

Original

# Skipping Breakfast is Associated with Academic Achievement, Unhealthy Behaviors, and Sense of Coherence Among Medical Students

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## SUMMARY

Few previous studies have examined the relationship between breakfast-skipping and sense of coherence (SOC). This study investigated whether breakfast-skipping was associated with academic achievement, unhealthy behavior, and SOC among medical students. The participants in this cross-sectional one-year cohort study were 92 first-year students (57 men, 35 women ; mean age,  $19.6 \pm 1.6$  years) at Dokkyo Medical University. They completed two self-evaluation questionnaires : the first comprised 26 items regarding standards of conduct, each rated on a 7-point scale, and the other comprised 29 items on SOC and 12 items on lifestyle. Subjects completed all questionnaires in July 2010 and again in August 2011.

Breakfast skippers had worse annual examination scores than breakfast eaters. In fact, breakfast eaters in the first year who became breakfast skippers in the second year had significantly worse annual mean scores in the first year. Moreover, students who had smoked at least once, those who often ate away from home, and those who got less than 6 or more than 8 hours of sleep per night were more likely to skip breakfast. Breakfast skippers also used sleeping pills significantly more often than breakfast eaters. While breakfast eaters had significantly higher scores of meaningfulness, manageability, and total SOC score in the first study year, only the comprehensibility score among breakfast eaters was significantly higher in the second study year. Because these findings indicate an association between SOC score and skipping breakfast, encouraging students to eat breakfast might promote higher SOC, healthier habits, and better academic achievement.

**Key Words** : breakfast-skipping, health, sleeping pills, sense of coherence, medical students

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## INTRODUCTION

Breakfast-skipping has become more common among adolescents and adults in Japan as well as in Western countries<sup>1)</sup>. According to the National Health

and Nutrition Survey in Japan (2010), the rate of breakfast-skipping was 29.7% for men and 28.6% for women in their twenties and 27.0% for men in their thirties; these rates are two to three times higher than those reported thirty years ago<sup>2)</sup>. Our earlier study found that the rate of skipping breakfast two or more times per week among university students was 62.2% for men and 51.0% in women<sup>3)</sup>. Therefore, the problem of skipping breakfast is more severe among university students than in the general population. A Malaysian medical school survey reported a breakfast-skipping rate of 48.6% for overweight or obese students and 34.1% for normal-weight students<sup>4)</sup>. A Finnish study found that breakfast-skipping was associated with health-compromising behaviors in both adults and adolescents<sup>1)</sup>. Similarly, a British study showed that skipping breakfast was associated with reports of poorer health in young adults<sup>5)</sup>. Finally, an Australian study reported that regular breakfast eaters were more likely to rate their health as excellent than adults who skipped breakfast<sup>6)</sup>.

Sense of coherence (SOC) was designed to explain maintenance or improvement of location on Antonovsky's health-ease/dis-ease continuum<sup>7,8)</sup>. A survey of North Indian students found that SOC was associated with health-promoting behaviors<sup>9)</sup>. Although one Japanese study has examined SOC and its related factors in university students<sup>10)</sup>, few previous studies have examined the relationship between breakfast-skipping and SOC.

This study investigated whether various factors involving academic achievement, health behaviors, and SOC were associated with breakfast-skipping among Japanese medical university students.

## METHODS

Our study design was a population-based, cross-sectional study and one year cohort study. Participants were 92 first-year students (57 men, 35 women; mean age,  $19.6 \pm 1.6$  years) at Dokkyo Medical University School of Medicine. One student's first-year questionnaire was incomplete and was not included in the analysis of the first-year students. On July 15, 2010, information on the study was provided to and written informed consent was obtained from all the participants. A self-evaluation questionnaire comprising 26

items regarding fitness to practice, and the other comprising 29 items on SOC, each to be rated on a 7-point scale, and 12 items on lifestyle were administered. The 29 SOC items reflect the components of comprehensibility, manageability, and meaningfulness with high internal consistency and evidence of validity<sup>7,8)</sup>. All questionnaires were completed on July 15, 2010 and again on August 29, 2011. In the present study, we analyzed data only for the 29 SOC items and 12 lifestyle items.

We divided the subjects into two groups: Breakfast eaters and breakfast skippers. The breakfast eaters were defined as those students who skipped breakfast no more than once per week, and the breakfast skippers were defined as those students who skipped breakfast two or more times per week. Both groups were compared using annual mean scores for the regular examination, which the university's academic affairs office provided in March 2011 and March 2012. Both groups were also compared in terms of sex, living with family, smoking habit, subjective well-being, daily snack consumption, eating away from home, sleep quality, hours of sleep per night, sleeping pill use, stress, weekly alcohol consumption, and daily exercise.

Significant differences in the data were determined using the Chi-squared test, Pearson's correlation coefficient, Mann-Whitney U test, analysis of variance (ANOVA), and binary logistic regression. The computer software program Statistical Package for Social Sciences (SPSS) version 18.0 for Windows (SPSS Japan Inc./IBM, Tokyo, Japan) was used for all analysis. The level of significance was set as  $p < 0.05$ .

Approval from the ethics committee at Dokkyo Medical University was obtained for this study.

## RESULTS

Table 1 shows the frequency of breakfast-skipping by male and female medical students during the first and second years of the study. The percentage of subjects who ate breakfast daily during the first study year was 65.9% and during the second study year was 55.4%. Of this group, 68.6% were women and 55.8% were men.

Table 2 shows the mean scores of the annual regular examination by breakfast-skipping frequency for the first study year and second study year. Students who skipped breakfast most often received the worst

**Table 1** Breakfast-skipping frequency per week by year of study and sex (N=183)

	Breakfast-skipping frequency per week, n (%)				<i>p</i> value*
	None or once	Two or three times	Four, five, or six times	Every day	
Year of study					
First year (n=91)	60 (65.9)	10 (11.0)	11 (12.1)	10 (11.0)	0.150
Second year (n=92)	51 (55.4)	21 (22.8)	13 (14.1)	7 (7.6)	
Sex					
Female (N=70)	48 (68.6)	12 (17.1)	8 (11.4)	2 (2.9)	0.091
Male (N=113)	63 (55.8)	19 (16.8)	16 (14.2)	15 (13.3)	

\* Pearson Chi-squared test

Note : One student had incomplete data for the first year.

**Table 2** Mean scores of the annual regular examination by breakfast-skipping frequency in the first study year (N=91)

	Breakfast-skipping frequency per week				Correlations ( <i>p</i> value)
	None or once (n=60)	Two or three times (n=10)	Four, five, or six times (n=11)	Every day (n=10)	
Mean ± SD					
First year	74.2 ± 5.5	73.5 ± 3.1	72.5 ± 5.1	70.3 ± 4.5	-0.237 (0.024*)
Second year	69.0 ± 11.7	70.3 ± 4.3	67.9 ± 15.2	62.9 ± 14.9	-0.087 (0.409)

\* &lt;0.05, Pearson's correlation coefficient

**Table 3** Mean scores of the annual regular examination among first year breakfast eaters by group in the second study year (N=60)

	Group		<i>p</i> value
	Breakfast eaters (n=41)	Breakfast skippers (n=19)	
Mean ± SD			
First year	74.3 ± 5.9	71.9 ± 3.5	0.035*
Second year	69.4 ± 13.8	68.1 ± 4.7	0.209

\* &lt;0.05, Mann-Whitney U test

regular examination scores in the first study year but this did not occur in the second study year. There was a significantly high negative correlation of breakfast-skipping frequency and mean examination score in the first year as shown in Table 2. Table 3 shows that during the first study year there were 60 breakfast eaters ; by the second study year, 41 continued to be breakfast eaters while 19 had become breakfast skippers. These 19 students had significantly worse annual mean scores in the first year than breakfast eaters.

Summing up the two study years, there were 111 breakfast eaters and 72 breakfast skippers, and group characteristics are shown in Table 4. Students who had smoked at least once skipped breakfast significantly more often than students who never smoked ( $p = 0.045$ ). Students who often ate away from home skipped breakfast more often than students who seldom ate away from home ( $p = 0.047$ ). Students who slept 6 to 8 hours per night skipped breakfast less often than students who either slept too little or too long

**Table 4** Group characteristics of daily breakfast eaters and breakfast skippers among both first-year and second-year medical students (N = 183)

	Daily breakfast eaters (N = 111) n, %	Breakfast skippers (N = 72) n, %	<i>p</i> value
Sex			
Male/Female	63/48 (56.8/43.2)	50/22 (69.4/30.6)	0.090
Living with family			
Yes/No	18/93 (16.2/83.8)	9/63 (12.5/87.5)	0.530
Smoking Frequency			
Never/At least once ever	97/14 (87.4/12.6)	54/18 (75.0/25.0)	0.045 *
Subjective well-being			
Good/Poor	100/10 (90.9/9.1)	58/14 (80.6/19.4)	0.071
Daily snack consumption			
Less than one/One or more per day	94/17 (84.7/15.3)	54/18 (75.0/25.0)	0.125
Eating away from home			
Less than one/One or more per day	40/71 (36.0/64.0)	37/35 (51.4/48.6%)	0.047 *
Sleep quality			
Good/Poor	76/35 (68.5/31.5)	40/32 (55.6/44.4)	0.086
Hours of sleep			
6 ≤ and 8 > / 6 > or 8 ≤	60/51 (54.1/45.9)	52/20 (72.2/27.8)	0.020 *
Sleeping pill use			
Never/At least once ever	105/6 (94.6/5.4)	61/11 (84.7/15.3)	0.035 *
Stress			
No/Yes	35/76 (31.5/68.5)	29/43 (40.3/59.7)	0.267
Drinks per week			
Less than once/Once or more	95/16 (85.6/14.4)	56/16 (77.8/22.2)	0.232
Daily exercise			
Yes/No	33/78 (29.7/70.3)	23/49 (31.9/68.1)	0.746

\* <0.05, Chi-squared test

( $p=0.02$ ). Finally, breakfast skippers used sleeping pills significantly more often than those who never used them ( $p=0.035$ ).

Table 5 shows the adjusted odds ratio of breakfast skippers using binary logistic regression using all of these variables for multiple analyses. After logistic regression, sleeping pill use had a significantly higher adjusted odds ratio for skipping breakfast. On the other hand, stress had a significantly lower adjusted odds ratio for skipping breakfast.

Table 6 shows the SOC scores for the following four groups of breakfast-skipping frequency as they occurred during the first year. In the first study year, SOC scores for meaningfulness and manageability and total SOC score among breakfast eaters was signifi-

cantly higher than those among breakfast skippers. In the second study year, only the comprehensibility score among breakfast eaters was significantly higher than that among breakfast skippers.

## DISCUSSION

Keski-Rahkonen et al.<sup>1)</sup> reported that smoking, infrequent exercise, low level of education, frequent alcohol use, and high BMI were associated with skipping breakfast among adolescents and adults. The present study found that breakfast-skipping was associated with smoking, eating away from home, unhealthy sleeping habits, and use of sleeping pills, which suggests that breakfast skippers might be unhealthier than breakfast eaters. An analysis of Australian adults

**Table 5** Adjusted odds ratios and 95% confidence intervals for breakfast skippers by logistic regression model\* among both first-year and second-year medical students (N=183)

	Reference/ Adjusted odds ratio	95% CI	<i>p</i> value
Sex			
Male	1.0	0.3-1.2	0.131
Female	0.6		
Living with family			
Yes	1.0	0.7-6.1	0.167
No	2.1		
Smoking frequency			
Never	1.0	0.8-5.5	0.140
At least once ever	2.1		
Subjective well-being			
Good	1.0	0.4-3.2	0.791
Poor	1.1		
Daily snack consumption			
Less than one	1.0	0.8-4.6	0.132
One or more	1.9		
Eat away from home			
Less than once	1.0	0.7-2.8	0.326
Once or more per day	1.4		
Sleep quality			
Good	1.0	0.6-2.9	0.432
Poor	1.4		
Hours of sleep			
6 $\leq$ and 8 $>$	1.0	1.0-4.3	0.063
6 $>$ or 8 $\leq$	2.0		
Sleeping pill use			
Never use	1.0	1.2-12.1	0.022**
At least once ever	3.8		
Stress			
No	1.0	0.2-0.9	0.034**
Yes	0.4		
Drinks per week			
Less than once	1.0	0.8-4.5	0.160
Once or more	1.9		
Daily exercise			
Yes	1.0	0.6-2.8	0.468
No	1.3		

\* Logistic regression model adjusted for all the following variables : sex, living with family, smoking frequency, subjective well-being, daily snack consumption, eating away from home, sleep quality, hours of sleep, sleeping pill use, stress, drinks per week, daily exercise.

95% CI, 95% confidence interval

\*\* <0.05, binary logistic regression

**Table 6** Mean SOC score by breakfast-skipping frequency in the first study year (N=91)

	Breakfast-skipping frequency per week				<i>p</i> value
	Mean score $\pm$ SD				
	None or once (n=60)	Twice or three times (n=10)	Four, five, or six times (n=11)	Every day (n=10)	
First year					
Comprehensibility	42.0 $\pm$ 8.7	36.2 $\pm$ 5.9	43.5 $\pm$ 7.8	38.4 $\pm$ 10.9	0.132
Manageability	47.0 $\pm$ 7.5	40.5 $\pm$ 5.0	43.6 $\pm$ 6.4	42.5 $\pm$ 8.5	0.025 *
Meaningfulness	40.2 $\pm$ 7.3	36.5 $\pm$ 5.6	35.5 $\pm$ 6.8	34.6 $\pm$ 11.0	0.049 *
Total score	129.3 $\pm$ 18.8	113.2 $\pm$ 12.4	122.6 $\pm$ 17.7	115.5 $\pm$ 25.2	0.026 *
Second year					
Comprehensibility	44.8 $\pm$ 7.7	41.7 $\pm$ 8.2	42.3 $\pm$ 5.7	43.2 $\pm$ 8.1	0.026 *
Manageability	47.0 $\pm$ 7.7	44.3 $\pm$ 6.2	40.1 $\pm$ 5.7	35.9 $\pm$ 9.0	0.093
Meaningfulness	39.0 $\pm$ 7.5	39.7 $\pm$ 7.3	33.1 $\pm$ 8.3	42.0 $\pm$ 9.0	0.444
Total score	130.8 $\pm$ 19.1	125.7 $\pm$ 13.1	115.5 $\pm$ 16.7	121.1 $\pm$ 22.1	0.059

\* <0.05, analysis of variance

found that, compared with breakfast skippers, regular breakfast eaters were more likely to rate their health as excellent<sup>6)</sup>. Our study suggests that breakfast skippers are more likely to have smoked at least once. Several previous studies have suggested an association between skipping breakfast and smoking among adults and adolescents<sup>1,11,12)</sup>. For example, Hashizume et al. reported that smokers were more likely to skip breakfast than nonsmokers<sup>11)</sup>.

Breakfast-skipping and eating away from home are risk factors for overweight and obesity<sup>13)</sup>. For college females, the most unhealthy weight loss behavior was skipping breakfast<sup>14)</sup>. Therefore, the present study suggests with reason that breakfast-skipping is related to eating away from home.

Our previous study of paramedical students found that students who slept 6 to 8 hours per night were significantly less likely to skip breakfast<sup>3)</sup>. Furthermore, the study of Japanese medical students showed that students who ate no more than 2 meals per day woke up later in the morning and went to bed later than students who ate three or more meals per day<sup>15)</sup>. Breakfast skippers are more likely to have insomnia. According to a nationwide study of Japanese adolescents, skipping breakfast had a significantly higher odds ratio for insomnia<sup>16)</sup>. The present study provides new evidence that breakfast skippers use sleeping pills significantly more often than breakfast eaters. Although multiple regression analysis unexpectedly

showed that stress was associated with eating breakfast, this result might be due to the strong relationship between sleeping habits and stress. In short, there were more breakfast eaters among the students who had stress than the students who had used sleeping pills.

SOC score, which is positively related to psychological health, is composed of three components: comprehensibility, manageability, and meaningfulness<sup>17)</sup>. Comprehensibility is the sense that one's present situation is easily grasped or the future can be easily predicted. Manageability is the sense that one has the ability to cope with stress. Meaningfulness is the sense that one's life is meaningful and is related to well-being<sup>18)</sup>. Many previous studies reported the high validity and reliability of Antonovsky's sense of coherence questionnaire, both original and Japanese versions<sup>19~22)</sup>. Söderhamn et al. reported that the scale had good psychometric properties and evidence of face validity, content validity, and construct validity<sup>22)</sup>.

The present study found that first year scores of manageability and meaningfulness among breakfast skippers were lower than those among breakfast eaters. Second year scores of comprehensibility among breakfast skippers were lower than those among breakfast eaters. Therefore, total SOC scores among breakfast skippers were lower than those for breakfast eaters, particularly during the first study year. Similarly, another study found that mean SOC scores were

lower among students aged 14 to 15 who seldom or never ate breakfast<sup>23</sup>. SOC has also been associated with psycho-emotional resources including social support, quality of work, and childhood living conditions<sup>24</sup>. These findings suggest that SOC might improve if students were encouraged to adopt healthy habits such as eating breakfast.

According to a previous study on school children, the group of regular breakfast eaters achieved higher academic achievement scores than the group of breakfast skippers<sup>25</sup>. Our results suggest that breakfast-skipping frequency has a significantly high negative correlation with academic achievement scores in the first year of study but not in the second year of study. Because the second year of study is more academically challenging, students might have been studying late into the evening and then waking up too late to eat breakfast. Nevertheless, the group that skipped breakfast every day had the worst score in the second year without significance. We found that the group who ate breakfast every day in the first year but became breakfast skippers in the second year had a worse mean score in the first year than the group who kept eating breakfast in the second year. This result might mean that those students with the worst first year scores began to skip breakfast. Although questionnaires were filled out in July for the first and second years of study, academic achievement scores were provided in the following March of each year. Therefore, we do not know exactly when the students who ate breakfast became breakfast skippers, which is one of the limitations of our study.

The present study has several other limitations. First, the sample size was small and narrowly confined to first-year students from one medical university in Japan. Second, the variables examined in our cross-sectional study were based on the sum of over two years of data from the same students. When these two groups are divided by study year, the number of students is too small to examine the association of breakfast-skipping with these variables. Thus, the results of the present study might not describe the association between breakfast-skipping and other unhealthy behaviors. Third, the questionnaires used in our study relied on self-reporting by subjects. Some reporting errors might have occurred due to misun-

derstood questions. Finally, skipping breakfast is a lifestyle habit that can be variable over the course of a year.

In conclusion, the results of our study suggest that the academic achievement of breakfast skippers is worse than that of breakfast eaters. Breakfast skippers were also more likely to eat away from home, have unhealthy sleeping habits, and use sleeping pills. Lower mean annual regular examination scores of the breakfast skippers suggest that breakfast influences academic performance. Because SOC score is associated with breakfast, encouraging students to eat breakfast might improve SOC, thus increasing other health-promoting behaviors and academic achievement.

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