



## Comparison of Meal Skipping, Snacking, and Body Weight Perceptions among Urban College Students: On-Campus Living Alone vs. Off-Campus Living with Parents in New York, USA

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### Abstract

This study was undertaken to compare meal skipping, snacking, and weight perceptions between students on-campus living alone and off-campus living with parents, in an urban college in the United States. The self-report survey was completed by 219 college students (on-campus=100, off-campus=119) between April and May 2012. Two-thirds (67%) of the respondents skipped at least one meal in the past week, and most participants showed strong desires to lose weight despite their normal/under-weight status. Significant differences between the two groups were obtained for the reason to skip a meal and the type of snack consumed. Compared to on-campus students, significantly higher values were obtained for off-campus students for choosing 'no time to prepare' as a meal skipping reason for lunch and dinner, and 'sweets' as a preferred snack. In addition to the group comparison, multiple regression results indicate that the body mass index (BMI) positively correlates with meal skipping and snacking frequencies. Younger students and female students were determined to have a higher frequency of meal skipping and morning snacking. Future research is required to study the dietary factors associated with living arrangements, to help college students develop healthy eating habits.

**Key Words:** College students, living arrangements, meal skipping, snacking, body weight

### 1. Introduction

College is a critical period for establishing healthy dietary behaviors that have a long-lasting impact on health (Stok et al. 2018). College students transition from home to living independently for the first time and begin to be in charge of their food choices while experiencing social changes. Research has shown that college students practice unhealthy eating behaviors (Lim et al. 2005; Sogari et al. 2018) and these tend to worsen over time (Harris et al. 2006). Poor dietary habits include meal skipping (Howarth et al. 2007; Kim et al. 2011), frequent unhealthy snacking (Buscher et al. 2001; Kim et al. 2011; Hong et al. 2013), and consumption of high amounts of fat, sodium, sugar, red meat, and alcohol (Park et al. 2003; Kim et al. 2004; Brunt & Rhee 2008; Sprake et al. 2018).

Many studies have examined the relationship of living arrangements on dietary behavior, but the findings do not show consistent patterns according to living arrangements. Among the studies conducted in Korea, some studies

reported that students living on-campus (dormitory boarding) had a higher calorie intake due to frequent consumption of night snack and processed food and a lower fruit consumption than those living off-campus (self-boarding and living with parents) (Bae et al. 2007; Jun et al. 2015), while other studies showed no significant differences in calorie intake between living on-campus and off-campus groups (Kim et al. 2006; Yang & Sohn 2009). A study in Greece reported that students living away from home had a decreased weekly consumption of fresh fruits, cooked and raw vegetables, and increased consumption of sugar, fast food, and alcohol (Papadaki et al. 2007). The study results in Lebanon showed students living independently from parents were significantly more likely to be obese and consume more high fat and high sugar foods, eat meals at irregular times and to binge on food in response to stress than those living at the parental home (Mikhael et al. 2018). A survey in Australia showed alcohol consumption was significantly higher among students living away from home (Riddell et al. 2011). In the United States, college students who lived off campus were more likely to be

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overweight/obese, consume more alcohol and less fruits and vegetables than those who lived on campus or with parents, however, there was no significant difference in fruits and vegetable consumption between 'on-campus' and 'living with parents' conditions (Brunt & Rhee 2008). Another study results of college students in the United State indicated that students who lived off campus consumed less fruits and vegetables (Brown et al. 2005) and had unhealthier lipid profiles (Brevard & Ricketts 1996) than those who lived on-campus.

The possible reason for the discrepancy among the study results might be the different living arrangements for college students depending on the rule or policy of college and the location of college. One common classification of living arrangement used in those studies is whether they live on campus or off-campus. However, the difference between on-campus and off-campus in the colleges/universities varies depending on the socio geographic locations. In most cases, the key distinguishing factor is whether off-campus group are 'living with parents.' For example, in the colleges in rural areas, most students are living independently from parents whether they live on campus or off campus, whereas in the colleges in urban areas, relatively higher percentage of students living off campus are living with parents. That might be the reason that some study compared three groups (on-campus, off-campus, and living with parents) to examine the effect of living arrangements on dietary behaviors (Brunt & Rhee 2008) and others compared only two groups (on-campus vs. off-campus or living alone vs. living with parents (Brevard & Ricketts 1996; Brown et al. 2005; Mikhael et al. 2018). Although there is a need for the research on the differentiated living arrangements between rural and urban colleges/universities, very few studies have been done in urban colleges and universities that have a different living environment from those located in rural area.

Studies have also shown that students tend to gain weight during their college years (Racette et al. 2005; Riddell et al. 2011). Meal skipping is one of the strategies used by college students to manage weight (Lee et al. 2003; Lee et al. 2007; Field et al. 2010). Other study reported that meal skipping is one of the most common poor eating habits in younger adults and is related to the frequency of snacking (Howarth et al. 2007). As the frequency of skipping meals increases, the frequency of snacking increases (Howarth et al. 2007). Despite a large number of studies examining college students' dietary behaviors, less attention has been paid to explore the relationship among college students' living

arrangement, meal skipping, snacking patterns, and body weight perceptions.

To address those missing links, we examined the effects of living arrangement on meal skipping and snacking behavior at an urban college in New York City. The living arrangement conditions (on-campus and off-campus) that were examined in the present study is a representative case of the public colleges/universities located in a large metropolitan area in the United States. Among the participants living off campus in the present study setting, only 8% of the students lived alone or with friends/siblings and the rest of the students lived with parents. Thus, in order to make meaningful single variable comparison (with or without parents), the data for the students living off-campus with parents only were included in the present study.

The objectives of the present study were to examine 1) the differences in the patterns of meal skipping, snacking, and body weight status and perceptions of students living alone on campus and living with parents off campus and 2) the relationship between the weight perception and meal skipping.

## II. Materials and Methods

### 1. Study Design and Participants

This cross-sectional study was conducted using a self-administered survey on a college campus in New York City between April and May in 2012. The protocol was approved by the Institutional Review Board at Queens College, the City University of New York (IRB#11-07-093-4578). Written informed consent was obtained from all participants. A convenience sampling was used, and eligibility criteria included students who were age 18 or older and non-nutrition majors. College students were approached in the cafeteria, student union, and residence halls and recruited via flyers posted on a college campus or word-of-mouth. Students living in residence halls have their own kitchen with a full-size oven and a full-size refrigerator. Of the 259 college students approached, 228 participants completed the questionnaire (100 participants living on-campus and 128 participants living off-campus) for a response rate of 88%. However, as stated above, to decrease extraneous variables, the data for 9 students who lived off campus with friend(s) or sibling(s) were excluded and the data that were collected from 219 college students (on-campus=100, off-campus=119) were analyzed in the present study.

## 2. Questionnaire Contents

The survey consisted of 20 questions, including several that focused on demographics. The questions about weight perception were adopted from National Health and Nutrition Examination Survey (Centers for Disease Control and Prevention 2009) and all other questions were adapted from previous studies (Howarth et al. 2007; Silliman et al. 2004). Body Mass Index (BMI, kg/m<sup>2</sup>) was calculated from self-reported heights and weights.

Survey questions included 1) Gender (Male/Female); 2) Age; 3) Weight and height; 4) Where to live (On-campus/Off-campus) and whom to live with (Parents/Siblings or other family members/Friends/Alone); 5) Frequency of cooking from scratch in the past week; 6) Having skipped meals in the past week (Yes/No) and if 'Yes', how many times one skipped 7) breakfast; 8) lunch; and 9) dinner. If meals were skipped, students were asked to explain the reason for skipping for each type of meal (breakfast, lunch, and dinner) 10)-12). The following items were provided as the reason option for skipping meals: "No time to prepare", "Limited food selection", "Limited budget/equipment", "Lose weight", and "Others". If the respondents chose "Others", they were asked to write down their reason. Also questions included were 13) whether one had a snack between main meals or instead of a meal in the past week (Yes/No), and if 'Yes', how many times 14) in the morning, 15) afternoon, or 16) evening; 17) the kinds of snacks eaten in the past week (open-ended question); 18) how one would like to change one's weight (More/ Less/ Stay about the same/Don't know); 19) whether one had ever tried to lose weight (Yes/No); and 20) whether one thought skipping

meals can help to lose weight (Yes/No).

## 3. Statistical Analysis

Chi-square tests or Fisher's exact tests were utilized to compare categorical values and independent t-tests were used to compare continuous variables of students who lived on campus and those who lived off campus. Several inferential statistical analyses such as multiple regressions, factorial analyses, MANOVA were conducted by changing variables. However, as most of the statistical assumptions in the analyses were severely violated, only the following regression results that meet the assumptions of error are presented in the present study. To predict frequencies of breakfast, lunch, dinner-skipping and morning, afternoon, evening-snacking, simultaneous multiple linear regression models were used to fit with covariates, age (continuous), residence (category; on-campus vs. off-campus), gender (category), and BMI (continuous). The assumptions of linearity, normally distributed errors, and uncorrelated errors of variables were checked and met. For all analyses, a p-value<0.05 indicated statistical significance. Statistical analyses were performed using SPSS software for Windows (version 25.0, 2017, IBM Corp, Armonk, NY).

## III. Results and Discussion

Descriptive statistics organized by residence status are presented in <Table 1>. There was no significant difference in the gender ratio between on-campus and off-campus students. Students who lived on campus were significantly younger than those who lived off campus <Table 1>.

<Table 1> Participant characteristics by living arrangements

		Total (N=219)	On-campus (N=100)	Off-campus (N=119)	p-value <sup>1)</sup>
Gender <sup>2)</sup>	Female	148(67.6)	65(65.0)	83(69.7)	0.46
	Male	71(32.4)	35(35.0)	36(30.3)	
Age (years) <sup>3)</sup>		20.9±3.4	19.5±2.0	22.1±3.8	<0.001***
Whom do you live with? <sup>2)</sup>	Parents	119(54.3)	0(0.0)	119(100.0)	
	Alone	100(45.7)	100(100.0)	0(0.0)	
Body Mass Index (kg/m <sup>2</sup> ) <sup>2)</sup>	Underweight (≤18.4)	11(5.0)	3(3.0)	8(6.7)	0.65
	Normal weight (18.5-24.9)	138(63.0)	65(65.0)	73(61.3)	
	Overweight (25.0-29.9)	52(23.7)	23(23.0)	29(24.4)	
	Obese (≥30.0)	16(7.3)	7(7.0)	9(7.8)	
Reported frequency of cooking in the past week (times/week) <sup>3)</sup>		2.9±3.6	3.4±3.6	2.5±3.5	0.06

<sup>1)</sup>Chi-square test or Fisher's exact test was used for categorical variables; t-test was used for continuous variables as appropriate.

<sup>2)</sup>N (%), column percentage

<sup>3)</sup>Mean±SD

\*\*\*p<0.001

The mean BMI of the participants was 23.9 and 63% of the participants were of normal weight. The distribution of BMI categories did not differ significantly between living arrangements. Among the findings, it is interesting to note that our results showed the lower prevalence of overweight and obesity (31%, Table 1) compared to the national prevalence of those for adults aged 20-49 in 2017-2018 in the United States (42.5%) (Fryar et al. 2020) and the prevalence for 1578 college students aged 18-25 years from the study conducted by Sa et al. (2020) (45-52% in U.S. students; 57% in South Korean students). Though there was no significant difference in the frequency of cooking between the two groups ( $p=0.06$ , Table 1), students who lived on campus tended to cook more often than off-campus students <Table 1>.

Two-thirds (67%) of all participants reported skipping any meal in the past week, and there was no significant difference

in the rate of skipping a meal between on-campus and off-campus students <Table 2>. For participants who reported skipping any meal(s), the frequency of skipping breakfast higher than other meals. Consistent with the present study result, college students skip breakfast more often than lunch or dinner (Lowry et al. 2000). The studies in Korea reported the same result that breakfast is the most skipped meal (more than 50 % of the college students) than lunch and dinner in college students (Lee et al. 1996; Kim 2007; Kim et al. 2011; Yang & Sohn 2009). There was no significant difference in skipping breakfast, lunch, or dinner between students living on campus and off campus <Table 2>. However, most of the studies examining skipping meal rate according to the residence type found that students living on-campus (dormitory boarding) had a higher breakfast skipping rate than those living off-campus with parents (Lee et al. 1996; Kim 2007; Yang & Sohn 2009). “No time to prepare food” was the most

<Table 2> Meal skipping patterns and reasons for skipping meals in the past week between on-campus and off-campus participants

	Total (N=219)	On-campus (N=100)	Off-campus (N=119)	p-value <sup>1)</sup>
Did you skip any meal in the past week? <sup>2)</sup>				0.43
Yes	147(67.1)	66(66)	81(68.1)	
How often did you skip in the past week? (times/week) <sup>3)</sup>				
Breakfast (N=128)	2.0±2.2	2.1±2.2	1.9±2.2	0.54
Lunch (N=89)	0.9±1.5	1.1±1.5	0.9±1.4	0.32
Dinner (N=56)	0.5±1.1	0.6±1.0	0.5±1.2	0.63
Reasons for skipping breakfast <sup>2),4)</sup> (N=128)				
No time to prepare	104(66.2)	47(61.8)	57(71.3)	0.89
Limited food selection	18(11.5)	15(19.7)	3(3.8)	0.001**
Others	17(10.8)	8(10.5)	9(11.3)	0.90
Budget/Limited equipment	13(8.3)	5(6.6)	8(10.0)	0.59
Lose weight	4(2.5)	1(1.3)	3(3.8)	0.63
Reasons for skipping lunch <sup>2),4)</sup> (N=89)				
No time to prepare	55(53.4)	33(63.5)	22(44.0)	0.01*
Limited food selection	16(15.5)	8(15.4)	8(16.0)	0.72
Others	14(13.6)	4(7.7)	10(20.0)	0.19
Budget/Limited equipment	13(12.6)	5(9.6)	8(16.0)	0.54
Lose weight	4(3.9)	2(3.8)	2(4.0)	0.62
Reasons for skipping dinner <sup>2),4)</sup> (N=56)				
No time to prepare	24(34.8)	16(43.2)	8(25.8)	0.03*
Others	19(27.5)	9(24.3)	10(32.3)	0.88
Limited food selections	13(18.8)	6(16.2)	7(22.6)	0.97
Budget/Limited equipment	7(10.1)	4(10.8)	3(9.7)	0.41
Lose weight	5(7.2)	2(5.4)	3(9.7)	0.58

<sup>1)</sup>Chi-square test or Fisher's exact test was used for categorical variables; t-test was used for continuous variables as appropriate

<sup>2)</sup>N (%), column percentage

<sup>3)</sup>Mean±SD

<sup>4)</sup>Multiple response question. Percentage and totals are based on responses.

\* $p<0.05$ , \*\* $p<0.01$

frequent reason for meal skipping, and “To lose weight” was the least frequent reason regardless of meal timing and residence status <Table 2>. The reasons for skipping a meal from the present study are consistent with another study reporting that time is the greatest barrier for college students to have better dietary practices (Silliman et al. 2004). However, there were significant differences in the frequency of selecting some of the reasons for skipping breakfast, lunch and dinner between on-campus and off-campus students. The students who lived on-campus more often chose “Limited food selections” as a reason for skipping breakfast ( $p=0.001$ ) and “No time to prepare” for skipping lunch ( $p=0.01$ ) and dinner ( $p=0.03$ ) than those who lived off campus <Table 2>. Previous studies also showed that “Lack of time” was the most frequent reason of skipping meals regardless of the type of residence (Kim 2007; Lee et al. 1996).

In this study, 84% of the total participants reported having a snack in the past week <Table 3>, but there were no significant differences between the on-campus and off-campus groups for snacking. The most frequent snacking time was afternoon, followed by evening and morning. There was no significant difference in snacking time between the on-campus and off-campus groups. The most frequent snack was fruit for all students and the on-campus group and sweets for the off-campus group. The type of snack item did

not differ significantly between the on-campus and off-campus groups, except for sweets. However, students who lived off campus selected sweets as a snack item significantly more often than those living on campus ( $p=0.009$ , Table 3). This finding is consistent with the study of Wansink et al. (2006), which showed fruit consumption was more closely related to sweet snack consumption than to salty snack consumption, and sweet snack consumption was more closely related to fruit consumption than vegetable consumption.

<Table 4> presents the multiple regression results for the age, residence, gender, and BMI to predict the frequencies of meal skipping and snacking. Among the regression analyses, the combination of independent variables significantly predicted afternoon snack frequency ( $p=0.018$ ). In the analysis, only gender significantly predicted the afternoon snack frequency. The  $\beta$  weights, presented in <Table 4>, suggest that the BMI contributes more to the prediction of breakfast, lunch, dinner skipping, and afternoon snacking, and gender does more to the prediction of morning and afternoon snacking than other independent variables. The BMI was shown to be positively correlated with breakfast, lunch, dinner skipping and morning snack, while the gender (0: female, 1: male) was negatively correlated with lunch, dinner skipping, and morning, afternoon, and evening snacking. The other  $\beta$  values suggest that younger students

< Table 3> Reported snacking pattern in the past week between on-campus and off-campus participants

	Total (N=219)	On-campus (N=100)	Off-campus (N=119)	p-value <sup>1)</sup>
Did you eat any snack in the past week? <sup>2)</sup>				0.35
Yes	183(83.6)	81(81.0)	102(85.7)	
How many times did you have any snack in the past week? (times/week) <sup>3)</sup>				
In the morning (N=127)	2.1±2.3	2.0±2.4	2.1±2.2	0.93
In the afternoon (N=170)	3.2±2.5	3.0±2.3	3.4±2.6	0.22
In the evening (N=144)	2.7±2.5	2.7±2.7	2.8±2.5	0.69
Foods selected as snack in the past week <sup>2),4)</sup>				
Chips	68(31.3)	26(26.0)	42(35.3)	0.09
Nuts	53(24.2)	20(20.0)	33(27.7)	0.12
Vegetable/Salad	89(45.6)	34(34.0)	55(46.2)	0.52
Fruit	121(55.3)	53(53.0)	68(57.1)	0.32
Sweets (candies/cookie)	111(50.7)	41(41.0)	70(58.8)	0.009**
Supplemental bars	48(21.9)	22(22.0)	26(21.8)	0.55
Beverage	68(31.1)	28(28.0)	40(33.6)	0.23
Others	18(8.2)	9(9.0)	9(7.6)	0.44

<sup>1)</sup>Chi-square test or Fisher's exact test was used for categorical variables; t-test was used for continuous variables as appropriate.

<sup>2)</sup>N (%), column percentage

<sup>3)</sup>Mean±SD

<sup>4)</sup>Multiple response question. Percentage and totals are based on responses.

\*\* $p<0.01$

&lt;Table 4&gt; Simultaneous multiple regression analysis summary for age, residence, gender, and body mass index (BMI) predicting frequencies of meal skipping and snacking

Dependent Variable: Frequency of Breakfast Skipping (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	-0.03±0.06	-0.04	0.59
Residence	-0.02±0.34	-0.01	0.94
Gender	0.008±0.34	0.002	0.98
BMI	0.04±0.03	0.09	0.23
R <sup>2</sup> =0.01 (Adjusted R <sup>2</sup> = -0.01), F (4,190)=0.410, p=0.801			
Dependent Variable: Frequency of Lunch Skipping (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	-0.15±0.24	-0.05	0.54
Residence	-0.05±0.23	-0.02	0.82
Gender	-0.02±0.04	-0.04	0.61
BMI	0.02±0.02	0.07	0.35
R <sup>2</sup> =0.01 (Adjusted R <sup>2</sup> = -0.01), F (4,190)=0.438, p=0.78			
Dependent Variable: Frequency of Dinner Skipping (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	0.004±0.03	0.01	0.87
Residence	-0.21±0.15	-0.11	0.16
Gender	-0.01±0.15	-0.004	0.99
BMI	0.02±0.01	0.13	0.07
R <sup>2</sup> =0.03 (Adjusted R <sup>2</sup> =0.01), F (4,190)=1.39, p=0.24			
Dependent Variable: Frequency of Morning snacking (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	0.03±0.06	0.04	0.64
Residence	-0.09±0.36	-0.02	0.80
Gender	-0.72±0.35	-0.15	0.64
BMI	0.02±0.03	0.04	0.58
R <sup>2</sup> =0.02 (Adjusted R <sup>2</sup> =0.003), F (4,190)=1.17, p=0.33			
Dependent Variable: Frequency of afternoon snacking (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	0.03±0.07	0.04	0.61
Residence	0.45±0.38	0.09	0.24
Gender	-0.87±0.37	-0.17	0.02*
BMI	-0.06±0.03	-0.14	0.06
R <sup>2</sup> =0.06 (Adjusted R <sup>2</sup> =0.04), F (4,190)=3.04, p=0.02			
Dependent Variable: Frequency of Evening Snacking (times/week)			
Variables	Unstandardized Coefficients	Standardized Coefficients	p-value
	B±SE <sup>1)</sup>	β	
Age	0.03±0.07	0.03	0.69
Residence	0.09±0.40	0.02	0.83
Gender	-0.41±0.39	-0.08	0.30
BMI	-0.05±0.04	-0.10	0.17
R <sup>2</sup> =0.02 (Adjusted R <sup>2</sup> = -0.003), F (4,190)=0.85, p=0.50			

Independent variables included: Age (years); Residence (0: on-campus, 1: off-campus); Gender (0: female, 1: male); BMI (kg/m<sup>2</sup>)<sup>1)</sup>Standard Error

\*p&lt;0.05

&lt;Table 5&gt; Body mass index distribution and perceptions of weight status and dieting among the participants

	Total	Skipped any meal		Ate any snack	
Body Mass Index (N=217) <sup>2)</sup>		Yes (N=147)	No (N=72)	Yes (N=183)	No (N=36)
<25.0	149 (68.7)	95(64.6)	54(75.0)	130(71.0)	19(52.8)
≥25.0	68(31.3)	50(34.5)	18(25.0)	51(28.2)	17(47.2)
	p-value <sup>1)</sup>	0.10		0.22	
You want to weigh (N=215) <sup>2)</sup>		Yes (N=147)	No (N=72)	Yes (N=183)	No (N=36)
More	36(16.7)	20(13.6)	16(22.2)	28(15.3)	8(22.2)
Less	115(53.5)	84(57.1)	31(43.1)	95(51.9)	20(55.6)
Stay about the same	64(29.8)	41(27.9)	23(31.9)	59(32.2)	5(13.9)
	p-value <sup>1)</sup>	0.12		0.11	
Have you ever tried to lose weight (N=210) <sup>2)</sup>		Yes (N=147)	No (N=72)	Yes (N=183)	No (N=36)
Yes	142(67.6)	99(67.3)	43(59.7)	119(65.0)	23(63.9)
No	68(32.4)	40(28.8)	28(39.4)	57(32.4)	11(32.4)
	p-value <sup>1)</sup>	0.08		0.58	
Can skipping meal help losing weight (N=219) <sup>2)</sup>		Yes (N=147)	No (N=72)	Yes (N=183)	No (N=36)
Yes	45(20.5)	33(22.4)	12(16.7)	34(18.6)	11(30.6)
No	174(79.5)	114(77.6)	60(83.3)	149(81.4)	25(69.4)
	p-value <sup>1)</sup>	0.21		0.08	

<sup>1)</sup>Chi-square test or Fisher's exact test was used for categorical variables as appropriate.

<sup>2)</sup>N (%), Column percentage

and would have a more frequent breakfast, lunch, and dinner skipping, and a less frequent morning, afternoon, evening snacking. With respect to residence type (0: on-campus; 1: off-campus), students living on-campus were predicted to have a more frequent breakfast, lunch, dinner skipping and morning snack, and a less frequent afternoon, evening snacking as well.

As shown in <Table 5>, none of the weight perception questions were significantly related to whether they skipped a meal or whether they ate snacks in the past week. Meal skipping and snacking behavior were statistically unrelated to having ever tried to lose weight and thinking skipping meals help losing weight.

Given the living arrangement situation, slightly different results can be found among the studies that similar living arrangements were examined. The present results are different from the findings of Mikhael and colleagues (2018) who found that Lebanese students living independently from parents significantly more likely to skip breakfast, to eat cake and sugar-based foods, and to be more obese than those living with parents. However, the study that compared the three groups (on-campus, off-campus, and living with parents) in the United States reported that although there were significant differences in some food consumptions between off-campus and other groups, no significant difference

was found between on-campus and living with parents in body weight and all food intakes (Brunt & Rhee 2008). The study that compared the three groups (on-campus, off-campus, and living with parents) in Korea also found that although on-campus and off-campus groups had a significantly higher rate of consumption of night snack and alcohol than living with parents group, no significant difference in body weight was observed among three groups (Jun et al. 2015). Since all the food intakes were not examined in the present study, we couldn't compare the dietary healthiness of our participants with that of other studies' participants. However, the body weight results from those two studies above were in accord with the result in the present study. Brevard & Ricketts (1996) indicated that there is a great possibility that students living on campus may access more healthy foods and exercise facilities and classes offered on campus than those living off-campus. With this in mind, the positive environment of living on-campus can be considered as a factor that offset the difference in body weight between on-campus and off-campus.

As commented above, studies have reported that students tend to gain weight during their college years (Fedewa et al. 2014; Monroe et al. 2017). In the present study, despite a high percentage (68%, Table 1) of normal weight or underweight, 54% of the participants reported wishing to

weigh less, and 68% of participants attempted to lose weight <Table 5>. Similarly, Silliman et al. (2004) found that approximately 50% of college students who were within the normal BMI range (18.5-24.9) wanted to lose weight to reach underweight status (<18.5). In another study in Korea, 90% of the total university student participants wanted to lose weight regardless their weight status and self-weight overestimation was higher in the females than in the males (Kim & Yeon 2017). These results demonstrated college students' strong perceptions to lose weight regardless of their weight status. It has been shown that meal skipping is considered a strategy for losing weight among college students (Lee et al. 2007; Field et al. 2010). However, 80% of the respondents in the present study did not think skipping meals could help them lose weight <Table 5>.

This study has some limitations that may reduce the validity to generalize the findings to other population and times. First, participants were recruited from a single urban area in New York City. The differences in living condition between on-campus and off-campus students may vary among colleges. Second, this study asked participants to report their dietary behaviors in a specified period, which is during the previous week to help them recall better. The survey was also conducted between April and May. The dietary behaviors in this specific time frame may not represent their general dietary habits. Thus, the questionnaire that can evaluate their usual dietary intake should be used for the future study.

#### IV. Summary and Conclusion

The present study indicates that more than half of the college student participants skipped at least one meal and ate a snack in the past week, regardless of living arrangements. No significant difference was found in meal skipping and snacking behaviors except for the meal skipping reason and the type of snack between the living alone on-campus group and the living with parents off-campus group. The off-campus students chose 'no time to prepare' as a meal skipping reason for lunch and dinner and sweets as a snack significantly more than the on-campus students. Additionally, this study found that students' current weight status and perceptions do not significantly relate to meal skipping and snacking patterns. However, the multiple regression results suggest that heavier and younger students would have a higher frequency of meal skipping and morning snacking and female students would have a higher frequency of meal

skipping and snacking.

These results might be helpful for health educators to develop nutrition and food programs for college students' wellness. Given limited food selections at a college campus and time constraints for college students, innovative solutions to increase access to healthy and affordable food on campus such as on-site food pantries or grab-and-go kiosks can be developed and instituted by colleges. More research is needed to understand the needs and perceptions regarding healthy eating in college students. Further investigations are also needed to identify critical factors associated with college students' living arrangement that affect their dietary behavior.

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#### Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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