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Mental health and sleep of Japanese elementary school students

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### Abstract

Many studies have suggested that Japanese children are tired, because they are busy and sleep deprived. Children do not establish their lifestyle on their own, but are influenced by schools, family and the society. The present article reviews the Japanese education system and education at home, in terms of their effects on sleep and mental health of elementary school students, and discusses sleep education at school.

Keywords: sleep education, mental health, stress management, elementary school students

## Mental health and sleep of Japanese elementary school students

Japanese people are short sleepers. According to the report provided by the Organization for Economic Co-operation and Development, the average length of sleep among Japanese people were seven hours and 42 minutes, the shortest length of sleep among 26 countries, with average sleep time being 63 minutes shorter than the country with the longest sleep<sup>1</sup>. The shortage of sleep is not only a problem among adults. A study in which researchers compared the total amount of sleep (night plus daytime sleep) of zero to three year old children in 17 different countries have indicated that Japanese infants sleep eleven hours and 37 minutes again being the shortest sleeping time<sup>2</sup>. The study revealed that not only Japanese infants, but also Asian infants in general sleep shorter than infants in Western countries. This trend is reserved for teenagers between nine to 18 years of age. The short length of sleep among Asians may be related to differences in social values, such as giving priority to work than sleep<sup>4</sup> and excessive competition to enter schools<sup>5</sup>. Such values could stress out children and negatively affects sleep and physical and mental health. In particular, younger children who have less experience in coping with stress might be greatly affected. The research conducted by the Benesse Educational Research and Development Institute (BERD) have indicated that the top three conditions that Japanese elementary school students experience are: “easily getting tired (53.3%)”, being “busy (51.7%)”, and “easily get annoyed (48.6%)”<sup>6</sup>. This result suggest that Japanese children are busy and stressed out. The present study reviews the association between mental health and sleep of elementary school students.

### **Educational system and lifestyle**

Physical health is essential for education. The purpose of Japanese education is stated in the Fundamental Law of Education as, “a completion of character” and “educating physically

and mentally healthy citizens as a member of the nation and society”<sup>7</sup>. Therefore, health education is mandatory in the Japanese educational system. In Japan, the elementary (six years from six to 12 years old) and middle school (three years from 12 to 15 years old) are compulsory whereas high school is not compulsory. However, 98.5% of middle school graduates continue to high schools<sup>8</sup>. Depending on the organization of schools, Japanese schools are divided into three types: national schools run by the national government, public schools run by local public bodies, and private schools run by private educational institutions. Educational programs provided at elementary, middle, and high schools are designed following the standard learning curriculum provided by the Japanese Ministry of Education, Culture, Sports, Science, and Technology. The curriculum includes achievement goals for each subject, and contents to be learned, so that a certain level of education can be attained throughout of Japan.

The result of the Trends in International Mathematics and Science Study (TIMSS) conducted in 2011 showed that Japanese fourth grade students scored fifth in mathematics and fourth in science among the 50 countries surveyed<sup>9</sup>. This study represented students' bodies of each country and region based on international guidelines, and is thus indicative of the educational level in Japan. In addition, in Japan, a national survey of academic achievement and learning level has been conducted since 2007 in order to attain equal opportunity for compulsory education and improvement of its level. Sixth and ninth grade students were randomly chosen from all over Japan, and their scores for subject exams (mathematics, Japanese, and science was added since 2015) and learning achievements were surveyed. Here is the interesting result. According to the Figure 1, students who wake up and go to bed at the same time everyday achieve higher academic results<sup>10</sup>. Students who eat breakfast also achieve higher academic performance. These results suggest that lifestyle, such as eating and sleeping habits, are

associated with academic achievement.

### **Home education and a life style**

Why does lifestyle relate to academic achievement? 7.8% of first grade students and 18.6% of sixth grade students could independently “wake up and sleep at a designated time”<sup>11</sup>. As they advance in the school grade, the number of children that can wake up and go to bed on their own increases, however, many students still depend on their family to wake up and go to bed at a certain time. Regarding the aforementioned association between academic achievement and breakfast, Japanese children rarely prepare their own breakfast, thus their family habits might reflect on child’s habits. Moreover, the time to start eating dinner affects bedtime, and wake-up time influences sleep length and whether students eat breakfast or not. Furthermore, this relates to motivation and amount of activity at daytime. Therefore, children do not solely construct their lifestyles but their lifestyles reflect the lifestyle of their family. When children and their parents assessed their lifestyle, parents tended to overrate their lifestyles<sup>12</sup>. This tendency was prominent especially among parents of children who sleep after 11pm and sleep less than seven hours. Furthermore, the same study examined the relationship between academic achievement and sleep length, and the results indicated that children who sleep less than seven hours and longer than ten hours tended to evaluate themselves as having lower grades in Japanese and mathematics. It is reported that parents’ educational values and children’s view of their academic achievement are related, moreover, children whose parents value their child’s autonomy attain academic values, such as the intention to have a usual lifestyle and enjoyment<sup>11</sup>. On the other hand, parents who are easily affected by societal opinions about education and who easily become anxious without extracurricular classes tend to have a higher intention for studying and have a strong interest in learning. Moreover, it is reported that mothers’ educational

background affects children's lifestyles and stress<sup>6</sup>. For example, children whose mother holds two-year, or four-year college degrees, recognize time rules, and spend a longer time studying than children whose mothers hold only high school diplomas. This tendency becomes more salient as mothers hold higher degrees. In terms of stress, larger proportion of children of mothers with two-year, or four-year college degrees indicate that they feel "busy" and "have a sore shoulder". On the other hand, higher percentage of children whose mothers with a high school diploma felt "I have no motivation" and "I cannot have self-confidence". It is interesting that there are such differences in children's perceptions. These results suggest that lifestyles, stress, and academic achievement of children reflect the educational values of their parents.

### **Stress and lifestyles of busy elementary school students**

Children from families that have a high interest in education are busy. Although elementary schools run by national universities offer education based on a standardized curriculum, these national schools serve the purposes of functioning as centers operating innovative and experimental curriculums, and as regional models of schools for improving teachers' abilities and character, and for promoting educational activities. These schools are characterized by parents with high interest in children's education, because children have to go through entrance exams to enter these schools.

In one elementary school run by a national university, 92.0% of fourth through sixth grade students go to cram schools, or study outside the school, which is a higher rate than the national average of 52.3%<sup>10</sup>. Moreover, 69.3% of students practice sports outside school in addition to school physical education classes, suggestive of the busy lifestyle of children. Comparing lifestyle during and before the summer vacation has indicated that breakfast time and dinnertime do not differ, suggesting that time management at home could be ruled out. On the

other hand, average sleep duration on weekdays during school period was eight hours and longer on weekends (Table 1)<sup>13</sup>. According to the national sleep foundation<sup>14</sup>, optimal sleep length for elementary school aged children is 9 to 11 hours, thus Japanese students sleep shorter hours in general. Moreover, students often described chronic fatigue, “I feel giving a yawn”, and “I feel drowsy” (Figure 2). Chronic fatigue did not decrease during non-school period indicating that children are under chronic sleep deprivation. The most often used stress coping strategy by children is “giving up”. It is imperative to increase methods of coping with their stress. Not only cognitive interventions but also taking short naps might be necessary. Schools and family need to support children by understanding that their tiredness is related to their lifestyle and take control of their life and reduce stress.

### **Sleep and stress as a classroom subject**

How do children learn about sleep and stress at school? As mentioned earlier in this review, education provided by Japanese schools follows the standard learning curriculums developed by the government, in order to attain a certain level of educational level. Health education is included in health and physical education classes. The standard learning curriculum revised in 2008 specifies that lifestyle should be taught once a week as a part of the “everyday life and health” unit at third and fourth grades<sup>15</sup>. In this unit, the daily life cycle is emphasized and children learn that being well requires paying attention to the daily diet, exercise, and sleep. In the related subject, the “home life and family” unit, in the home and economics class, also teaches students to effectively use time in their daily lives and to cooperate with their family<sup>16</sup>. Although this prompts children to reconsider their lifestyles, the purpose of the unit is to think about how they use their time, in order to obtain family time and help family management. Lifestyle from a scientific perspective, such as sleep, is rarely discussed in classrooms. Education

about stress is conducted during fifth and sixth grades in the “mental health” unit, three to four times. The curriculum probably reserve more time to teaching stress, so that children can prepare for puberty in which they go through drastic mental and physical changes. Since bullying and truancy, which are deeply associated with stress, radically increase at seventh grade<sup>17</sup>, it is important to learn coping strategies against stress in the last years of the elementary school.

### **Tips for sleep education from Stress management**

Stress management education teaches children to acquire effective self-control strategies against stress<sup>18</sup>. In Japan, bullying and truancy become social problems in 1990's, and the stress experienced among children in their daily lives at schools has gained attention as a background factor in these problems. Along with this social attention, numerous basic studies were conducted on stress experienced at schools; thereafter stress management education was implemented as a practical intervention<sup>19,20,21</sup>. Stress management education was first introduced as “mental health”, in the 1998 revision to the standard learning curriculum and it was conducted at schools. Moreover, education has recently focused not only on prevention of adjustment problems at schools, but also on stress relief after the massive earthquake<sup>22,23</sup>.

Yamanaka and Tominaga<sup>18</sup> suggested stress management education should have four steps: (1) students learn what is stress, (2) students learn their response to stress, (3) students learn stress coping strategies, and (4) students apply coping strategies. These steps are similar to sleep education that has proposed gaining correct knowledge about sleep, learning a method to improve sleep habits, and applying the method. Additionally, both educations have issues in application and establishment in daily lives. Stress management education is implemented and applied in school education prior to sleep education, thus much can be learned from it. In one practical example of a way for students to apply stress management in daily lives, children

learned progressive muscle relaxation exercise and record it. Then, the homeroom teacher sent reminders from time to time, such as in the morning, at the end of the daily meetings, between school events, and at exams<sup>24</sup>. The reminder prompted relaxation by saying, “Let’s do the relaxation exercise that we learned”, or “Let’s remember the best way to deal with stress (coping) and do it.” Results showed that when teachers reminded students, the learned coping method was used by 50% of the students, six month after the class, and about 40% of students did the relaxation exercise. Using these reminders, homeroom teachers promoted stress coping at appropriate times as a part of their daily activities, instead of teaching stress management as a subject unit, and this seemed to be effective. Applying this method to sleep education, children could record their bedtime and waking times, as well as their physical and mental conditions and hand in this information in the morning to the school nurse. Then, the school nurse was able to put this information together. The homeroom teacher was then able to give feedback before children left school. Furthermore, health newspapers from the school nurse could promote the awareness of the family. Frequent reminders could be especially important at the change of seasons, and at times when many school events are scheduled.

### **Future issues in sleep education**

Using the standardized learning curriculums that are currently in use, it is difficult to promote the application and practice of sleep education in daily lives. Therefore, various faculties, such as homeroom teachers, school nurses, and visiting lecturers with professional knowledge, and various application methods, such as morning and end of the day meetings, extra activities, individual classed, school health newspapers, seminars, lecture meetings, committees of school health (organization to discuss health problems at schools and promote health of students by teachers, school doctors, parents, students, and health related institutions) are

currently implemented. The reports about sleep education implemented at schools are mainly focused on middle and high school students<sup>25,26,27</sup>, and few reports have focused on elementary school students. Tamura and Tanaka<sup>28</sup> reported one case of sleep education targeting elementary school students. An outside lecturer with a certification as a sleep improvement instructor (an instructor certified by Japan Organization for Better sleep) held sleep education for elementary school students using special activity time. During 45 minutes of class time, about 20 minutes was spent teaching about sleep, followed by 15 minutes for checking lifestyle and sleep conditions, and choosing goals to improve the lifestyle. Furthermore, as homework, students kept track of their sleep by using a sleep log. The class was a one-time opportunity, however, improvements in lifestyles and routines at night, and improvements in sleep quality were reported. On the other hand, despite the contemplated lecture content, some has reported that a single lecture is beneficial for increasing awareness and correct knowledge, but it does not lead to changes in behavior<sup>29</sup>. Thus, an appropriate intervention that promotes behavioral changes, such as self-monitoring and behavioral records using a diary for improving the lifestyle could be appropriate. As shown in the Table 2, Yamamoto and Hara<sup>30</sup> suggested implementing sleep education as a continuum with other subjects. Since the standard learning curriculum meticulously specifies learning content and the number of hours, it is difficult to make additional time for sleep education. Thus, providing sleep education in relation to other subjects could be realistic in busy schools. Adding sleep education to the “mental health” unit of health and physical education could provide general learning for the purpose of recovering mental and physical health. In the future, examining the effectiveness of such curricula and their application at schools would be necessary.

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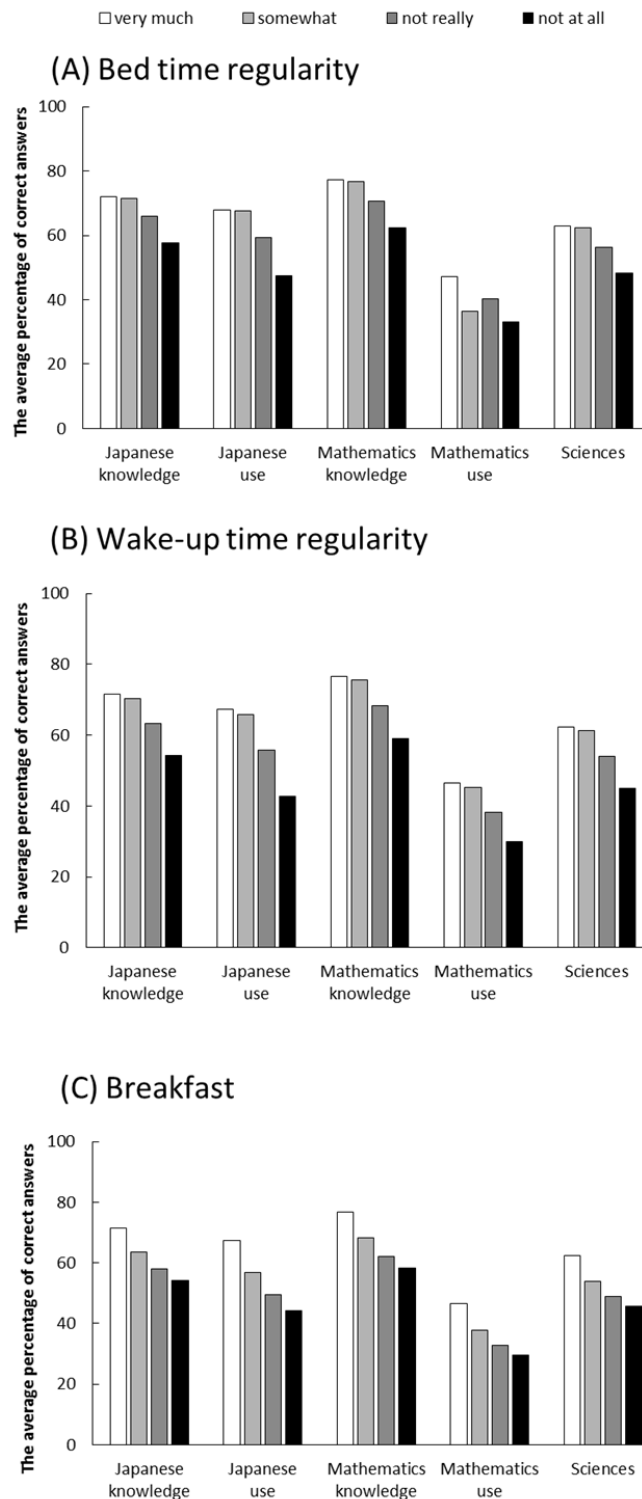


Figure 1 The average of percentage of correct answers par subjects and lifestyle in Japanese elementary school students<sup>10</sup>. Each questions were the following sentences: (A) Do you go to bed at the same time every day?, (B) Do you wake up at the same time every day? and (C) Do you have a breakfast every day?.

Table 1 Comparison of sleep habits by grade and school period between weekday and weekend of busy elementary school students<sup>13</sup>.

|                        | 4th          | 5th          | 6th          | Grade<br><i>F</i> | School<br>period<br><i>F</i> | Interaction<br><i>F</i> |
|------------------------|--------------|--------------|--------------|-------------------|------------------------------|-------------------------|
| Sleep duration         |              |              |              |                   |                              |                         |
| Weekday                |              |              |              |                   |                              |                         |
| School                 | 8:46 ± 0:48  | 8:17 ± 0:50  | 8:15 ± 0:45  | 2.33              | 26.91**                      | 5.67**                  |
| non-School             | 8:56 ± 0:58  | 8:38 ± 1:20  | 9:11 ± 0:57  |                   |                              |                         |
| Weekend                |              |              |              |                   |                              |                         |
| School                 | 9:40 ± 1:17  | 9:17 ± 1:15  | 9:21 ± 1:22  | 1.56              | 5.91*                        | 0.59                    |
| non-School             | 9:14 ± 1:11  | 8:49 ± 1:13  | 9:14 ± 1:16  |                   |                              |                         |
| Bed time               |              |              |              |                   |                              |                         |
| Weekday <sup>a,b</sup> |              |              |              |                   |                              |                         |
| School                 | 21:56 ± 0:36 | 22:20 ± 0:42 | 22:26 ± 0:41 | 5.36**            | 0.65                         | 0.52                    |
| non-School             | 21:59 ± 0:44 | 22:19 ± 0:56 | 22:33 ± 0:37 |                   |                              |                         |
| Weekend <sup>a,b</sup> |              |              |              |                   |                              |                         |
| School                 | 22:07 ± 0:38 | 22:36 ± 0:51 | 22:57 ± 0:57 | 10.02**           | 1.32                         | 1.13                    |
| non-School             | 22:12 ± 0:48 | 22:45 ± 0:53 | 22:52 ± 0:55 |                   |                              |                         |
| Wakeup time            |              |              |              |                   |                              |                         |
| Weekday                |              |              |              |                   |                              |                         |
| School                 | 6:40 ± 0:22  | 6:40 ± 0:27  | 6:40 ± 0:26  | 2.63              | 66.78**                      | 5.50**                  |
| non-School             | 7:10 ± 0:56  | 7:01 ± 0:45  | 7:36 ± 0:48  |                   |                              |                         |
| Weekend                |              |              |              |                   |                              |                         |
| School                 | 7:38 ± 1:04  | 7:46 ± 1:06  | 8:04 ± 1:20  | 2.99              | 0.03                         | 1.89                    |
| non-School             | 7:35 ± 0:58  | 7:33 ± 0:53  | 8:17 ± 1:22  |                   |                              |                         |

Results are presented as mean±SD. \* $p < 0.05$ ; \*\* $p < 0.01$ . <sup>a</sup> 4th < 5th; <sup>b</sup> 4th < 6th, non-school period; summer vacation.

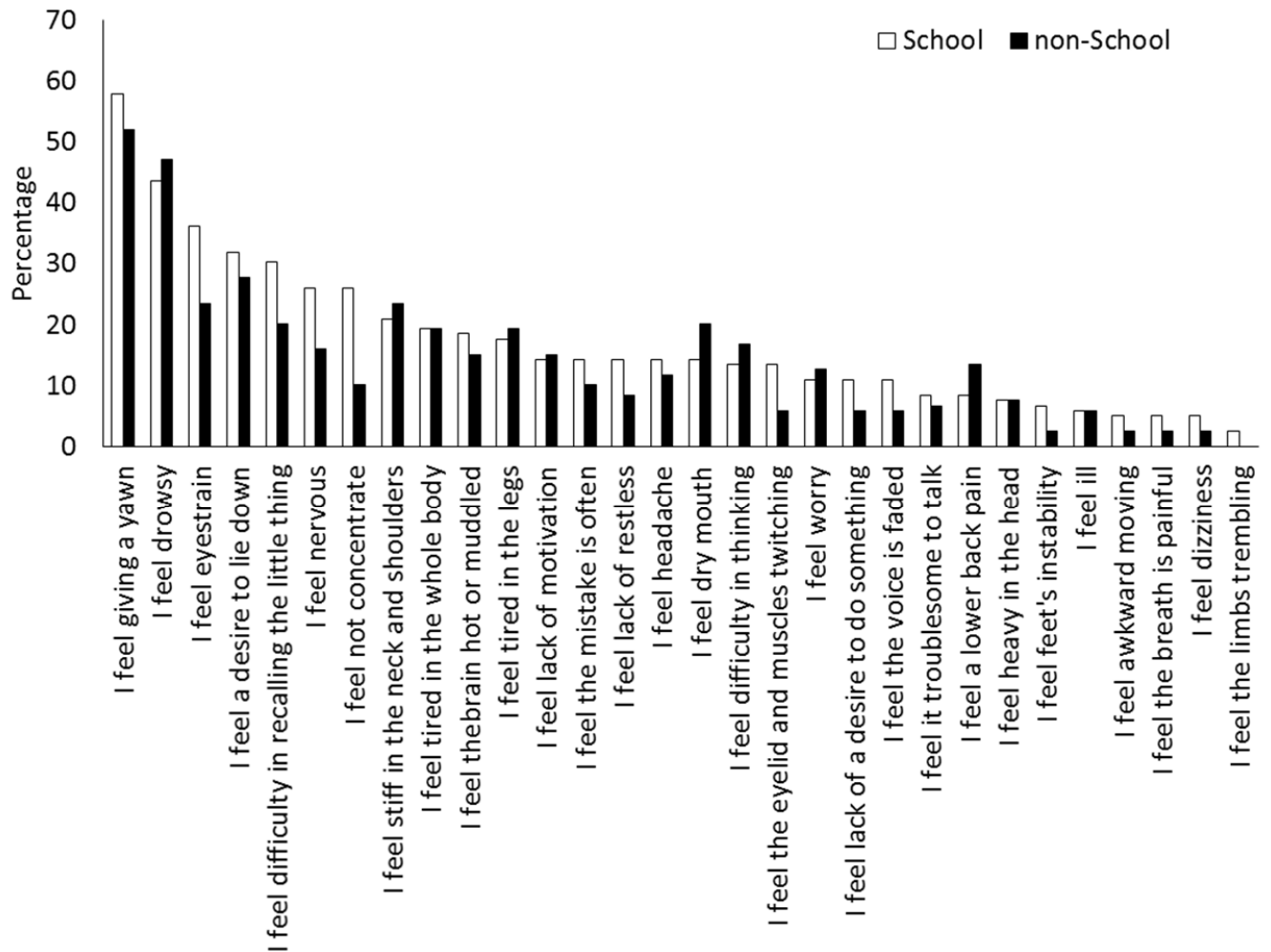


Figure 2 Comparison of school and non-school period on stress responses of busy elementary school students<sup>13</sup>. Stress responses for School period and non-School period are shown in white and black bars, respectively.

Table 2 Suggested implementation of sleep education in the current learning curriculum<sup>30</sup>

| Grade         | Subject                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Outside activities                                                                                                                                                                                                                                                                                           | Other activities                                                                                                                    |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1st-2nd grade | <p>Mathematics (2nd grade): How to read a clock</p> <ul style="list-style-type: none"> <li>Calculate sleep length from sleep time to wake up time</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                              | <p>Providing a survey about sleep condition (including pre-school students), and sending sleep awareness newspapers to parents.</p> |
| 3-4th grade   | <p>Introduction of health (from 3rd grade): “a healthy lifestyle”, “growth and development of the body”</p> <ul style="list-style-type: none"> <li>Encourage thinking the relationship between physical health, growth and development and sleep</li> </ul> <p>Science (4th grade): “activities of animals”</p> <ul style="list-style-type: none"> <li>Learn about nocturnal animals and think about difference in sleep length</li> </ul>                                                                                                                                                             | <p>Introduction of general learning (from 3rd grade)</p> <ul style="list-style-type: none"> <li>Based on the health, home economics, and science classes, integrate sleep education cross sectional.</li> <li>Bring up about sleep in information related class to discuss about society of 24/7.</li> </ul> | <p>Checking sleep length in the morning meeting with students as a part of health check.</p>                                        |
| 5-6th grade   | <p>Health (from 5th grade): “mental development and injury”, “prevention of diseases”</p> <ul style="list-style-type: none"> <li>Learn about sleep and growth hormones (formation of bones) and immunity</li> </ul> <p>Introduction to home economics (5th grade): “home life and family”, “daily meals and basics of cooking”</p> <ul style="list-style-type: none"> <li>Think about the relationship between home life and sleep</li> </ul> <p>Science: “organisms and environment”</p> <ul style="list-style-type: none"> <li>Bring up sleep as a result of interaction with environment</li> </ul> | <p>Committee of school health (mainly 4th grade)</p> <ul style="list-style-type: none"> <li>sleep education using any opportunity</li> </ul>                                                                                                                                                                 | <p>Posting a sleep awareness poster.</p>                                                                                            |