

# Irregular Breakfast Eating and Associated Health Behaviors: A Pilot Study Among College Students

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## Abstract

The purpose of this study was to examine prevalence of eating breakfast and associated health compromising behaviors. This study utilized a cross-sectional survey methodology. A purposive cluster sampling technique was utilized to collect data from a representative sample of college students in a Midwestern university in the U.S. A total of 1,257 college students with a response rate of 85% participated in the study. The questionnaire, consisting of 22 closed ended questions was adopted from health related literature. These questions measured demographic and health compromising behaviors such as drinking, smoking, eating breakfast. Data were analyzed using descriptive statistics, chi squared and logistic regression. Place of living significantly influenced the health compromising behaviors such as number of hours sleeping, drinking, and smoking. Over one-fifth of the sample reported never eating breakfast. Logistic regression analysis indicated that sleeping <5.5 hours [odds ratio (OR): 2.76; 95% CI: 1.50, 5.09], drinking alcohol once a week [odds ratio (OR): 2.05; 95% CI: 1.43, 2.95], currently smoking [odds ratio (OR): 2.38; 95% CI: 1.59, 3.58], never exercising [odds ratio (OR): 3.99; 95% CI: 2.3, 6.63], and frequency of regular soda consumption [odds ratio (OR): 5.56; 95% CI: 2.91, 10.63] were associated with irregular breakfast eating.

## Introduction

Health behaviors are associated with most of the leading causes of morbidity and mortality in the U.S. Some of the leading causes of death like heart disease, cancer, and diabetes (Minio, Heron, & Smith, 2006) are to a certain extent associated with personal behavior choices. Johansson and Sundquist (1999) indicated that current life style factors predict the present and future poor health status of an individual's life. Their results showed that lack of physical activity and smoking were predictors of poor health later in life for both genders while obesity is a predictor in women only. Further, in adults, eating breakfast is associated with

healthier lifestyles (Smith, 1998) and those who eat breakfast tend to make better food choices throughout the day (Nicklas, Myers, Reger, Beech, & Berenson, 1998). Haines, Guilkey, & Popkin (1996) reported that prevalence of eating breakfast decreased with increase in age. Young adult breakfast skippers were more likely not to meet their Recommended Dietary Allowances compared to those who eat breakfast (Nicklas et al., 1998).

Colleges are important settings for delivery of health related prevention methods to the majority of young adults. According to the latest statistics, over 16 million students are enrolled in over four thousand higher institutions of education in the United States (U.S. Department of Education, 2005). This age category is the transition period between adolescence and young adulthood and has the greater potential for intervention. Further, the effect of eating breakfast and associated health behaviors on school children and adults received much attention in the literature; little information was included on eating breakfast and associated behaviors in college students. The purpose of this pilot study was to assess the current prevalence of eating breakfast and irregular breakfast eating and associated health compromising behaviors among college populations.

## Methodology

A total of 1,257 college students enrolled in a Midwestern University participated in the study during the spring semester of 2006. Classes from various academic backgrounds were selected and instructor permission was obtained. The questionnaire was administered in intact classes and provided no incentives. More than 85% of the students who attended the selected classes during the data collection period responded to the survey. The survey took approximately 10 minutes to complete. A computer scannable sheet was used to record responses. The study protocol and survey instrument were approved by the university's institutional review board for protection of human subjects.

A sample of college students were asked to complete a questionnaire with regard to certain health behaviors including eating breakfast. The survey instrument consisted of 22 closed-ended questions and was divided into 2 sections. The first section had 8 questions related to anthropometric and demographic data. The second section had 14 questions related to eating habits and related behaviors. The current survey was adopted from a research publication dealing with eating breakfast (Keski-Rahkonen, Kaprio, Rissanen, Virkkunen, & Rose, 2003). This research publication assesses eating breakfast and associated factors among adults and adolescents. Most of these health behaviors are generally

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observed in college age students in western society. For example, drinking sugared beverages, drinking coffee and alcohol, smoking, and using different fat content milk are some behaviors that are common to both Finland and USA. Therefore we adopted the questionnaire from this publication. The nature of this adopted questionnaire is not a summative scale, rather it consists of selective individual questions measuring selected health behaviors with follow-up questions such as “how regular” or “how often.” Consequently, no measure of internal consistency (reliability) is expected for these kinds of questions. The content and face validity of the questionnaire are based on the original article from which the questions were adopted as well as a small jury of reviewers who reviewed the questionnaire.

Body Mass Index (BMI) was calculated from self-reported height and weight for each participant. Participants were classified within the range of underweight to obese in accordance with the Centers for Disease Control and Prevention’s classification guidelines (U.S. Department of Health and Human Services): BMI <18.5 underweight; Healthy weight 18.5 – 24.9; Overweight 25.0 – 29.9; Obese > 30. Eating breakfast was measured by the question “How often do you eat breakfast” and the responses ranged from never, 1-2 days/week, 3-4 days/week, 5-6 days/week to everyday. Based on breakfast eating responses, subjects were categorized in two groups: every day or 5-6 days/week as “regular breakfast eaters” and never, 1-2 days/week or 3-4 days/week as “irregular breakfast eaters.”

Descriptive statistics such as percentage of frequency was utilized to describe the demographic characteristics of the study population. Gender differences in self-reported health related behaviors were tested using chi square test. Differences between health compromising categories and demographic variables like gender, age, ethnicity, class standing, and place of living were examined statistically using chi square test. Logistic regression model was developed, controlling for gender and ethnicity to examine the relationship between smoking, drinking alcohol, frequency of coffee intake, frequency of snacking, number of hours sleeping, exercise habit, and the outcome variable, irregular breakfast eating. Analyses were performed using Statistical Package for the Social Sciences (SPSS) version 15.0 for Windows, and an alpha level of 0.05 was used to determine statistical significance.

## Results

The sample consisted of more females (59.4%) than males (40.6%) and more than a third of the respondents (38%) were 21 years old. The sample represented all levels of undergraduates, from freshmen to seniors. Thirty-two percent were freshmen, 24.8% were sophomores, 17.8% were juniors, 23.8% were seniors, and 0.8% belonged to other categories. Most of the subjects (87.8%) were Caucasian and 6.1% were African Americans. Less than half of the respondents (46.9%) reported living in off-campus apartment/housing followed by 37.9% living in campus dormitories, 8.9% living in fraternity

or sorority houses, 4.5% living in university apartments, and 1.9% living with their parents/guardians at the time of the survey. Based on BMI calculated from self-reported height and weight, nearly three-fourths of the study sample (70.2 %) was categorized as having a healthy weight, while underweight, overweight, and obese were 2.9%, 21.1%, and 5.9% respectively. Most of the underweight students were female (94%). However overweight (male students 33.25%, female students 12.8%) and obese (male students 7.6%, female students 4.7%) were higher among male students compared to female students. Mean BMI for total study sample was  $23.47 \pm 3.8$  (mean BMI for men  $24.6 \pm 3.43$  & mean BMI for women  $22.71 \pm 3.88$ ).

Descriptive statistics of health compromising behaviors by gender are shown in Table 1. All the self-reported health related behaviors, with the exception of the number of sleeping hours, showed a significant gender difference. Twenty-one percent of the participants responded that they never ate breakfast while 23.8% ate breakfast every day. The chi square test indicated that there was a statistical significance by gender in breakfast eating patterns and female students were more likely to eat breakfast everyday as compared to male students. Most students indicated that they do not drink coffee (74%). However, male students were less likely to drink coffee compared to female students. At the same time, female students (32.4%) were more likely not to drink regular soda/sugared beverages compared to male students (19.7%). Further, female students were more likely to choose skim milk (53.7%) compared to male students (30.2%). Most of the students indicated that they ate snacks one or more times per day consisting of chips, crackers, or nuts. However, male students were more likely to eat fast foods like pizza, or fries (female 5.1% vs. male 12.2%) while female students were more likely to eat ice cream, cookies, or candy (female 13.4% vs. male 9.1%).

The majority of the male students indicated that they drank alcohol at least once a week (male students 63.4%, female students 58.6%). With respect to smoking, the majority of the students indicated that they never smoked (75.1%). However, male students were more likely to smoke every day (12.2%) compared to female students (7.5%). Most students of both genders indicated that they were involved in physical activity to some extent. However, 15.5% of female students never exercised compared to 8.3% of male students.

Place of living was significantly associated with behaviors like smoking, alcohol consumption, frequency of snacking, and coffee consumption. Table 2 illustrates these results. Students living off campus (32%) reported consuming meals irregularly compared to students living in a campus dormitory (24.7%) and fraternity (61.6%). Students living in a dormitory (80.9%) did not drink coffee at all compared to students living in a fraternity (57.3%) and off campus (71.9%). Students living in a fraternity were more likely to drink alcohol everyday compared to students living in a dormitory and off campus. Students living in a fraternity and dormitory reported sleeping less than 5.5 hours per day

Table 1

*Distribution of the Subjects' Self-Reported Health Compromising Behaviors by Gender (Percentage)*

	Total	Male	Female	P value
How often do you eat breakfast? (N = 1,250) <sup>a</sup>				
Never	21.1	27.2	17.0	.01
1-2 days/week	28.1	31.9	25.5	
3-4 days/week	18.6	16.3	20.2	
5-6 days/week	8.3	6.1	9.8	
Everyday	23.8	18.5	27.5	
How often do you eat snacks?(N = 1,246) <sup>a</sup>				
Never	5.8	8.7	3.8	.01
1 time/day	29.9	32.0	28.4	
2 times/day	42.5	38.5	45.1	
3 times/day	16.7	14.5	18.0	
4 or more times/day	5.2	5.9	4.7	
Types of snack (N = 1,223) <sup>a</sup>				
Chips, crackers, or nuts	54.9	56.6	53.7	.01
Ice-cream, cookies, candy	11.7	9.1	13.4	
Fast foods (e.g., pizza, fries)	7.9	12.2	5.1	
Other	25.5	22.1	27.8	
Types of milk (N = 1,243) <sup>a</sup>				
Regular	4.3	6.1	3.0	.01
Low-fat	36.5	51.4	26.3	
Skim/1/2 % milk	44.2	30.2	53.7	
Combination of above types	3.1	4.0	2.6	
Don't drink milk	11.9	8.3	14.4	
Drinking coffee (N = 1,244) <sup>a</sup>				
None	74.0	79.4	70.2	.01
1-2 cups/day	22.9	17.0	26.9	
3 or more cups/ day	3.1	3.6	2.8	
Drinking regular soda/sugared beverages (N = 1,245) <sup>a</sup>				
None	27.2	19.7	32.4	.01
Few times/ week	43.4	46.0	41.6	
1-2 times/day	19.4	23.3	16.7	
2-3 times/day	6.9	8.3	6.0	
More than 4 times/day	3.1	2.8	3.4	
Alcohol (N = 1,231) <sup>a</sup>				
Everyday	4.1	7.2	2.1	.01
At least Once a week	60.6	63.4	58.6	
At least once a month	17.7	15.3	19.3	
More than once a year	8.8	7.0	10.0	
Once a year or less	8.8	7.2	10.0	
Smoking (N = 1,244) <sup>a</sup>				
Never	75.1	68.0	79.9	.01
Given up temporarily/permanently	4.3	4.5	4.1	
Less than once a week	5.5	7.5	4.2	
Once a week or more but less than daily	5.7	7.7	4.3	
Daily	9.4	12.2	7.5	
Exercise (N = 1,238) <sup>a</sup>				
Everyday	10.4	13.3	8.4	.01
5-6 times/week	15.3	19.8	12.1	
3-4 times/week	31.9	32.5	31.5	
1-2 times/week	29.8	26.0	32.4	
Never	12.6	8.3	15.5	
Sleep (N = 1,229) <sup>a</sup>				
5.5 hours or less	7.9	7.4	8.2	.28
6-7.5 hours daily	65.5	63.6	66.8	
8 or more hours	26.6	29.0	25.0	

<sup>a</sup>N= <1,257 due to missing values

Table 2

*Place of Living of College Students and Significantly Associated Health Related Behaviors (Percentage)*

Health related behaviors	Campus dormitory percentage	Fraternity/sorority	Other places <sup>a</sup>	P value
Eating pattern (N = 1,247) <sup>b</sup>				
Eat regularly	75.3	78.4	67.9	.01
Eat irregularly	24.7	21.6	32.1	
Eat snacks <sup>c</sup> (N = 1,248) <sup>b</sup>				
1 time/day	30.6	45.0	37.4	.02
2 times/day	44.4	37.8	41.9	
3 or more times/day	25.1	17.1	20.7	
Types of snack (N = 1,225) <sup>b</sup>				
Chips, crackers, or nuts	55.9	57.0	53.8	.03
Ice creams, cookies, candy	14.6	12.1	9.6	
Fast foods(e.g., pizza, fries)	6.1	11.2	8.8	
Others	23.5	19.6	27.8	
Drinking coffee (N = 1,246) <sup>b</sup>				
None	80.9	57.3	71.9	.001
1-2 cups/day	17.4	37.3	24.3	
3 or more cups/day	1.4	5.5	3.8	
Vitamin intake (N = 1,237) <sup>b</sup>				
Yes	36.5	34.9	44.6	.01
No	63.5	65.1	55.4	
Smoking <sup>c</sup> (N = 1,246) <sup>b</sup>				
Never	79.6	80.2	71.0	.002
Given up	2.3	6.3	5.3	
Current smokers	18.1	13.5	23.8	
Sleeping (N = 1,230) <sup>b</sup>				
<5.5 hours	10.0	10.1	6.1	.01
6-7.5 hours	66.5	71.6	64.0	
8 or more hours	23.6	18.3	29.9	
Alcohol <sup>c</sup> (N = 1,235) <sup>b</sup>				
Everyday	2.6	7.2	4.7	.001
1/week	55.1	74.8	61.6	
1/month	19.4	15.3	17.2	
1/year or less than that	22.9	2.7	16.5	

<sup>a</sup> Others include off-campus apartment/housing, parent/guardian's home or other university/college apartment housing. <sup>b</sup>N = <1257 due to missing values. <sup>c</sup>Number of frequency responses were collapsed due to not enough subjects in certain cells.

compared to students living off campus. Students living off campus were more likely to take vitamins compared to students living in a dormitory or fraternity.

Ethnic differences and health compromising behaviors like alcohol consumption, eating a number of meals per day, eating patterns, and sleeping hours showed a significant difference. Ethnicity was categorized into three groups including white, black, and others. The small numbers of Asian/Asian American, Hispanic, and others are pooled

together as "other" group. White students (54.5%) were more likely to consume three or more meals per day compared to black students (40%). Also, more white students (74.2%) reported eating regularly compared to black students (48.7%). Further, black students were more likely to consume regular soda or sugared beverages compared to white students (three or more times per day for white 9.5% and for black 21.1%). White students (64.1%) are more likely to consume alcohol at least once a week compared to black students (27.8%). Even

Table 3

*Adjusted Odd Ratios (OR) in Multiple Logistic Regression Analysis<sup>a</sup> of Irregular Breakfast Eating Category (N=1,214)*

Main effects	OR (95% CI)	Wald $\chi^2$	Standard error
<b>Smoking<sup>b</sup></b>			
Non smoker	1		
Current smoker	2.38 (1.589, 3.576)**	17.64	0.207
<b>Sleeping hours<sup>c</sup></b>			
>5.5 hours	1		
≤5.5 hours	2.76 (1.50, 5.09)**	10.62	0.312
<b>Regular soda/sugared beverages</b>			
Never	1		
Few times/week	1.53 (1.128, 2.089)*	26.97	0.330
1-2 times/day	2.06 (1.381, 3.071)**	12.56	0.204
3 or more times/day	5.56 (2.911, 10.63)**	7.42	0.157
<b>Coffee intake</b>			
None	1		
1-2 cups/day	1.09 (0.450, 2.618)	0.03	0.45
3 or more cups/day	0.85 (0.619, 1.174)	0.96	0.16
<b>Alcohol intake<sup>d</sup></b>			
Rarely	1		
1 time/month	1.51 (0.681, 3.343)	1.03	0.41
1 time/week	2.05 (1.43, 2.947)**	15.18	0.19
Every day	1.22 (0.799, 1.872)	0.86	0.22
<b>Exercise<sup>e</sup></b>			
Regular	1		
3-4 times/week	1.93 (1.380, 2.709)**	28.87	0.26
1-2 times/week	2.81 (1.953, 4.054)**	30.80	0.19
Never	3.99 (2.411, 6.626)**	14.70	0.17
<b>Frequency of snacking</b>			
Never/1 time	1		
2 times/day	0.538 (0.375, 0.772)**	11.307	0.18
3 or more times/day	0.767 (0.565, 1.040)	2.91	0.16

<sup>a</sup>Gender and ethnicity were controlled in this model. <sup>b</sup>Nonsmokers indicate those who reported never smoking or given up temporarily/permanently; current smokers, those who reported smoking less than once a week, once a week or more but less than daily and daily.

<sup>c</sup>Sleeping hours was dichotomized to either sleeping ≤ 5.5 hours or sleeping more than 5.5 hours. <sup>d</sup>Rarely indicate those who reported more than once a year or once a year or less. <sup>e</sup>Regular exercise indicate those who reported exercising every day or 5-6 times/week.

\* Significant at <.01. \*\* Significant at <.001.

though the relationship between current smoking status and ethnicity is not significant, whites (21.1%) were more likely to be current smokers compared to blacks (10.5%).

The adjusted odd ratios in multiple logistic regression analysis of health compromising behaviors associated with irregular breakfast eating are shown in Table 3. The multiple logistic regression analysis identified several health-compromising risk factors for irregular breakfast eating: Sleeping fewer hours, smoking, not exercising, alcohol

consumption, and regular soda consumption. For example, the ‘odds ratio’ for sleeping 5.5 hours or less is 2.76 with a 95% confidence interval of (1.50, 5.09). This suggests that those who are “eating breakfast irregularly” are almost 3 times more likely to sleep fewer hours than those who are “eating breakfast regularly.” Further, those who are “eating breakfast irregularly” are over 5 times more likely to drink regular soda or sugared beverages three or more times per day than those who are “eating breakfast regularly.”

## Discussion

The purpose of this study was to assess the breakfast skipping and associated health compromising behaviors among college students. Not eating breakfast daily may be an indicator for unhealthy eating behavior. Our study indicated that only 23.8% of the participants reported consuming breakfast every day. Song, Chun, Obayashi, Cho, & Chung (2005) showed that 37.2% of those between 19 and 29 years of age did not eat breakfast on a particular day. Most frequently stated reasons for not eating breakfast in the current study was not enough time (64%) and not being hungry in the morning (30.3%). This finding is consistent with other studies (Reddan, Wahlstrom, & Reicks, 2002; Cartwright et al., 2003). There was a significant gender difference in breakfast eating patterns. Female students (37.3%) were more likely to eat breakfast frequently compared to male students (24.6%). Overall, no significant difference was observed in this study between breakfast eating patterns and other demographic characteristics like ethnicity, class standing, and place of living.

This study showed that health compromising behaviors among college students like smoking, alcohol intake, increased frequency of drinking regular soda or other sugared beverages, and lack of exercise was associated with irregular breakfast eating. But BMI was not significantly associated with breakfast eating patterns. A similar finding was observed in another study of young women ages 18-20 years (Fujiwara, 2003). Song, Chun, Obayashi, Cho, and Chung (2005) indicated that regular breakfast eaters were more likely to be older, female, white, nonsmokers, and regular exercisers compared to breakfast skippers. Further, their study indicated that only female breakfast skippers were more likely to have BMI >25 compared to non-skippers. In this study, breakfast skippers were more likely to sleep 5.5 hours or less compared to regular breakfast eaters. Sleep deprivation would have caused them to be tired the next morning and, thus, lead to skipping breakfast. Breakfast skippers were more likely to never exercise compared to non-skippers. Eating breakfast may enhance the energy intake and provide energy boost to engage in regular physical activity (Wayyat et al., 2002). Further, breakfast skippers are more likely to have increased frequency of consumption of regular soda or other sugared beverages. They may be compensating their calories from these non-nutritive beverages.

The majority of students in the present study slept six or more hours and never smoked, but place of living had an influence on behavior choices. Students living in a fraternity/sorority drank frequently compared to students living in a dormitory or off campus. Wechsler, Lee, Nelson, and Kuo (2002) reported that students living in fraternity or sorority houses were more likely to binge drink compared to other types of living places. In this study, students living in a fraternity or sorority and campus dormitory were more likely to sleep less than 5.5 hours compared to living other places. This may be due to students living in a fraternity or campus dormitory having more opportunity to have parties and thus

reduce their hours of sleep. But surprisingly, students living in a sorority were less likely to be current smokers compared to living other places.

The findings of this study should be interpreted in light of its limitations, including the use of students' self-reported height, weight, and other health compromising behaviors. Another limitation was the convenience sampling method used to collect the data and therefore, the findings of this study may not be broadly generalized.

Based on findings reported here, there are several implications for nutritionists and health professionals which are especially useful for personnel who are directly involved with student populations in designing effective interventions for college students. These implications relate to gender and place of living. Underweight is a major concern among women while overweight and obesity is a problem for both genders. Of particular interest is that among all the factors examined, irregular breakfast eating was greatly associated with health compromising behaviors like drinking regular soda/sugared beverages three or more times per day, and not exercising (adjusted odds ratios of 5.56 and 3.99 respectively). In this study more than 60% of the irregular breakfast eaters stated there was not enough time as the major reason for skipping breakfast. Therefore, including time management as a component of any health education intervention for college students may reduce irregular breakfast eating and thus may reduce the prevalence of health compromising behaviors.

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