient detail [18]. A possible association between sleep problems and mental health problems was also described in a study of Norwegian adolescents [9]. *Velten et al* reported that lifestyle's effects about mental health were comparable among German and Chinese students [25].

However, this related study was shown results by various methods from different aspects including each country and age group [3,5,13,23]. We feel that such study needs cooperation with preventive activity and research in various occupations including government agency, teachers, and parents/guardians of the students in school district.

Herein, we investigated the lifestyles of elementary and junior high school students as part of our research concerning the health of this age group. We administered a survey to examine the health/lifestyles of students in the city of Izumo (population 172,775) in Shimane Prefecture on Japan's northern coast [21,22].

Methods

Participants

In Japan, compulsory education consists of six years of elementary school (1st–6th grade) and three years of junior high school (7th–9th grade). The participants in this study were a total of 714 students aged 11–15 in an Izumo civic Daiichi school district who completed a lifestyle survey in

2018. The participants were 6th graders (n=197), 7th graders (n=174), 8th graders (n=179), and 9th graders (n=164).

Informed consent to participate in this study was obtained from the students and their parents/guardians. The study was approved by the Medical Ethics Committee of the Faculty of Medicine, Shimane University.

Ethics approval

Informed consent to participate in this study was obtained from the students and their parents/guardians. The study was approved by the Medical Ethics Committee of the Faculty of Medicine, Shimane University.

Survey details

The lifestyle survey administered to the students in 2018 asked that questions:

{1} being in a good mood when waking (yes, rather yes, rather no, or no),

{2} the time that the student woke up (before 6:30 a.m., after 6:30 a.m. but before 7:00 a.m., after 7:00 a.m. but before 7:30 a.m., or after 7:30 a.m.),

{3} the time that the student went to bed (before 9:00 p.m., after 9:00 p.m. but before 10:00 p.m., after 10:00 p.m. but before 11:00 p.m., after 11:00 p.m. but before 12:00 a.m., or after 12:00 a.m.),

{4} the hours of TV watched per day (seldom watch, watch less than 1 hr, watch more than 1 hr but less than 2 hr, watch more than 2 hr but less than 3 hr, watch more than 3 hr but less than 4 hr, or watch more than 4 hr),

{5} the hours of games played per day (none, play less than 30 min, play more than 30 min but less than 1 hr, play more than 1 hr but less than 2 hr, play more than 2 hr but less than 3 hr, play more than 3 hr but less than 4 hr, or play more than 4 hr),

{6} the hours of smartphone use per day (none, use for less than 30 min, use for more than 30 min but less than 1 hr, use for more than 1 hr but less than 2 hr, use for more than 2 hr but less than 3 hr, use for more than 3 hr but less than 4 hr, or use for more than 4 hr),

{7} the hours of PC or tablet PC use per day (none, use for less than 30 min, use for more than 30 min or less than 1 hr, use for more than 1 hr but less than 2 hr, use for more than 2 hr but less than 3 hr, use for more than 3 hr but less than 4 hr, or use for more than 4 hr),

{8} how often the student turned off the TV during meals (yes, rather yes, rather no, or no), and

{9} the number of times the student ate breakfast per week (every day, 3–4 times/week, 1–2 times/week, or none).

Statistical analysis

Using the above-described nine survey items, we consolidated the students' responses for the statistical analyses as follows.

{1} Being in a good mood when waking was categorized as essentially yes (yes and rather yes) or essentially no (rather no and no).

{2} The time that the student woke up was categorized both as {a} before 6:30 a.m. (before 6:30 a.m.) or after 6:30 a.m. (after 6:30 a.m. but before 7:00 a.m., after 7:00 a.m. but before 7:30 a.m., and after 7:30 a.m.) and {b} before 7:00 a.m. (before 6:30 a.m. and after 6:30 a.m. but before 7:00 a.m.) or after 7:00 a.m. (after 7:00 a.m. but before 7:30 a.m., and after 7:30 a.m.).

{3} The time that the student went to bed was categorized as both {a} before 10:00 p.m. (before 9:00 p.m. and after 9:00 p.m. but before 10:00 p.m.) or after 10:00 p.m. (after 10:00 p.m. but before 11:00 p.m., after 11:00 p.m. but before 12:00 a.m., and after 12:00 a.m.) and {b} before 11:00 p.m. (before 9:00 p.m., after 9:00 p.m. but before 10:00 p.m., and after 10:00 p.m. but before 11:00 p.m.) or after 11:00 p.m. (after 11:00 p.m. but before 12:00 a.m. and after 12:00 a.m.).

{4} The hours of TV watched per day were categorized as <1 hr (seldom watch and less than 1 hr) or ≥1 hr (more than 1 hr but less than 2 hr, more than 2 hr but less than 3 hr, more than 3 hr but less than 4 hr, and more than 4 hr).

{5} The hours of games played per day were categorized as <1 hr (none, less than 30 min, and more than 30 min but less than 1 hr) or ≥1 hr (more than 1 hr but less than 2 hr, more than 2 hr but less than 3 hr, more than 3 hr but less than 4 hr, and more than 4 hr).

{6} The hours of smartphone use per day were categorized as <1 hr (none and less than 1 hr) or ≥1 hr (more than 1 hr but less than 2 hr, more than 2 hr but less than 3 hr, more than 3 hr but less than 4 hr, and more than 4 hr).

{7} The hours of PC or tablet PC use per day were categorized as <1 hr (none and less 1 hr) or ≥1 hr (more than 1 hr but less than 2 hr, more than 2 hr but less 3 hr, more than 3 hr but less than 4 hr, and more than 4 hr).

{8} How often the student turned off the TV during meals was categorized as essentially yes (yes and rather yes) or essentially no (rather no and no).

{9} The number of times the student ate breakfast per week was categorized as every day (every day) or not every day (3–4 times/week, 1–2 times/week, and none). Fisher's exact test was used for the statistical analysis of these items with EZR ver. 1.36 [12]. For the analysis, the students were grouped into (a) 6th graders and 7th graders, (b) 7th graders and 8th graders, and (c) 8th graders and 9th graders.

Interpretation based on the analyses

Using the results of the statistical analyses, we summarize the changes in the daily rhythms of 6th–9th graders and their effects on health. Based on those findings, we will examine the factors that comprise a good lifestyle from the perspectives of preventive medicine and public health.

Results

Detailed Survey Results

The results of the nine items in the lifestyle survey are depicted in Figures 1–9. As shown in Figure 1, regarding the first item, i.e., being in a good mood when waking {1}, the most frequent response from the 6th graders was yes (40.1%), followed by rather yes (31.0%). The most frequent response from the 7th–9th graders was rather yes (41.4% for 7th graders, 48.9% for 8th graders, and 38.9% for 9th graders), followed by rather no (27.6% for 7th, 24.7% for 8th, and 30.9% for 9th graders).

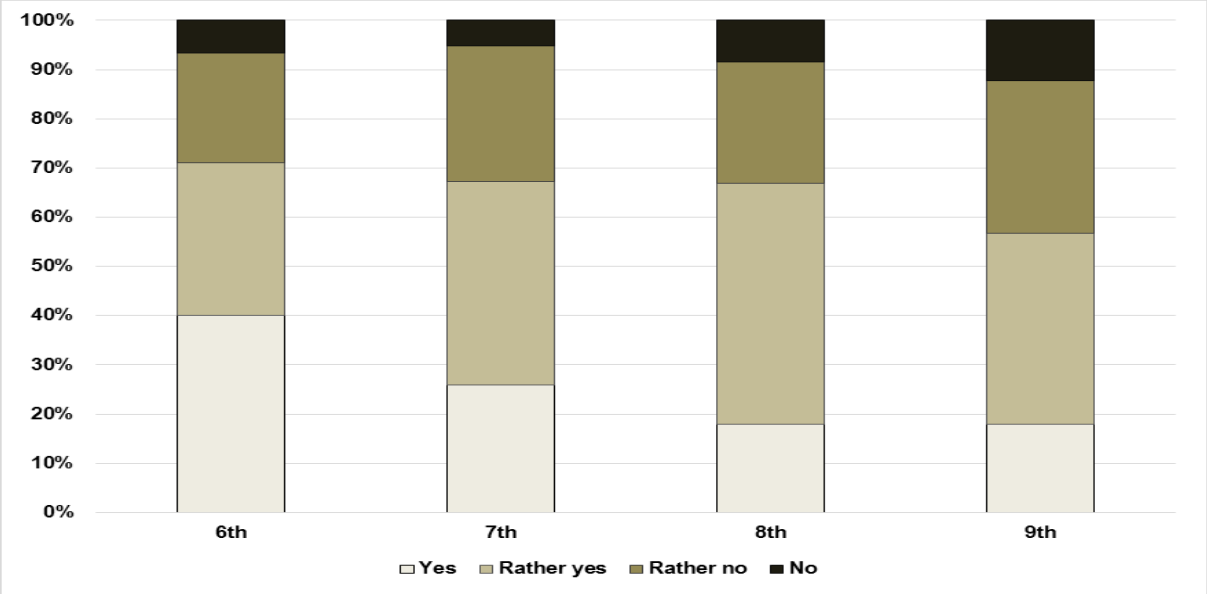

Figure 1. Detailed survey results regarding being in a good mood when waking.

Concerning the time that the student woke up {2}, the most frequent response from 6th, 8th and 9th graders was after 6:30 a.m. but before 7:00 a.m. (50.3% for 6th graders, 46.4% for 8th, and 48.5% for 9th), followed by before 6:30 a.m. (37.6% for 6th, 37.4% for 8th, and 23.9% for 9th graders) (Figure 2). The most frequent response from 7th graders was before 6:30 a.m. (46.8%), followed by after 6:30 a.m. but before 7:00 a.m. (38.7%).

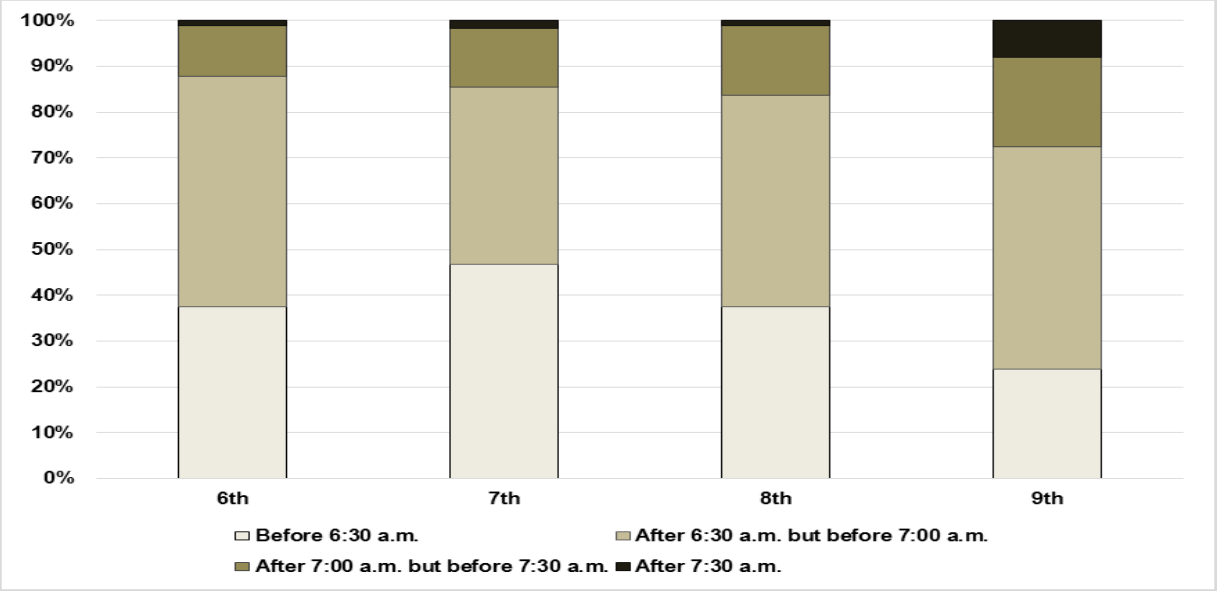

Figure 2. Survey results of the time that the student woke up.

Figure 3 illustrates the students' responses to the survey item about the time at which the student went to bed {3}, showing that the most frequent response from 6th graders was after 10:00 p.m. but before 11:00 p.m. (44.7%), followed by after 9:00 p.m. but before 10:00 p.m. (44.2%). The most frequent response from 7th and 8th graders was after 10:00 p.m. but before 11:00 p.m. (45.9% for 7th graders and 50.8% for 8th graders), followed by after 11:00 p.m. but before 12:00 a.m. (33.1% for 7th graders and 38.5% for 8th graders). The most frequent response from 9th graders was after 11:00 p.m. but before 12:00 a.m. (53.4%), followed by after 10:00 p.m. but before 11:00 p.m. (30.1%).

Item {4}, the hours of TV watched per day, revealed that the most frequent response from 6th graders was more than 1 hr but less than 2 hr (36.5%), followed by more than 2 hr but less than 3 hr (22.8%) (Figure 4). The most frequent response from 7th–9th graders was more than 1 hr but less than 2 hr (33.5% for 7th graders, 38.0% for 8th, and 43.3% for 9th), followed by less than 1 hr (22.5% for 7th, 20.7% for 8th, and 21.3% for 9th graders).

The responses to item {5}, the hours of games played per day, were as follows (Figure 5): The most frequent response from 6th and 7th graders was none (34.0% for 6th graders and 34.3% for 7th graders), followed by more than 30 min but less than 1 hr (20.8% for 6th and 26.7% for 7th graders). The most frequent response from 8th and 9th graders was none (38.0% for 8th and 38.9% for 9th graders), followed by more than 1 hr but less than 2 hr (21.8% for 8th and 21.6% for 9th graders).

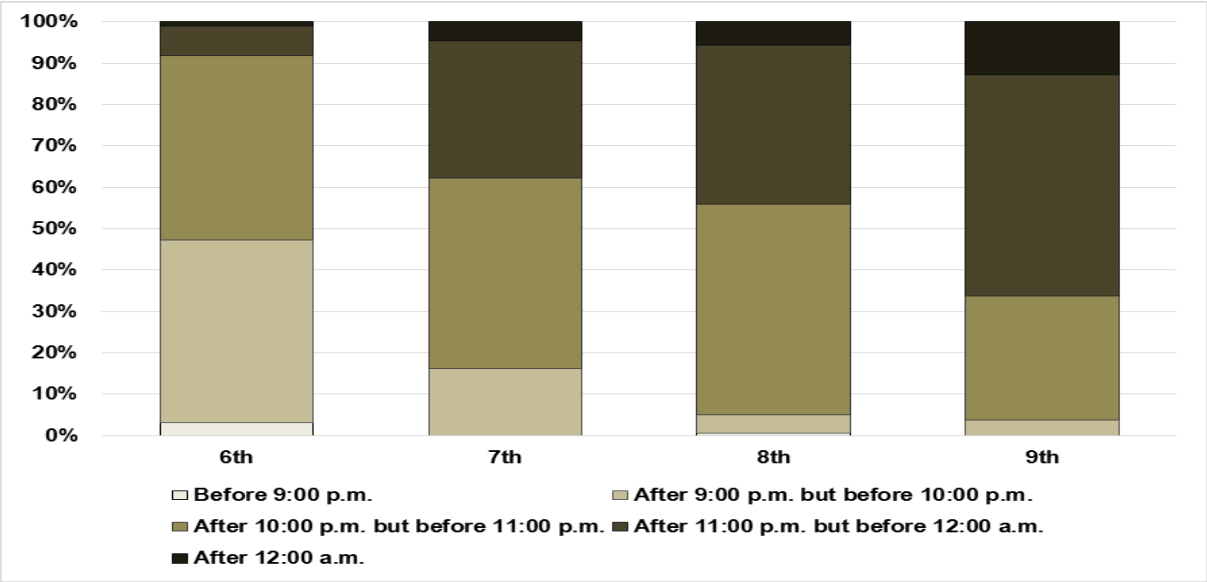

Figure 3. The times that the student went to bed.

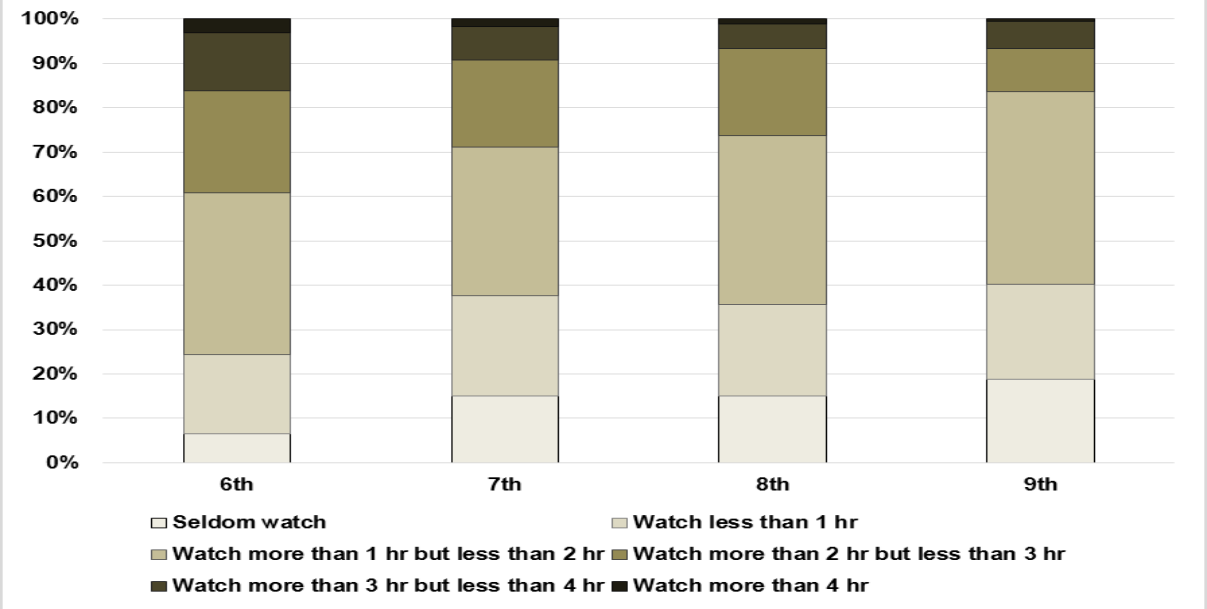

Figure 4. The hours of TV watched per day.

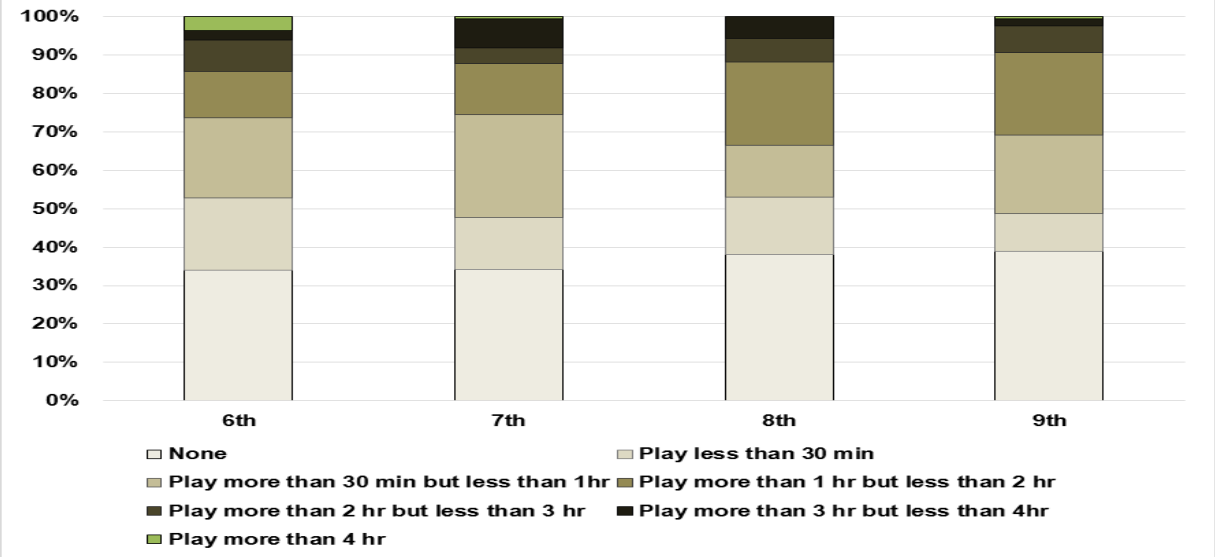

Figure 5. The hours of games played per day.

The question regarding the number of hours of smartphone use per day {6} revealed that the most frequent response from 6th graders was none (49.5%), followed by less 30 min (18.9%). The most frequent response from 7th–9th graders was none (45.9% for 7th, 45.5% for 8th, and 37.7% for 9th graders), followed by more than 1 hr but less than 2 hr (14.5% for 7th, 18.0% for 8th, and 21.0% for 9th graders) (Figure 6).

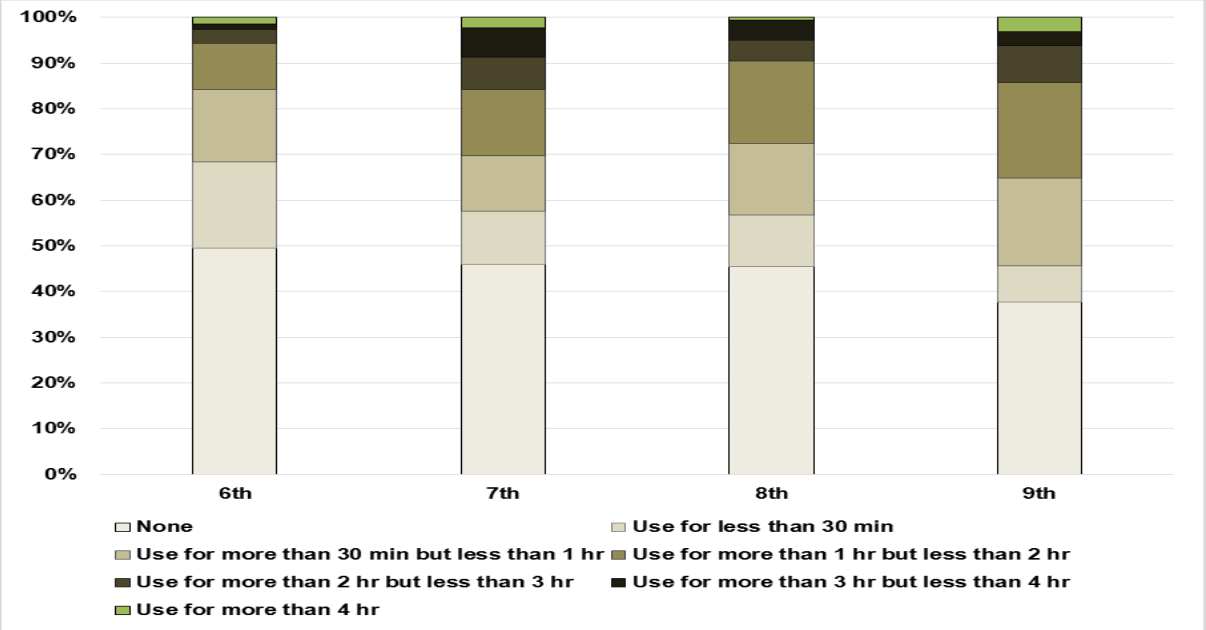

Figure 6. The hours of smartphone use per day.

As shown in Figure 7, the most frequent response to item {7}, the hours of PC or tablet PC use per day, was none (55.3%) among the 6th graders, followed by less 30 min (13.7%) in that grade. The most frequent response from 7th and 8th graders was none (54.9% for 7th and 51.1% for 8th graders), followed by more than 30 min but less than 1 hr (13.9% for 7th graders and 19.1% for 8th graders). The most frequent response from 9th graders was none (51.2%), followed by more than 1 hr but less than 2 hr (16.5%).

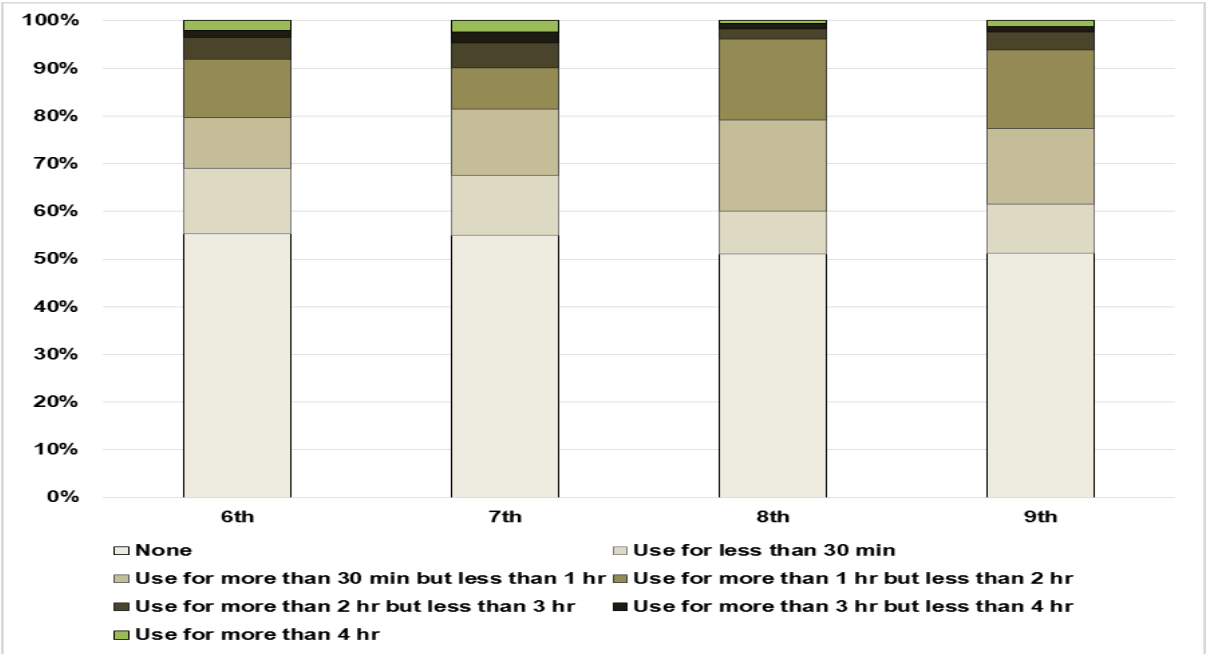

Figure 7. The hours of PC or tablet PC use per day.

When the students were asked how often they turned off the TV during meals {8}, the most frequent response from students in all grades was no (35.2% for 6th, 34.5% for 7th, 40.2% for 8th, and 40.9% for 9th graders); the percentages of the answer yes were 28.1% for 6th graders, 27.0% for 7th, 24.6% for 8th, and 22.6% for 9th graders (Figure 8).

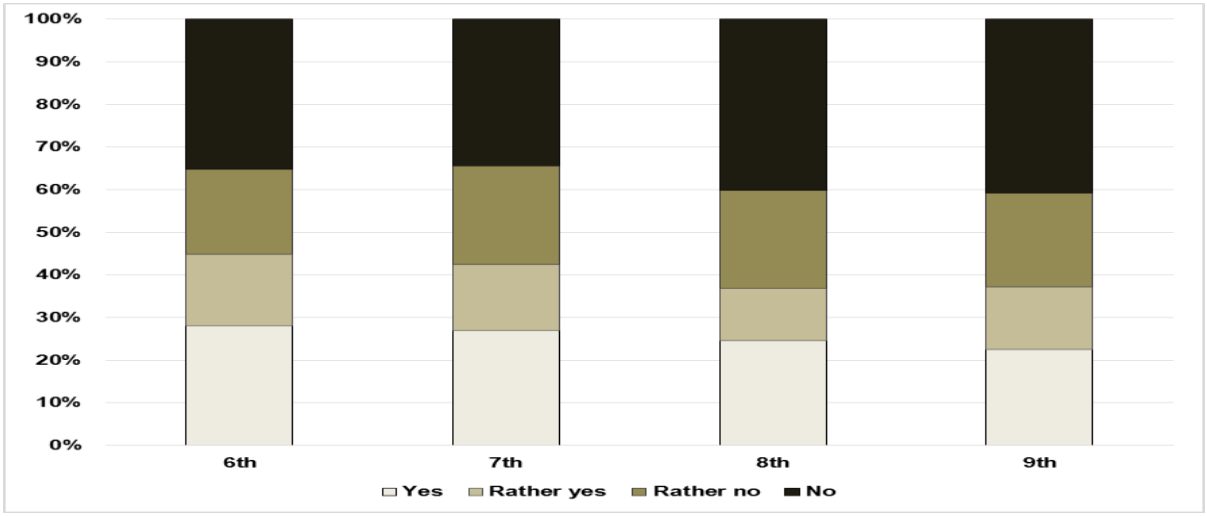

Figure 8. How often the student turned off the TV during meals.

When asked about {9} the number of times the student ate breakfast per week (Figure 9), the most frequent response from students in all grades was every day (95.4% for 6th graders, 86.6% for 7th, 92.0% for 8th, and 87.1% for 9th), followed by 3–4 times/week (3.0% for 6th, 8.1% for 7th, 4.5% for 8th, and 8.6% for 9th graders).

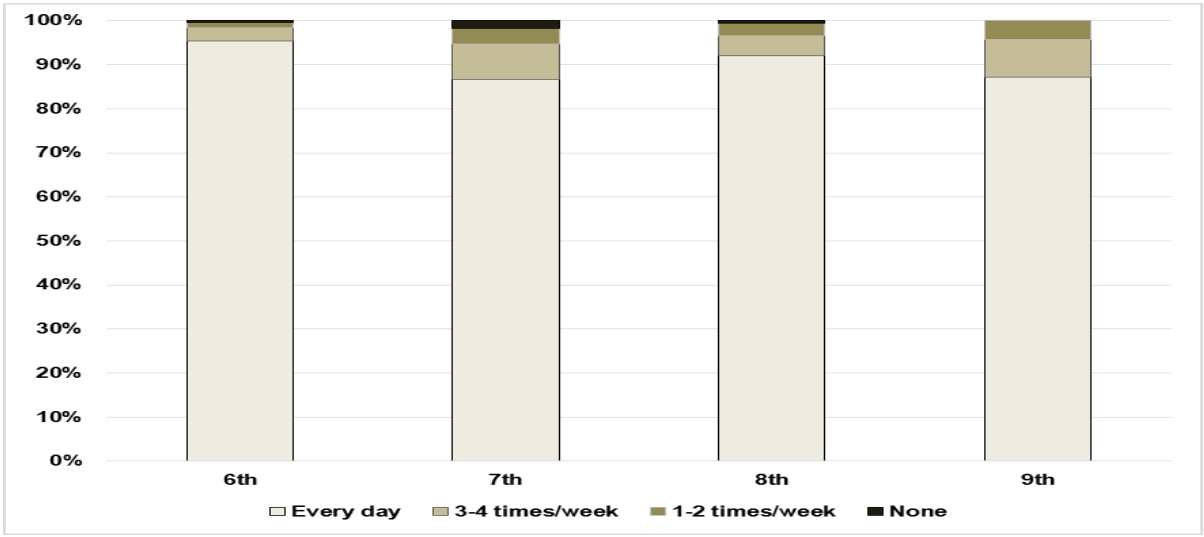

Figure 9. The number of times the student ate breakfast per week.

Summary of survey responses in the categories and the statistical analysis results

Table 1 summarizes the survey responses in the categories described above in section 'Statistical analysis' and provides detailed results of the analyses. When responses to {1} (being in a good mood when waking) were categorized as essentially yes or essentially no, there were no significant differences among the student groupings (a) (6th and 7th graders together), (b) (7th and 8th graders), and (c) (8th and 9th).

Regarding {2-a}, i.e., the time that the student woke up categorized as before or after 6:30 a.m., there were no significant differences in the two student groups (a) and (b). A significantly greater proportion of 9th graders woke up after 6:30 a.m. (c) compared to 8th graders ($p<0.01$).

When {2-b} the time that the student woke up was categorized as before or after 7:00 a.m., there were no significant differences in the two student groups (a) and (b). A significantly greater proportion of 9th graders woke up after 7:00 a.m. (c) compared to 8th graders ($p<0.05$).

When we categorized the time that the student went to bed {3-a} as before or after 10:00 p.m., we observed that compared to the 6th graders, a significantly greater proportion of 7th graders went to bed after 10:00 p.m. ($p<0.001$), and a significantly greater proportion of 8th graders went to bed after 10:00 p.m. than 7th graders ($p<0.001$). There was no significant difference for this item in the 8th+9th graders group (c).

We divided the times that the student went to bed {3-b} as before or after 11:00 p.m., and we observed that a significantly greater proportion of 7th graders went to bed after 11:00 p.m. compared to 6th graders ($p<0.001$), and a significantly greater proportion of 9th graders went to bed after 11:00 p.m. than 8th graders ($p<0.001$). There were no significant differences in the group of 7th+8th graders (b).

We categorized responses to the hours of TV watched per day {4} as <1 hr or ≥1 hr, and the analysis revealed that compared to the 6th graders, a significantly smaller proportion of 7th graders watched ≥1 hr ($p<0.01$). There were no significant differences in the other two student groups (b) and (c).

There were no significant differences in the responses by groups (a), (b) or (c) regarding the hours of games played per day {5} when categorized as <1 hr or ≥1 hr.

Table 1. **Summary of the 2018 Survey Responses to the Nine Items and the Statistical Analysis Results.**

{1} grade	Essentially yes	Essentially no		p-value
6th	71.1%	28.9%		
7th	67.2%	32.8%	(a)	0.432
8th	66.9%	33.1%	(b)	1
9th	56.8%	43.2%	(c)	0.0583
{2-a} grade	**Before 6:30 a.m.**	**After 6:30 a.m.**		**p-value**
6th	37.6%	62.4%		
7th	46.8%	53.2%	(a)	0.0739
8th	37.4%	62.6%	(b)	0.0843
9th	23.9%	76.1%	(c)	0.00729
{2-b} grade	**Before 7:00 a.m.**	**After 7:00 a.m.**		**p-value**
6th	87.8%	12.2%		
7th	85.5%	14.5%	(a)	0.542
8th	83.8%	16.2%	(b)	0.661
9th	72.4%	27.6%	(c)	0.0124
{3-a} grade	**Before 10:00 p.m.**	**After 10:00 p.m.**		**p-value**
6th	47.2%	52.8%		
7th	16.3%	83.7%	(a)	1.56×10^{-10}
8th	5.0%	95.0%	(b)	0.00077
9th	3.7%	96.3%	(c)	0.605
{3-b} grade	**Before 11:00 p.m.**	**After 11:00 p.m.**		**p-value**
6th	91.9%	8.1%		
7th	62.2%	37.8%	(a)	4.96×10^{-12}
8th	55.9%	44.1%	(b)	0.235
9th	33.7%	66.3%	(c)	0.0000539
{4} grade	**<1 hr**	**≥1 hr**		**p-value**
6th	24.4%	75.6%		
7th	37.6%	62.4%	(a)	0.00667
8th	35.8%	64.2%	(b)	0.741
9th	40.2%	59.8%	(c)	0.436
{5} grade	**<1 hr**	**≥1 hr**		**p-value**
6th	73.6%	26.4%		
7th	74.4%	25.6%	(a)	0.906
8th	66.5%	33.5%	(b)	0.128
9th	69.1%	30.9%	(c)	0.643
{6} grade	**<1 hr**	**≥1 hr**		**p-value**
6th	84.2%	15.8%		
7th	69.8%	30.2%	(a)	0.00112
8th	72.5%	27.5%	(b)	0.637
9th	64.8%	35.2%	(c)	0.159
{7} grade	**<1 hr**	**≥1 hr**		**p-value**
6th	79.7%	20.3%		
7th	81.5%	18.5%	(a)	0.694
8th	79.2%	20.8%	(b)	0.595
9th	77.4%	22.6%	(c)	0.696
{8} grade	**Essentially yes**	**Essentially no**		**p-value**
6th	44.9%	55.1%		
7th	42.5%	57.5%	(a)	0.675
8th	36.9%	63.1%	(b)	0.327
9th	37.2%	62.8%	(c)	1
{9} grade	**Every day**	**Not every day**		**p-value**
6th	95.4%	4.6%		
7th	86.6%	13.4%	(a)	0.00295
8th	92.0%	8.0%	(b)	0.118
9th	87.1%	12.9%	(c)	0.155

{1} Being in a good mood when waking. {2-a} The time that the student woke up, categorized as before or after 6:30 a.m. {2-b} The time that the student woke up, categorized as before or after 7:00 a.m. {3-a} The time that the student went to bed, categorized as before or after 10:00 p.m. {3-b} The time that the student went to bed, categorized as before or after 11:00 p.m. {4} The hours of TV watched per day. {5} The hours of games played per day. {6} The hours of smartphone use per day. {7} The hours of PC or tablet PC use per day. {8} How often the student turned off the TV during meals. {9} The number of times the student ate breakfast per week.

(a) 6th graders + 7th graders, (b) 7th graders + 8th graders, (c) 8th graders + 9th graders in the statistical analysis.

With the categorization of the hours of smartphone use per day {6} as <1 hr or ≥1 hr, a significantly greater proportion of 7th graders used a smartphone for ≥1 hr compared to the 6th graders ($p<0.01$). There was no significant differences in group (b) or (c).

There were no significant differences in the responses by groups (a), (b) or (c) regarding the hours of PC or tablet PC use per day {7} categorized as <1 hr or ≥1 hr. There were also no significant differences in the responses by groups (a), (b) or (c) about how often the student turned off the TV during meals {8} categorized as essentially yes or essentially no.

For item {9}, i.e., the number of times the student ate breakfast per week were categorized as every day or not every day; a significantly greater proportion of 7th graders did not eat breakfast every day compared to 6th graders ($p<0.01$). There were no significant differences in the 7th+8th graders group or 8th+9th graders group.

Discussion

The time at which a student wakes up and the time when a student goes to bed both affect whether the student has a positive view of activities that day [24]. A study of the mental health aspects of sleep durations suggested that adolescents should sleep for ≥8.5 hr or longer [17]. A review comparing the sleep of adolescents in multiple countries around the world demonstrated that Asian adolescents slept less than North American and European adolescents and that Asian adolescents tended to have a higher rate of daytime sleepiness [7]. Routinely being active at night can cause disruption of a person's innate biological rhythm, which can eventually lead to an unstable mental and physical state [10]. Another study of Japanese subjects noted that going to bed late led to napping and sleepiness during the day and that going to bed late was associated with insomnia and poor performance [6].

Melatonin is secreted at night in humans, and serotonin is actively secreted in the morning. Waking up and going to bed are vital since they keep these two factors functioning normally and help a person to sleep. Educational campaigns and efforts to provide a correct understand of the importance of sleep and the importance of a regular lifestyle are thus necessary and should continue. Our survey revealed that the 9th-grade students were waking up later than the younger student, which may be because 9th graders in Japan are studying for exams. Education about daily rhythms that takes into account the timepoints at which 9th graders in particular wake up must be provided and followed up. Junior high school students of all grades go to bed rather late, and education about the appropriate time to go to bed should be provided and followed up while closely monitoring the times that students are going to bed, especially among the students starting junior high school.

In this era of smartphones, students are beginning to use smartphones at an earlier age [11]. In Japan, the use of the instant messaging application LINE has spread among students, and the same study [11] suggested that uses of LINE, video sites, and Twitter have pushed back the times that students go to bed. A 2015 survey indicated that 78% of teens ages 10–15 watched more than 15 min of TV on weekdays, but that figure decreased by over 20% in 2020 [1]. Our present analyses indicate that smartphone use by 7th graders has increased significantly; students, and particularly those starting junior high school, should therefore continually be informed of the need to avoid prolonged smartphone use so that their lives and health are not impacted.

In the modern age, people need to continue to be correctly and fully informed about both the benefits and the dangers of the use of information devices (including smartphones). Educational campaigns to that end should continue to be conducted so that people use such devices appropriately, without detrimental effects on their health. Although no significant changes in the amount of time spent on online games has been established, it was indicated that preventive measures should continue to be taken globally with attention to young people [2,4,8,19].

If one does not eat breakfast (our survey's item {9}), then one's mind tends to wander during the morning, even if one's body is active. The body and brain need to be energized by a reliable supply of glucose, which is the brain's energy source, at breakfast [15]. Efforts to provide breakfast at school, in cooperation with the local community, have been undertaken in several countries [16]. Students should continue to be informed of the importance of eating breakfast before their school day [20].

Study Limitations

There are several study limitations to consider. The survey was administered in a single school district in one prefecture among Japan's 47 prefectures, and it was the discussion from survey of one time in a year. However, our findings thus provide valuable information about the health of elementary and junior high school students based on the focus for lifestyle habits including important social items.

Conclusion

The major findings in this study are that the 9th graders woke up significantly later than the other students, and junior high school students as a whole (7th–9th graders) went to bed significantly later. The 7th graders watched TV for significantly less time than the 6th graders, but the 7th graders used a smartphone for a significantly longer time compared to the 6th graders. The 7th graders also ate breakfast significantly fewer times per week than the 6th graders. Therefore, students should have a correct understanding of the importance of waking up and going to sleep at appropriate times and the importance of a wake and sleep rhythm, the importance of breakfast, and precautions regarding the prolonged use of smartphones/tablets and their hours of TV watching, and education about these topics should begin in elementary school. Methodical educational campaigns are needed before and after students start junior high school so that the students remain mindful of these issues. Greater attention must be paid to the time when a student wakes up so that 8th graders do not start waking up later once they move on to 9th grade. Moreover, attention must be focused on the duration of sleep so that students do not start going to bed later in junior high school. It is quite possible that students' use of smartphones for academic purposes will continue to increase, and these devices should be adeptly incorporated in students' lives.

Students' own understanding of required results in this study, parents/guardians, schools, school physicians, educators, medical experts, and government agencies should coordinate to provide education about healthy lifestyles for students, and actions by the students' communities as a whole could be optimal.

Acknowledgment. *We thank the nursing teachers and teachers of the Izumo civic Daiichi school district for their enthusiastic cooperation.*

Author Contributions. *Conceptualization was KI, YF and MK. Discussion of methodology was KI, YF, HT and MK. Data collection was YF and MK. Statistical analysis was KI. and YF.*

Draft preparation of manuscript was KI. Editing of manuscript was KI, YF, HT and MK. Funding was KI. and YF. All authors have read and agreed final approval for submission of the manuscript.

Funding. *This work was supported by JSPS KAKENHI Grants-in-Aid for Scientific Research (C) Numbers 16K01760 and 22K02494 awarded to Y.F.; and Numbers 17K09194 and 21K02383 awarded to K.I.*

Conflict of Interests: *None.*

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