Table7 Exploratory analysis for correlates of irritable bowel syndrome (IBS-U)

co-variates		adjusted odds ratio	95% CI low	95% CI high	P value
Junior high school students					
Sex	male	reference			
	female	0.75	0.63	0.88	.00
School year	10th grade	reference			
	11th grade	1.05	0.85	1.30	.68
	12th grade	1.34	1.10	1.65	.00
Eating breakfast	dairy	reference			
	occasionally	0.78	0.56	1.09	.15
	never	0.60	0.36	0.98	.04
Drinking alcohol	no	reference			
	yes	1.47	1.22	1.78	.00
Subjective sleep assessment	good	reference			
	bad	1.55	1.30	1.86	.00
Difficulty initiating sleep	no	reference			
	yes	1.35	1.08	1.70	.01
Depression and anxiety	no	reference			
	yes	1.31	1.09	1.56	.00
High school students					
Sex	male	reference			
	female	0.84	0.76	0.94	.00
School year	10th grade	reference			
	11th grade	1.05	0.92	1.19	.48
	12th grade	1.16	1.02	1.32	.03
Extracurricular activity	participated	reference			
	not participated	1.20	1.07	1.34	.00
Sleep duration	< 5h	0.82	0.71	0.95	.01
	5h - 6h	0.97	0.84	1.12	.68
	6h - 7h	reference			
	7h - 8h	1.08	0.89	1.31	.43
	> 8h	1.01	0.80	1.29	.91
Bed time	before 0:00	reference			
	after 0:00	1.19	1.05	1.34	.01
Subjective sleep assessment	good	reference			
	bad	1.26	1.12	1.42	.00
Difficulty initiating sleep	no	reference			
	yes	1.18	1.02	1.36	.03
Depression and anxiety	no	reference			
	yes	1.44	1.29	1.60	.00

Mobile phone use does not discourage adolescent smoking in Japan

Yoneatsu Osaki[a], Takashi Ohida[b], Hideyuki Kanda[c], Yoshitaka Kaneita[b], Takuji Kishimoto[a]

[a] Tottori University, Faculty of Medicine, Nishi-cho 86, Yonago 683-8503, Tottori, Japan
[b] Nihon University, Faculty of Medicine, 30-1 Ohyaguchikami Machi, Itabashi 173-8610, Tokyo, Japan
[c] Fukushima Medical University, 1 Hikarigaoka, Fukushima 960-1295, Fukushima, Japan

Abstract

The hypothesis that smoking prevalence among junior and senior highs school students may have decreased by increasing mobile phone bill was reported by the mass media in Japan. We conducted a nationwide survey on adolescent smoking and mobile phone use in Japan in order to assess the hypothesis that mobile phone use has replaced smoking.

A total of 70 junior high schools (response rate; 71%), and 69 high schools (90%) from all over Japan responded to 2005 survey. Students in the responding schools were asked to fill out an anonymous questionnaire about smoking behavior, mobile phone bill, and pocket money. Questionnaires were collected from 32,615 junior high school students and 48,707 senior high school students.

The smoking prevalence of students with high mobile phone bill was more likely to be high, and that of students who used mobile phones costing 10,000 yen and over per month was especially high. When "quitters" were defined as students who had tried smoking but were not smoking at the time of survey, the proportion of quitters decreased as the mobile phone bill increased. The proportion of students who had smoking friends increased with the increase in the mobile phone bill per month. The hypothesis that the decrease in smoking prevalence among Japanese adolescents that has been observed in recent years is due to a mobile phone use can be rejected.

Key words; mobile phone, cigarette smoking, adolescent, behavior

Introduction

Cigarette smoking increases the risk of many diseases. Given the difficulty of escaping nicotine dependence, prevention of smoking among adolescents has been identified as a major public health measure. The monitoring of smoking prevalence among adolescents is thus an important means of clarifying the characteristics of this problem, establishing countermeasures, and evaluating public health efforts to reduce smoking prevalence. Many articles describe associated factors or predictors of adolescent smoking (Ma H et al., 2008; Villanti A et al., 2011). Therefore, analyzing contributing factors is important for establishing appropriate countermeasures.

Mobile phones are used by the majority of adolescents as vital communication tool. There have been some reports of an association between mobile phone use and health-related behaviors among youth (Augner and Hacker, 2011).

In the 1990s, the prevalence of adolescent smoking decreased in European and North American countries. Since British researchers (Charlton and Bates, 2000) observed that the trend in adolescent smoking prevalence was inversely correlated with the prevalence of mobile phone use in British study in 2000, they hypothesized that mobile phone use contributed to the decreasing in the smoking prevalence.

Some reports contradicting these hypotheses

have subsequently been published. There was one report indicating that the prevalence of adolescent smoking had decreased earlier than the spread of mobile phones (Invernizzi, 2001). In addition, the prevalence of adolescent smoking actually increased in some of the countries where mobile phones has spread among the young people (Italian girls, Switzerland) (Invernizzi et al., 2001; Lee 2001). In other counties, researchers examined the association between smoking behavior and the possession of mobile phone directly (Koivusidflta et al., 2003, 2005; Sleggles and Jarvis, 2003). These studies found that the smoking prevalence was high in the young people who used their mobile phones frequently. These studies all indicate that the previously proposed hypothesis should be rejected. However, the hypothesis was not tested in Asian countries.

In Japan, we observed a dramatic reduction in the smoking prevalence among the junior and senior high school students in a nationwide surveys after 2000 (Osaki et al., 2008). The hypothesis that smoking prevalence among junior and senior highs school students may have decreased due to increase in mobile phone bill was reported by the mass media in Japan. We conducted a national survey in 2005 to examine it whether the decrease in smoking prevalence was caused by increasing mobile telephone use in Japan. The decrease in the adolescent smoking prevalence is a favorable finding regardless of the reason for the decrease, however misunderstanding the reason for the reduction may lead to the promotion of incorrect counter-measures in the future.

Methods

In order to confirm the decrease in smoking prevalence among high school students noted in the 2004 survey, a nationwide survey on smoking behavior among Japanese junior and senior high school students was conducted in 2005. The sampled schools in the 2005 survey were those that had responded in the 2000 survey, so a total of 99 junior high schools and 77 senior high schools were asked to participate in this survey. A total of 70 of those junior high schools (response rate; 71%), and 69 of those senior high schools (90%) responded to the 2005 survey. The schools sampled in the 2000 survey were selected randomly using a national school directory (Osaki et al., 2008). The number of students who responded to the present survey was 32,615 junior high schools and 48,707 senior high schools (81,322 students in total).

The anonymous questionnaire included questions about smoking status, the monthly mobile telephone bill, friends' smoking habits, and their monthly amount of pocket money in order to investigate the reasons for the decrease in smoking prevalence. Experimenting smokers, current smokers and daily smokers were defined as those who had tried smoking at least once, those who had smoked at least once during the previous 30 days, and those who had smoked every day during the previous 30 days, respectively. The quitters were defined as students who had tried smoking, but did not smoke at the time of the survey. The mobile phone bill per month was assessed for 8 categories, namely no use, <1000 Japanese yen, <2000 yen, <3000 yen, <5000 yen, < 10000 yen, <20000yen, and 20000 yen and over. The mobile phone bills were then divided into 5 categories, no use, <3000 yen, <5000 yen, <10000 yen, and 10000 yen and over for the statistical analyses because of the small number of subjects in some categories. The smoking status was calculated for each of the categories of mobile phone use.

The Cochran-Armitage test was used to evaluate for trends in proportions. In addition, a multiple logistic regression analysis was applied to calculate the odds ratios of each category of mobile phone bill using the "no use" group as a reference group to smoking status. The current smoking was used as an independent variable in the statistical model. The odds ratios were calculated with current smoking used as the independent variable and explanatory variables including sex, age, and the mobile phone bill. The data were analyzed using the SPSS for Windows (version 18.0) software program (SPSS Inc.; IL, USA).

Results

A decrease in the smoking rate was found in 2005 in both males and females, and for both junior and senior high school students compared with the 2000 survey. The experimental smoking rate, current smoking rate, and daily smoking rate for males were 43.5%, 22.0%, and 12.2% in 2000, and were 24.7%, 10.4%, 5.0%, respectively in 2005. The rates for females were 28.4%, 10.0%, 3.6% in 2000, and 17.0%, 5.7%, 1.9% in 2005. The reduction in smoking prevalence among junior and senior high school students was reviewed similar to the results in the 2004 nationwide survey. The proportion of students who did not use a mobile phone was 56.1% for junior high school males, 42.3% for junior high school females, whereas the figures decreased in senior high school students to 10.0% for males and 4.0% for females. That indicates that most senior high school students use mobile phone.

Among the mobile phone users within the senior high school student population, more than half of the students spent 5,000 yen a month or more. The smoking prevalence was higher for students spending 5,000 yen or more for their monthly mobile phone bill, and the prevalence was much higher for students spending 10,000 yen or more. This was the case for both sexes and for both junior and senior high school student (Table 1). We investigated the proportion of students who quit smoking among the experimenters in the 2005 survey. The prevalence of quitters among all respondents was 4.8% for junior high school males, 3.3% for females, 7.8% for senior high school males, and 5.4% for females. When the number of experimenters' students was used as a denominator, the proportion of quitters was 39.3% for junior high school males, and 32.5% for females, and was 27.8% for senior high school males, and 30.2% for females. When we examined the proportion of the quitters (among experimenters) according to mobile phone bill per month, we found that the proportion of students tended to be lower for those with high mobile phone bills (Table 1).

In order to assess the association between the mobile phone bill and smoking status among students, a multiple logistic regression analysis was applied to adjust for differences in gender and age. The mobile phone bill was divided into 5 categories (no use, <3000 yen, <5000 yen, <10000 yen, and ≥10000 yen) and 'no use' was used as the reference group for the other categories. Compared with students who did not use a mobile phone, the relative risks of the other 4 categories for current smoking was 1.1 (95% Confidence Interval; 0.9-1.4), 0.9 (0.8-1.0), 2.4 (2.1-2.6) and 8.1(7.3-9.0), indicating that students who have expensive mobile phone bill are more likely to be smokers. This association remained after entering variables related to parental and siblings smoking into the statistical model.

When an analysis was performed using smoking cessation among the smoking experimenters as a independent variable and

with the mobile phone bill as covariates, compared with students who did not use a mobile phone, the relative risks of other 4 categories were 1.0 (0.7-1.3), 1.1 (1.0-1.3), 1.0 (0.9-1.1), and 0.8 (0.7-0.9). Therefore, smokers with the highest mobile phone bills are less likely to quit smoking. Moreover, when an analysis was performed in order to assess the association between the mobile phone bill and having smoking friends, the proportion of students who had friends who smoked increased as the mobile phone bill increased for both sexes and for both junior and senior high school students.

Discussion

The present study revealed that students who reported a higher mobile phone bill were more likely to smoke cigarettes, less likely to quit smoking, and more likely to have friends who smoke. Therefore, the hypothesis (Charlton and Bates 2000) that the decrease in smoking prevalence among adolescents during recent years is due to mobile phone use can be rejected. This result was similar to previous studies conducted in European countries (Koivusilta et al. 2003, 2005, Steggles and Jarvis 2003). The mobile phone is an important item for adolescents, and is a symbol of their human relationships. The use of mobile phone, which can lead to activities, such as part-time jobs top at the mobile phone bill, are also linked to experience with smoking or alcohol use, and are influence by friendship.

Smoking and alcohol use among adolescents is also closely related to pocket money or spending money (Zhang et al. 2007). The present survey also observed associations among the mobile phone bill, pocket money and smoking among adolescents in Japan. Since using a mobile phone is not a reason responsible for the decline in the smoking prevalence among adolescents, an additional spread of mobile phone use among adolescents in the near future will be unlikely to lead to a further decrease in smoking prevalence.

Because the present study was a cross-sectional study, we cannot determine which was the preceding factor among smoking, alcohol use, mobile phone use, and human relationship. However, the present study showed a strong relationship among these factors. Since we can conclude that students who use mobile phones frequently are an important high risk group for adolescent smoking, a health education program employing mobile phone applications may be useful for providing information to these high risk groups. A dramatic increase in cigarette prices will likely be necessary before adolescent smokers give up their smoking habit.

Conclusions

We conducted a nationwide survey on adolescent smoking and mobile phone use in Japan in order to assess the hypothesis that mobile phone use has replaced smoking. We revealed that students who reported a higher mobile phone bill were more likely to smoke cigarettes, less likely to quit smoking, and more likely to have friends who smoke. Therefore, the hypothesis that the decrease in smoking prevalence among adolescents during recent years is due to mobile phone use can be rejected.

References

Augner, C., Hacker, G.W. (2011). Association between problematic mobile phone use and psychological parameters in young adults. *Int J Public Health*, (in print)

Charlton, A., Bates, C. (2000). Decline in teenage

smoking with rise in mobile phone ownership: hypothesis. *BMJ. 321*, 1155.

Invernizzi, G., Boffi, R., Mazza, R., Paredi, P. (2001). Italian data don't show the same pattern. *BMJ. 322*, 616.

Koivusilta, L., Lintonen, T., Rimpela, A. (2003). Mobile phone use has not replaced smoking in adolescence. *BMJ. 326*, 161.

Koivusilta, L., Lingonen, T., Arja, R. (2005). Intensity of mobile phone use and health compromising behaviors –how is information and communication technology connected to health related. *Journal of Adolescence. 28*, 35-47.

Lee, C.Y. (2001). No correlation in Switzerland either. *BMJ. 322*, 616-7.

Ma, H., Unger, J.B., Chou, C.P., Sun, P., Palmer, P.H., Zhou, Y., et al. (2008). Risk factors for adolescent smoking in urban and rural China: Findings from the China seven cities study. *Addict Behav. 33*, 1081-1085.

Osaki, Y., Tanihata, T., Ohida, T., Kanda, H., Kaneita, Y., Minowa, M., Suzuki, K., Wada, K., Hayashi, K. (2008). Decrease in the prevalence of smoking among Japanese adolescents and its possible causes; Periodic nationwide cross-sectional surveys. *Environ Health Prev Med. 13*, 219-226.

Steggles, N., Jarvis, M.J. (2003). Do mobile phones replace cigarette smoking among teenagers? *Tob Control. 12*, 339-40.

Villanti, A., Boulay, M., Juon, H.S. (2011). Peer, parent and media influences on adolescent smoking by developmental stage. *Addict Behav. 36*, 133-136.

Zhang, B., Cartmill, C., Ferrence, R. (2007). The role of spending money and drinking alcohol in adolescent smoking. *Addiction. 103*, 310-319.

Table 1 Smoking status by mobile phone bill per month

	boys				girls			
	number of students	current smoker % (95% CI)	quitter % (95% CI)	have smoking friends % (95% CI)	number of students	current smoking % (95% CI)	quitters % (95% CI)	have smoking friends % (95% CI)
junior high school								
no use	9593	2.4 (2.1- 2.7)	45.4 (41.9-49.0)	16.2 (15.4-16.9)	6565	1.4 (1.1- 1.6)	37.8 (32.4-43.1)	12.4 (11.6-13.2)
<3000 yen	1809	3.6 (2.9- 4.5)	45.6 (38.4-52.8)	17.3 (15.6-19.0)	2082	1.6 (1.1- 2.2)	37.4 (27.4-47.3)	14.4 (12.9-15.9)
<5000 yen	1963	3.4 (2.6- 4.2)	39.2 (32.2-46.1)	24.6 (22.7-26.5)	2515	2.1 (1.5- 2.6)	40.4 (33.0-47.7)	18.6 (17.0-20.0)
<10000 ye	2660	7.6 (6.6- 8.6)	34.6 (30.4-38.8)	34.7 (32.9-36.5)	2952	4.2 (3.5- 4.9)	36.0 (31.4-40.6)	30.3 (28.6-31.9)
>=10000y	1080	19.6 (17.3-22.0	29.7 (25.0-34.6)	38.3 (35.4-41.2)	1396	13.4 (11.6-15.2)	32.5 (27.7-37.3)	41.8 (39.2-44.3)
test for trend		p<0.01	p<0.01	p<0.01		p<0.01	p=0.10	p<0.01
senior high school								
no use	2474	8.4 (7.3- 9.5)	32.1 (27.1-37.2)	30.4 (28.6-32.2)	957	5.3 (3.9- 6.8)	29.9 (20.8-39.0)	25.3 (22.5-28.0)
<3000 yen	2576	6.0 (5.1- 6.9)	34.4 (29.2-39.6)	42.1 (40.2-44.0)	2069	3.2 (2.4- 3.9)	32.1 (24.7-39.4)	26.9 (25.0-28.8)
<5000 yen	4828	6.0 (5.3- 6.6)	36.2 (32.8-39.5)	53.7 (52.3-55.1)	5217	1.6 (1.2- 1.9)	36.3 (31.3-41.2)	34.3 (33.0-35.6)
<10000 ye	11064	14.8 (14.1-15.4	29.1 (27.5-30.6)	65.7 (64.8-66.5)	10986	5.8 (5.3- 6.2)	32.5 (30.3-34.6)	51.4 (50.5-52.3)
>=10000y	3691	35.7 (34.1-37.2	20.0 (18.2-21.9)	73.6 (72.1-75.0)	4845	20.0 (18.7-20.9)	26.3 (24.3-28.4)	69.2 (67.9-70.5)
test for trend		p<0.01	p<0.01	p<0.01		p<0.01	p<0.01	p<0.01

quitter: students who tried smoking but do not smoke currently

Association of Parental Factors with Student Smoking and Alcohol Use in Japan

Yoneatsu Osaki[1], Kenji Suzuki[2], Kiyoshi Wada[3] and Shin-ichi Hitsumoto[4]

1) *Division of Environmental and Preventive Medicine, Department of Social Medicine,*
   Faculty of Medicine, Tottori University, Yonago 683-8503, Japan
2) *Suzuki Mental Clinic, 370 Isshiki, Hayama, Kanagawa 240-0111, Japan*
3) *National Institute of Mental Health, National Center of Neurology and Psychiatry, T*
   Ogawa-Higashi 4-1-1, Kodaira-city, Tokyo 187-8553, Japan
4) *Medical Welfare Support Center, Ehime University Hospital, Shitsukawa, Toon, Ehime*
   791-0295, Japan

Summary

A nationwide survey was conducted on smoking and alcohol use among junior and senior high school students and their parents in Japan. The analyses were performed to assess whether parents' smoking or drinking behavior, health knowledge, and attitude toward their children's smoking or drinking behavior influenced their children's behavior using linked datasets of students and parent answers. The number of schools that responded was 24 out of 40 sampled schools. A total of 11,362 questionnaire data sets from students and parents were applied to the analyses. The influence of parental factors including smoking, alcohol use, knowledge, and attitudes were used as the covariates on students' smoking or alcohol use as independent variables. The data were analyzed using a multiple logistic analysis.

The analysis revealed that the parental attitudes of children's smoking or alcohol use were important risk factors as well as parental smoking or drinking behaviors. Conversely, the parental attitude toward warning children of the hazard of smoking or alcohol use was a significant preventive factor for the outcome of their children's behavior.

Key words: adolescent behavior, smoking, alcohol use, parental factors

Introduction

Smoking and the consumption of alcohol are two important health-related behaviors that are associated with many social and health problems among minors (under 20 years of age). These problems contribute to many diseases and social problems including drunk driving, domestic violence, and child abuse in adulthood. Therefore, preventing minor smoking and alco-

hol use is an essential public health task. It is necessary to determine the risk factors and preventive factors that contribute to minor smoking and alcohol use in order to develop appropriate public health measures. The association of parental smoking and alcohol use with their children's smoking and alcohol use has been studied in some detail[1-6]. However, the association between parental attitudes or norms (parental disapproval, family rules, strict monitoring of child's smoking or alcohol use) or parent-child relationship (connectedness, communication, or family bonding) and child smoking or alcohol use has led to no consistent conclusions because of various study results[7-17]. Moreover, some of those studies analyzed the parental behaviors based on reports by children using the questionnaire surveys[2,4,7,11,16,17]. Although some results on adolescents' smoking and alcohol use are reported on subjects from Asian countries, there are few papers indicating the relationship between student and parental reports[18-20]. Smoking and drinking behavior and its correlates are considered to differ greatly from country to country[20]. To establish effective measures regarding smoking or drinking control in each country, a nationwide survey was carried out focusing on the behavior and its correlates. However, there is no previous study which analyzed the association between child smoking or alcohol use and parental behavior or attitudes in Japan based on both child and parental questionnaires. This study analyzed the linkage data from students' questionnaires and the father's and mother's questionnaires to identify the parental correlates for Japanese high school students' smoking and drinking behaviors.

Subjects and Methods

The present study design was performed as a cross-sectional study by random sampling. Schools were randomly sampled throughout Japan and the enrolled students were asked to complete an anonymous self administered questionnaire in the classrooms. Twenty-five junior high schools and 15 senior high schools were selected from Japan. Therefore, this sampling method was a one-stage cluster sampling. The parental questionnaires were taken home by students, and these were brought back to the schools after completion by their parents. This survey was conducted as a part of nationwide survey on junior and senior high school students in 1996[19,20]. Because the procedures of the parent-child survey were complicated, we only asked some of the sampled schools to participate in the present survey. The students completed the questionnaire, which was placed in a large envelope with the parental questionnaires. The teacher collected these data and sent them to the research institute without opening the envelope. The same identification number was assigned to each tripartite questionnaire, linking anonymous questionnaires.

The contents of the students' survey were determined taking the contents of past surveys conducted in Japan regarding the smoking behavior of junior and senior high school students into consideration. The parental questionnaire was developed according to the contents of the students' questionnaire by the present research group.

The students' questionnaire covered their smoking behavior, alcohol use, and correlates on school life and daily life in home. The parental questionnaire examined their smoking behav-

ior, alcohol use, recognition and attitude toward their children's smoking or alcohol use were examined. The questions on parental smoking or drinking behavior included "smoking status or drinking status", "experience under 18 years of age", and "wants to quit smoking or drinking". The questions on parental attitudes include "acceptance of minor smoking or drinking", "had recommended smoking or alcohol to child", "drink alcohol in front of the child", "making the child to buy cigarettes or liquor", "disapproval of smoking or drinking by the child", and "agreement with cigarette vending machine abolition". The questions on parent-child relationship include "short time spent with the child", "students do not talk about their troubles with parent", and "parent hopes the child will enter university".

The survey was conducted from December, 1996 to January, 1997.

The school response rate was 56% (14/25) from junior high schools, and 66.7% (10/15) in senior high schools. A total of 16,732 student questionnaires were collected. Of these, 1,051 of incomplete or inconsistent and were excluded from the analyses. A total of 12,744 and 14,019 father and mother questionnaires were collected, and there were ultimately 11,362 linked tripartite questionnaires data sets. The data sets were used for the multiple logistic analyses.

The statistical analyses used student current smoking or alcohol use as a dependent variable, and student factors and parental factors as the independent variables. Students who smoked or drunk at least once in the past 30 days were defined current smokers or drinkers. The student factors included student sex and school grade. The parental factors included their smoking or drinking behavior, their attitude toward minor smoking or alcohol consumption, interaction with children, their opinion on smoking and alcohol consumption in children. The statistical analyses used a multiple logistic regression model with the variable increase method by the likelihood ratio (SPSS ver18). The odds ratios of each factor were calculated by the model including all selected dependent variable, such as sex, school grade, other student factors and parental factors.

Results

The experimental rate of smoking among the students was 43.5% for boys, and 23.7% for girls. The current student smoking rate (smoked at least one day during the preceding 30 days) was 18.5% for boys and 6.2% for girls, and the daily smoking rate was 8.1% for boys and 1.8% for girls. The experimental rate of alcohol use was 78.3% for boys and 74.0% for girls, the prevalence of current alcohol use (had consumed an alcoholic drink on at least one day of the preceding 30 days) was 33.6% for boys and 25.8% for girls, and weekly alcohol use was 7.5% for boys and 3.1% for girls. The parental daily smoking rate was 55.3% for the fathers and 10.0% for mothers, and the prevalence of daily alcohol use was 48.2% for fathers and 6.5% for mothers (Table 1).

The present survey asked the parents that "Do you think the child is smoker or drinker?" About 30-40% of parents of smoking or drinking boys reported that their children were never smokers or never drinker. Moreover, about 40-60% of parents of smoking or drinking girls reported that their children were never smokers or never drinkers (Table 2).

Table 1 Smoking and drinking behavior of parents and their children

	children				parent			
	boys (%)	95% C.I.	girls (%)	95% C.I.	father (%)	95% C.I.	mother (%)	95% C.I.
smoking experiment	44.9	(43.7-46.2)	23.7	(22.5-24.9)				
alcohol experiment	78.3	(78.5-80.5)	74.0	(73.6-76.0)				
current smoking	18.5	(17.8-19.7)	6.2	(5.6-6.9)				
current alcohol use	33.6	(33.0-35.4)	25.8	(24.9-27.3)				
daily smoking	8.1	(7.6-9.0)	1.8	(1.5-2.2)	55.3	(54.4-56.2)	10.0	(9.4-10.5)
weekly alcohol use	7.5	(6.9-8.2)	3.1	(2.7-3.6)				
daily alcohol use					48.2	(47.3-49.2)	6.5	(6.1-7.0)
smoking experience under 18					7.8	(7.4-8.3)	1.1	(0.9-1.3)
drinking experience under 18					3.8	(3.5-4.2)	1.0	(0.8-1.2)
parent wants to quit smoking					8.6	(8.1-9.1)	3.6	(3.2-3.9)
parent wants to quit drinking					2.7	(2.4-3.0)	1.6	(1.4-1.9)
parental acceptance of a child's smoking					20.2	(19.5-21.0)	10.3	(9.7-10.8)
parental acceptance of a child's drinking					55.4	(54.4-56.3)	43.3	(42.4-44.2)
parental recommendation smoking to child					1.8	(1.5-2.0)	0.9	(0.7-1.1)
parental recommendation alcohol to child					25.5	(24.7-26.3)	15.4	(14.8-16.1)
parental disapproval of child smoking					80.0	(79.3-80.7)	85.1	(84.5-85.8)
parental disapproval of child alcohol use					57.0	(56.1-57.9)	63.9	(63.0-64.7)
making the child to go buy liquor					26.2	(25.4-27.0)	22.1	(21.3-22.8)
drinking in front of the child					83.7	(83.1-84.4)	55.9	(54.9-56.8)
short time spent with child					12.0	(11.4-12.5)	2.3	(2.0-2.6)
student do not talk of their troubles with parent					26.2	(25.4-27.0)	8.7	(8.2-9.2)
parent hopes the child will enter university					46.6	(45.7-47.5)	43.4	(42.5-44.3)

The model using student current smoking as a dependent variable revealed that the father's factors such as "smoking experience under 18 years of age" and "short time spent with child", and the mother's factors such as "mother wants to quit smoking", "acceptance of minor smoking", "mother making the child go buy cigarettes", "students do not talk of their troubles with mother", and "agreement with cigarette vending machine abolition" were statistically significant risk factors (Table 3). Mother's factors such as "mother having no job" and "maternal disapproval of smoking by child", and father's factor such as "father hopes his child will enter university" were significant preventive factors (Table 3).

The model using student current alcohol use as a dependent variable demonstrated that

Yoneatsu Osaki et al.

Table 2 Proportion of parents who consider their children are never smoker or never
drinker by children's smoking status or drinking status

smoking or drinking status of children		father			mother	
		number	proportion (%)	95% CI	proportion (%)	95% CI
boys	current smoker	1176	39.5	(36.7-42.3)	36.4	(3.6-39.1)
	non smoker	5095	87.3	(86.4-88.2)	86.8	(86.0-87.8)
girls	current smoker	318	63.2	(57.9-68.5)	54.7	(49.3-60.2)
	non smoker	4773	92.7	(91.9-93.4)	93.8	(93.1-94.4)
boys	current drinker	2143	35.8	(33.8-37.8)	32.0	(30.0-34.0)
	non drinker	4226	66.2	(64.8-67.6)	63.2	(61.8-64.7)
girls	current drinker	1327	48.8	(46.1-51.4)	44.8	(42.1-47.4)
	non drinker	3818	74.4	(73.0-75.8)	72.8	(71.4-74.2)

Table 3 Relating parental factors with smoking by students

	Odds ratio	95% CI.	p value
sex (boys=1, girls=2)	0.03	(0.02-0.03)	<0.01
school grade (+1)	1.47	(1.41-1.53)	<0.01
smoking experience under 18 years of age by father	1.48	(1.22-1.80)	<0.01
short spending time with child (less than 30 minutes a day) by father	1.45	(1.24-1.70)	<0.01
interaction of gender and daily smoking by father	1.12	(1.02-1.23)	<0.05
father hopes entrance of his child to university	0.46	(0.41-0.52)	<0.01
mother wants to quit smoking	1.43	(1.07-1.92)	<0.05
acceptance of minor smoking by mother	1.27	(1.07-1.52)	<0.01
making the child go to buy cigarettes by mother	1.25	(1.07-1.47)	<0.01
agreement of cigarette vending machine abolition by mother	1.24	(1.10-1.41)	<0.01
students do not talk on their troubles with mother	1.24	(1.03-1.49)	<0.05
having no job of mother	0.75	(0.64-0.88)	<0.01
maternal disapproval of smoking by child	0.66	(0.57-0.77)	<0.01

father's factors such as "father had recommended alcohol to his child", "paternal drinking in
front of the child", "paternal acceptance of a minor's alcohol use", and "father stating that liquor
is not hazardous to health", and that mother's factors such as "mother recommended alcohol
to her child", "mother drinking in front of the child", and "mother making the child go buy liquor"
were significant risk factors. On the other hand, the mother's factors such as "mother having
no job" and "maternal disapproval of alcohol use by child", and father's factors such as "father
hopes his child will enter university", and "paternal disapproval of alcohol use by the child"
were significant preventive factors (Table 4).

Table 4   Relating parental factors with alcohol use by students

item	Odds ratio	95% CI	p value
sex (boys=1, girls=2)	0.19	(0.16-0.23)	<0.01
school grade (+1)	1.26	(1.22-1.29)	<0.01
father had recommended of alcohol use to his child	1.35	(1.22-1.50)	<0.01
drinking in front of the child by father	1.19	(1.05-1.35)	<0.01
accepting minor alcohol use by father	1.16	(1.06-1.28)	<0.01
recognizing liquor not hazardous for health by father	1.10	(1.01-1.19)	<0.05
father hopes entrance of his child to university	0.87	(0.80-0.95)	<0.01
paternal disapproval of alcohol use by child	0.86	(0.78-0.95)	<0.01
mother had recommended of alcohol use to her child	1.45	(1.29-1.63)	<0.01
drinking in front of the child by mother	1.40	(1.28-1.53)	<0.01
making the child go to buy liquor by mother	1.18	(1.07-1.31)	<0.01
having no job of mother	0.88	(0.79-0.98)	<0.05
maternal disapproval of alcohol use by child	0.71	(0.65-0.78)	<0.01

Discussion

The current study revealed parental attitudes toward child's smoking or drinking were statistically significant risk factors for child smoking or alcohol use, as well as the parental smoking and drinking behavior. Although the present study was a cross-sectional study, the results on parental factors are considered risk or preventive factors for adolescent smoking or drinking, because there was a reasonably causal relationship of parental factors with their children's factors. Many reports indicated during recent several decades that parental smoking or alcohol use is a significant risk factor for child's smoking or alcohol use[1-6]. The influence of parental smoking on child's smoking is relatively stronger in Japan than that in China[20]. This influence was reviewed in the present study. In addition, parental initiation of smoking or alcohol use before 20 years of age was a significant risk factor as well as parental attitudes regarding child's smoking or drinking or parent-child relationship.

The result of the present study that the parental smoking and alcohol use associated with their children's smoking and alcohol use was similar to the results from previous studies.

Multivariable analyses found that drinking in front of the child rather than daily alcohol consumption by parents was a significant risk factor. Furthermore, this analysis suggested the hazard of involving children in adults' smoking or alcohol use, such as making the child buy cigarettes or alcohol beverages, was suggested by this analysis. However, the model suggested that the parental attitude of the father or mother to warn children against smoking or drinking was significant preventive factor. Several studies have reported that parental attitudes (such as parental disapproval, strict family monitoring, and family rule) can prevent a small part of their adolescent smoking or alcohol use[7,8,11,15-17], however, other studies have not observed any such effectiveness[9,10,13,14]. The present results suggested the importance of parental attitudes

toward child smoking or alcohol use. The difference may caused by cultural differences such as size of houses or rooms and the interrelationship among family members between Japan and Western countries.

The importance of the attitudes of parents who do not involve their child in the adults' smoking or drinking, warning children of the dangers of smoking or alcohol use and improving parental smoking or drinking behavior were found to be important factors influencing their children's behavior in the present study. In addition, the present study revealed the importance of communication between adolescents and their parents for preventing minor smoking or alcohol use, confirming previous studies[2]. Several recent studies from Western countries described the strong influence of the family on adolescents' smoking or alcohol use[5,9,11,16].

The present study also found that parents, especially the father, of current smokers or drinkers did not believe their children were not smokers or drinkers. Parents should be interested in children's smoking and alcohol use, and should be aware of the actual behaviors of their children. The gender difference in smoking prevalence among children is smaller than that among parents, and the gender differences in alcohol use is much smaller than those among parents. Since adolescent girls will give birth and care for children in the future, girls' smoking and alcohol use should be monitored carefully.

Measures for raising the interest of parents should therefore be developed by the smoking and alcohol control policy-makers in order to prevent children and adolescents from smoking and alcohol consumption.

The some limitations are considered to be associated with the present study. First, this study was conducted based on a self-administered questionnaire survey. Since smoking and drinking behavior are illegal behavior among minors under 20 years of age in Japan, the problems regarding the accuracy of the results obtained from children may arise. We considered that the influence of misclassification of reported smoking or drinking status was not large, because the number of questionnaires with invalid answers or contradictory answers was small. Moreover, the prevalence of smoking and alcohol use behavior in the present study was not significantly different from that reported in another nationwide survey[19,20].

Second, this survey was a cross-sectional survey, and therefore it is difficult to determine the causal relationships among the surveyed factors. Since we considered that it is unusual to begin smoking or drinking for parents because of the child factors, the parental factors we found in the present study were therefore dealt with as either risk factors or preventive factors for child smoking or alcohol use.

References

1) Bricker, J.B., Peterson, A.V., Jr, Leroux, B.G., Andersen, M.R., Rajan, K.B. and Sarason, I.G.: Prospective prediction of children's smoking transitions: role of parents' and older siblings' smoking. Addiction., 101 : 128-136, 2006.
2) Bricker, J.B., Peterson, A.V., Jr, Sarason, I.G., Andersen, M.R and Rajan, K.B.: Changes in the influence of parents' and close friends' smoking on adolescent smoking transitions. Addict. Behav., 32

: 740-757, 2007

3) Gilman, S.E., Rende, R., Boergers, J., Abrams, D.B., Buka, S.L., Clark, M.A., Colby, S.M., Hitsman, B., Kazura, A.N., Lipsitt, L.P., Lloyd-Richardson, E.E., Rogers, M.L., Stanton, C.A., Stroud, L.R. and Niaura, R.S.: Parental smoking and adolescent smoking initiation: an intergenerational perspective on tobacco control. Pediatrics., 123 : e274-281, 2009.

4) Yeh, M.Y.: Factors associated with alcohol consumption, problem drinking, and related consequences among high school students in Taiwan. Psychiatry. Clin Neurosci., 60 : 46-54, 2006.

5) Seljamo, S., Aromaa, M., Koivusilta, L., Rautava, P., Sourander, A., Helenius, H. and et al.: Alcohol use in families: a 15-year prospective follow-up study. Addiction., 101 : 984-992, 2006.

6) Scholte, R.H., Poelen, E.A., Willemsen, G., Boomsma, D.I. and Engels, R.C.: Relative risks of adolescent and young adult alcohol use: the role of drinking fathers, mothers, siblings, and friends. Addict. Behav., 33 : 1-14, 2008.

7) Sargent, J.D. and Dalton, M.: Does parental disapproval of smoking prevent adolescents from becoming established smokers? Pediatrics., 108 : 1256-1262, 2001.

8) Komro, K.A., McCarty, M.C., Forster, J.L., Blaine, T.M. and Chen, V.: Parental, family, and home characteristics associated with cigarette smoking among adolescents. Am. J. Health. Promot., 17 : 291-299, 2003.

9) Tilson, E.C., Mcbride, C.M., Lipkus, I.M. and Catalano, R.F.: Testing the interaction between parent-child relationship factors and parent smoking to predict youth smoking. J. Adolesc. Health., 35 : 182-189, 2004.

10) Woodruff, S.I., Laniado-Laborin, R., Candelaria, J.I., Villaseñor, A. and Sallis, J.F.: Parental prompts as risk factors for adolescent trial smoking: results of a prospective cohort study. Addict. Behav., 29 : 1869-1873, 2004.

11) Hill, K.G., Hawkins, J.D., Catalano, R.F., Abbott, R.D. and Guo, J.: Family influences on the risk of daily smoking initiation. J. Adolesc. Health., 37 : 202-210, 2005.

12) Otten, R., Engels, R.C., van de Ven, M.O. and Bricker, J.B.: Parental smoking and adolescent smoking stages: the role of parents' current and former smoking, and family structure. J. Behav. Med., 30 : 143-145, 2007.

13) Harakeh, Z., Engels, R., Den, Exter, Blokland, E., Scholte, R., Vermulst, A.: Parental communication appears not to be an effective strategy to reduce smoking in a sample of Dutch adolescents. Psychol. Health., 24 : 823-841, 2009.

14) Yu, J.: The association between parental alcohol-related behaviors and children's drinking. Drug. Alcohol. Depend., 69 : 253-262, 2003.

15) van, der, Vorst, H., Engels, R.C., Meeus, W. and Deković, M.: The impact of alcohol-specific rules, parental norms about early drinking and parental alcohol use on adolescents' drinking behavior. J. Child Psychol. Psychiatry., 47 : 1299-1306, 2006.

16) Cohen, D.A., Richardson, J. and LaBree, L.: Parenting behaviors and the onset of smoking and alcohol use : a longitudinal study. Pediatrics, 94 : 368-375, 1994.

17) Kristjansson, A.L., Sigfusdottir, I.D., James, J.E., Allegrante, J.P. and Helgason, A.R.: Perceived parental reactions and peer respect as predictors for adolescent cigarette smoking and alcohol use. Addict. Behav., 35 : 256-259, 2010.

18) Kim, D.S. and Kim, H.S.: Early initiation of alcohol drinking, cigarette smoking, and sexual intercourse linked to suicidal ideation and attempts: findings from the 2006 Korean Youth Risk Behavior Survey. Yonsei Med. J., 51 : 18-26, 2010.

19) Osaki, Y., Tanihata, T., Ohida, T., Kanda, H., Kaneita, Y., Minowa, M., Suzuki, K., Wada, K. and
      Hayashi, K.: Decrease in the prevalence of smoking among Japanese adolescents and its possible
      causes; Periodic nationwide cross-sectional surveys. Environ. Health Prev. Med., 13 : 219-226, 2008.

20) Osaki, Y., Tanihata, T., Ohida, T., Kanda, H., Suzuki, K., Higuchi, S. Kaneita, Y., Minowa, M. and
      Hayashi, K.: Decrease in the prevalence of adolescent alcohol use and its possible causes in Japan;
      Periodical nationwide cross-sectional surveys. Alcohol. Clin. Exp. Res., 33 : 247-254, 2009.

21) Osaki, Y., Minowa, M. and Mei, J.: A comparison of correlates of cigarette smoking behavior
      between Jiangxi province, China and Japanese high school students. J. Epidemiol., 9 : 254-260, 1999.

日本の若者の睡眠環境と睡眠習慣に関する疫学研究

池田真紀　日本大学医学部社会医学系公衆衛生学分野　専修研究員
大井田隆　日本大学医学部社会医学系公衆衛生学分野　教授
兼板佳孝　日本大学・医学部、公衆衛生分野准教授

【目的】日本の若者の睡眠を取り巻く環境と睡眠習慣について十分な疫学研究が集積されていない。そこで、日本の中高生を対象として、睡眠を取り巻く環境と睡眠習慣について明らかとすることを目的に疫学調査を行った。

【方法】2010 年 10 月に、無作為抽出した中学校 131 校、高等学校 113 校の学校長あてに調査の依頼と調査票を送付した。調査の承諾が得られた学校の全在校生を対象に自記式質問調査票を用いて調査を行った。調査期間は 2010 年 10 月から 2011 年 3 月とした。調査では、睡眠時間、就寝時刻、自覚的睡眠評価、寝具様式、就寝時の電灯の使用、寝室の共有、学校生活等が調べられた。入眠困難、中途覚醒、早朝覚醒、およびこれら 3 症状を 1 つでも有する者を不眠症と定義し、これらに関連する要因について検討した。

【結果】無作為抽出をした学校 244 校のうち、166 校(中学校 84 校、高等学校 82 校)(学校協力率 68.0%、中学校 72.6%、高等学校 64.1%)より回答を得た。対象者は 155219 人、協力を得られた学校における対象者は 107786 人であった。回答者は 99416 人(回答率：64.0%、協力を得られた学校における回答率：92.2%)で、回答者のうち、不良回答者(549 人)、入眠困難、夜間覚醒、早朝覚醒に 1 つでも回答しなかった者(2006 人)を除いた 96861 人(男性：47521 人、女性：49340 人)を解析対象者とした。

入眠困難、中途覚醒、早朝覚醒、不眠症の有訴者はそれぞれ 13.3%、10.5%、5.1%、21.4%であった。入眠困難に関連した要因は、性別、学年、睡眠時間、就寝時刻、悪い睡眠の質、寝具様式、電灯の使用、寝室の共用、気分の落ち込み、授業中の居眠り、帰宅後の昼寝であった。中途覚醒と関連した要因は、性別、睡眠時間、就寝時刻、睡眠の質、寝具様式、電灯の使用、寝室の共有、気分の落ち込み、授業中の居眠り、帰宅後の昼寝であった。早朝覚醒と関連した要因は、睡眠時間、就寝時刻、睡眠の質、寝具様式、電灯の使用、寝室の共有、気分の落ち込み、授業中の居眠り、帰宅後の昼寝であった。また、不眠症と関連した要因は、学年、睡眠時間、就寝時刻、睡眠の質、寝具様式、電灯の使用、寝室の共有、気分の落ち込み、授業中の居眠り、帰宅後の昼寝であった。

【考察】睡眠を取り巻く環境は不眠症と関連した。睡眠環境を考える際、寝具や電灯、寝室の共有などにも注意を払う必要がある。

表1 参加者の背景

	N	(%)
男性		
中学校		
1年生	6220	33.4
2年生	6247	33.5
3年生	6057	32.5
不詳	101	0.5
高校生		
1年生	10226	35.4
2年生	9703	33.6
3年生	8849	30.6
不詳	118	0.4
女性		
中学校		
1年生	6493	34
2年生	6331	33.1
3年生	6184	32.4
不詳	104	0.5
高校生		
1年生	10770	35.6
2年生	10089	33.4
3年生	9257	30.6
不詳	112	0.4
睡眠時間		
5時間未満	15340	15.8
5〜6時間未満	14188	14.6
6〜7時間未満	43444	44.9
7〜8時間未満	13995	14.4
8〜9時間未満	7435	7.7
9時間以上	2199	2.3
不詳	260	0.3
就寝時刻		
午後10時前	5703	5.9
午後10〜11時前	11173	11.5
午後11〜12時前	34573	35.7
午前0〜1時前	22147	22.9
午前1〜2時前	15838	16.4
午前2時以降	7134	7.4
不詳	293	0.3
起床時刻		
午前5時前	3863	4
午前5〜6時前	10854	11.2
午前6〜7時前	57444	59.3
午前7〜8時前	20540	21.2
午前8〜9時前	3260	3.4
午前9時以降	508	0.5
不詳	392	0.4
睡眠の質		
よい	59558	61.5
悪い	36701	37.9
不詳	602	0.6
入眠困難		
無	83976	86.7
有	12885	13.3
中途覚醒		
無	86718	89.5
有	10143	10.5
早朝覚醒		
無	91945	94.9
有	4916	5.1
不眠症		
無	76181	78.6
有	20680	21.4

表2.各不眠症状と関連因子のクロス表

	入眠困難			中途覚醒			早朝覚醒			不眠症		
	N	有訴者(%)	p value	N	有訴者(%)	p value	N	有訴者(%)	p value	N	有訴者(%)	p value
性別												
男性	47521	12.5	p<0.001	47521	10.0	p<0.001	47521	5.1	0.575	47521	20.7	p<0.001
女性	49340	14.1		49340	10.9		49340	5.0		49340	22.0	
学年												
中学校1年	12713	9.7	p<0.001	12713	9.1	p<0.001	12713	4.7	0.110	12713	17.6	p<0.001
中学校2年	12578	12.5		12578	10.2		12578	5.0		12578	20.4	
中学校3年	12241	16.7		12241	10.2		12241	5.3		12241	23.6	
高校1年	20996	12.6		20996	10.8		20996	5.0		20996	21.2	
高校2年	19792	13.2		19792	10.8		19792	5.1		19792	21.5	
高校3年	18106	15.1		18106	11.0		18106	5.3		18106	23.1	
睡眠時間												
5時間未満	15340	24.6	p<0.001	15340	14.5	p<0.001	15340	8.3	p<0.001	15340	31.4	p<0.001
5～6時間未満	14188	15.5		14188	10.8		14188	5.1		14188	23.8	
6～7時間未満	43444	11.1		43444	9.1		43444	4.2		43444	18.9	
7～8時間未満	13995	8.1		13995	9.4		13995	3.9		13995	16.7	
8～9時間未満	7435	8.2		7435	10.2		7435	4.4		7435	17.7	
9時間以上	2199	14.9		2199	14.6		2199	8.7		2199	25.0	
就寝時刻												
午後10時前	5703	6.6	p<0.001	5703	10.1		5703	5.4	p<0.001	5703	16.0	p<0.001
午後10～11時前	11173	7.8		11173	9.8	p<0.001	11173	4.5		11173	17.0	
午後11～12時前	34573	9.5		34573	9.8		34573	4.4		34573	18.1	
午前0～1時前	22147	14.8		22147	9.6		22147	4.6		22147	22.0	
午前1～2時前	15838	16.7		15838	10.3		15838	4.8		15838	24.0	
午前2時以降	7134	33.5		7134	18.1		7134	10.7		7134	40.0	
睡眠の質												
よい	59558	6.8	p<0.001	59558	7.8		59558	3.5	p<0.001	59558	14.4	p<0.001
悪い	36701	23.9		36701	14.8	p<0.001	36701	7.6		36701	32.7	
寝具様式												
ベッド	63460	13.1	p<0.001	63460	10.1		63460	4.8	p<0.001	63460	21.0	p<0.001
床たたみ	31967	13.1		31967	10.8	p<0.001	31967	5.1		31967	21.5	
その他	1214	27.3		1214	21.8		1214	15.7		1214	37.2	
電灯の使用												
完全消灯	64496	13.1	p<0.001	64496	9.8	p<0.001	64496	4.9	p<0.001	64496	20.8	p<0.001
薄明り	30074	12.9		30074	11.0		30074	5.0		30074	21.5	
点灯	1973	23.8		1973	23.6		1973	13.2		1973	37.2	
寝室の共有												
1人	67164	13.6	p<0.001	67164	10.7	p<0.001	67164	5.2	0.004	67164	21.7	p<0.001
2人	16569	12.9		16569	10.2		16569	5.0		16569	21.2	
3人	7780	12		7780	9.0		7780	4.2		7780	19.3	
4人以上	4872	12.6		4872	10.0		4872	4.9		4872	19.5	
気分の落ち込み												
ない	83359	11.7	p<0.001	83359	9.5	p<0.001	83359	4.4	p<0.001	83359	19.3	p<0.001
あり	13414	23.3		13414	16.7		13414	9.3		13414	34.1	
授業中の居眠り												
ない	73838	11.5	p<0.001	73838	9.3	p<0.001	73838	4.5	p<0.001	73838	19.1	p<0.001
あり	22558	19.2		22558	14.2		22558	6.9		22558	28.7	
帰宅後の昼寝												
ない	75599	11.0	p<0.001	75599	9.1	p<0.001	75599	4.2	p<0.001	75599	18.6	p<0.001
あり	20865	21.5		20865	15.3		20865	8.1		20865	31.3	

表3. 不眠症状と関連する要因

	入眠困難				中途覚醒				早朝覚醒				不眠症			
	調整オッズ比	95% 信頼区間		p value	調整オッズ比	95% 信頼区間		p value	調整オッズ比	95% 信頼区間		p value	調整オッズ比	95% 信頼区間		p value
性別				p<0.001				p<0.001				0.629				0.001
男性	1.00				1.00				1.00				1.00			
女性	1.11	1.06	1.15		1.11	1.06	1.16		0.99	0.93	1.05		1.06	1.03	1.10	
学年				p<0.001				0.011				0.107				p<0.001
中学校1年	1.00				1.00				1.00				1.00			
中学校2年	1.13	1.04	1.23		1.12	1.02	1.22		1.03	0.91	1.16		1.11	1.04	1.19	
中学校3年	1.36	1.25	1.48		1.09	0.99	1.19		1.04	0.92	1.17		1.23	1.15	1.32	
高校1年	0.85	0.79	0.92		1.12	1.03	1.22		0.92	0.82	1.03		0.99	0.93	1.06	
高校2年	0.87	0.80	0.94		1.13	1.04	1.23		0.93	0.83	1.04		1.00	0.93	1.06	
高校3年	1.02	0.94	1.11		1.18	1.08	1.28		0.98	0.87	1.11		1.11	1.04	1.19	
睡眠時間				p<0.001				p<0.001				p<0.001				p<0.001
5時間未満	1.26	1.18	1.34		1.15	1.07	1.24		1.38	1.25	1.51		1.12	1.06	1.18	
5～6時間未満	1.02	0.96	1.08		1.04	0.97	1.11		1.08	0.98	1.18		1.03	0.98	1.09	
6～7時間未満	1.00				1.00				1.00				1.00			
7～8時間未満	1.00	0.93	1.08		1.17	1.09	1.26		0.97	0.87	1.08		1.07	1.01	1.13	
8～9時間未満	1.11	1.01	1.23		1.28	1.17	1.40		1.11	0.97	1.26		1.20	1.12	1.29	
9時間以上	1.75	1.51	2.02		1.61	1.40	1.85		1.65	1.38	1.98		1.54	1.37	1.73	
就寝時刻				p<0.001				p<0.001				p<0.001				p<0.001
午後10時前	1.00				1.00				1.00				1.00			
午後10～11時前	1.34	1.17	1.53		1.04	0.93	1.17		0.98	0.84	1.15		1.16	1.06	1.28	
午後11～12時前	1.34	1.19	1.52		0.93	0.83	1.03		0.84	0.72	0.96		1.06	0.97	1.16	
午前0～1時前	1.56	1.38	1.77		0.70	0.63	0.78		0.65	0.56	0.76		1.00	0.92	1.10	
午前1～2時前	1.46	1.29	1.66		0.65	0.58	0.73		0.56	0.48	0.65		0.95	0.86	1.04	
午前2時以降	2.46	2.15	2.81		0.90	0.79	1.02		0.86	0.73	1.02		1.43	1.29	1.59	
睡眠の質				p<0.001				p<0.001				p<0.001				p<0.001
よい	1.00				1.00				1.00				1.00			
悪い	3.24	3.09	3.40		1.99	1.89	2.09		1.99	1.85	2.13		2.52	2.43	2.62	
寝具様式				p<0.001				p<0.001				p<0.001				p<0.001
ベッド	1.00				1.00				1.00				1.00			
床たたみ	1.02	0.98	1.07		1.14	1.08	1.19		1.12	1.05	1.20		1.07	1.03	1.11	
その他	1.61	1.39	1.87		1.70	1.46	1.99		2.32	1.95	2.77		1.56	1.37	1.78	
電灯の使用				p<0.001				p<0.001				p<0.001				p<0.001
完全消灯	1.00				1.00				1.00				1.00			
薄明り	1.00	0.95	1.04		1.18	1.13	1.24		1.06	0.99	1.13		1.07	1.04	1.11	
点灯	1.50	1.33	1.69		2.37	2.11	2.65		2.17	1.87	2.51		1.84	1.66	2.04	
寝室の共有				0.236				p<0.001				p<0.001				p<0.001
1人	1.00				1.00				1.00				1.00			
2人	0.98	0.93	1.04		0.91	0.86	0.97		0.98	0.90	1.06		0.98	0.94	1.03	
3人	0.92	0.85	1.00		0.75	0.69	0.82		0.77	0.68	0.88		0.86	0.80	0.91	
4人以上	0.97	0.88	1.07		0.82	0.74	0.91		0.84	0.73	0.98		0.86	0.79	0.93	
気分の落ち込み				p<0.001				p<0.001				p<0.001				p<0.001
ない	1.00				1.00				1.00				1.00			
あり	1.80	1.71	1.89		1.64	1.55	1.73		1.88	1.75	2.01		1.80	1.73	1.88	
授業中の居眠り				p<0.001				p<0.001				p<0.001				p<0.001
ない	1.00				1.00				1.00				1.00			
あり	1.26	1.20	1.32		1.31	1.25	1.38		1.20	1.12	1.29		1.28	1.24	1.33	
帰宅後の昼寝				p<0.001				p<0.001				p<0.001				p<0.001
ない	1.00				1.00				1.00				1.00			
あり	1.62	1.55	1.70		1.53	1.46	1.60		1.68	1.57	1.79		1.61	1.55	1.67	