

A Study of Nutrition Knowledge, Confidence, and Body Image of University Students

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ABSTRACT: The purpose of this research was to assess university students' nutrition knowledge, confidence, information sources and their body image. This study used an online survey engine to collect data from college students. The result of the correlation showed overall subjective knowledge had significant correlation with nutrition. Means of the BMI were compared among the demographic groups with regard to their ethnicity, classification, and age. Significant differences were found among demographic groups regarding the means of the BMI. These findings can enhance the extant literature on the universal applicability of the model and serve as useful references for further investigations within other health care or foodservice settings and for other health behavioral categories.

Keywords: nutrition knowledge, nutrition confidence, information sources, body image

INTRODUCTION

Today, knowledge about healthy food and nutrition receives more attention than ever before [1]. Of particular interest is the impact of nutrition knowledge and beliefs on a healthy diet. Researchers have shown a positive correlation between health knowledge and improved dietary habits [2-4]. Our understanding of the possible connections between diet and disease, the benefits of a healthy diet, and knowledge of nutrition can influence health behavior [5].

One quarter of all individuals aged 18~24 in the United States are currently enrolled in the nation's colleges and universities. College students exhibit distinct decline in nutritional priorities, and poor eating habits often worsen during this time. A hallmark

of most student diets is fast-food that is high in fat and sodium content [6,7]. In 2010, one study reported that most college students did not eat any fruit even once a day and about half of them ate vegetables less than once daily [8]. In addition, the U.S. Department of Health and Human Services found that within the typical university years, the frequency of doing vigorous exercise three or more times a week declined 6.2 percentage points for men and 7.3 percentage points for women [5].

Healthy People 2010 specifically identified post-secondary educational institutions as settings where young adults (aged 18~24) should be targeted for exercise promotion [9]. One aspect of promoting a healthy lifestyle within educational institutions is the presence of required health and physical education

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courses [10,11]. In general, studies suggest that university-sponsored physical activity and health classes have the potential to positively affect the attitudes and behaviors of the students. However, the results of many studies are inconclusive [12].

For this study, the term "nutrition knowledge" took a somewhat broader view and included any information that affected a person's nutrition beliefs. Nutrition knowledge can have a positive impact on an individual's nutrition beliefs, such as self confidence about their health status, taking a health-related class, eating a reduced-fat diet, and participating in appropriate levels of activity. Inappropriate nutrition knowledge can also have a negative impact on an individual's health status and can increase the risk of disease [13]. Therefore, The purpose of this research was to assess university students' nutrition knowledge, confidence, information sources and their body image.

LITERATURE REVIEW

College Students' Academic Achievement and Health Behavior

Health behaviors potentially affecting college student grade point average (GPA) include a wide range of actions and habits in several dimensions of health: physical, emotional, social, and spiritual [14]. Health behaviors most commonly studied in college students are nutrition, exercise, hygiene practices, sleeping patterns, alcohol and other drug use, tobacco use, sexual behaviors, and safety patterns [15]. Which behaviors a college student prefers is a matter of personal choice, often determined by their important factors. The primary factors are age, gender, ethnicity, family and parental relationships, peer relationships, personal knowledge, self-esteem, self-efficacy, and perceived susceptibility and vulnerability [6,16].

Low academic performance was found to be associated with an overall increase in poor health behaviors among adolescents. Perhaps these health behaviors may be seen as inadequate or dysfunctional coping styles as a result of increased educational demands [17]. One study reported that students who score low on measures of competency, such as aca-

ademic achievement, were more likely to initiate and maintain tobacco use [18].

Nutrition Knowledge, Beliefs, and Eating Behavior

Earlier studies were the focus of nutrition knowledge, attitudes, and perceptions. The effects of those researchers' findings had an impact on patients who acted on that advice [19]. Bruce AR & Nies JJ [20] noted significant and direct relationships overall between nutrition knowledge and attitudes, between knowledge and practices, and between attitudes and practices of Canadian public-health nurses. Nayga RM [21] found that greater nutrition knowledge was associated with favorable attitudes toward nutrition education. While nutrition knowledge of health professionals continues to be of research interest, researchers also have been drawn to study the extent of nutrition knowledge among various members of the general public.

Tepper BJ et al. [22] reported that current nutrition information had little meaning to consumers in their study. Like much of the general public, many food-service personnel lack formal nutrition education. In their study of nutrition knowledge, attitudes and behaviors of Canadian military cooks, Burton BA & Sabry JH [13] found nutrition knowledge somewhat lacking-although they also noted a positive attitude toward nutrition among the majority of cooks surveyed. Despite the increased interest in nutrition, studies of what public believed about nutrition indicate a lack of knowledge about healthful dietary guidelines [23]. The frequency with which consumers dine in restaurants has thrust the foodservice industry into the role of nutrition educator, although many in the industry lack formal nutrition education [24]. There is an opportunity now for the university foodservice, like the health-care industry, to be an educator for nutrition information to the college students. As such, management in university foodservice need know- ledge and a positive attitude to provide healthy, nutritious food choices.

METHODOLOGY

A questionnaire was developed based on a comprehensive review of the college student health or

nutrition knowledge literature. A 5-point Likert-type rating scale was used for the items' measurement ranging from (1) not at all important to (5) very important. The study used a convenience online sampling method. Questionnaires using an online survey engine were distributed to university students. The instructors sent an e-mail to their students with the recruitment message and URL for the survey. During the recruitment process, students were informed that participation was voluntary and that the participants could withdraw at any time.

SPSS 20.0 was used to manage, screen, and analyze the data. Data were downloaded directly into Microsoft Excel using one of the functions at Qualtrics.com, then imported into SPSS 20.0. Range and frequency checks were used to insure that no variables were outside the range of possible values.

RESULTS AND DISCUSSION

Data Management and Screening

While care was taken during the data collection phase, missing data did occur in the questionnaire. Univariate statistics including frequency tables and histograms were constructed for all variables to assess for missing values. The distribution of the data was examined for normality and identification of possible outlier. Missing values were examined for systematic patterns. With the exception of the BMI calculation, missing values within scales were replaced using the median value for that variable provided no more than one value was missing within the scale. Scale scores were calculated in Excel then imported into SPSS. This process utilized only those cases with complete data for the variables being analyzed. Data were then analyzed for outliers using box plots. Outliers were identified as those values more than three standard deviations from the mean. Outliers were examined to assess accuracy of data entry. If an outlier represented an actual value, data were analyzed with the outlier in the distribution as well as with the outlier removed. The effect, if any, of the outliers on the results was addressed in the discussion of results. Box plots were also used to identify subjects falling in the upper and lower quartiles of the scales.

Descriptive Statistics of Sample

Descriptive statistics of demographic variables were helpful in describing the sample, which aided in evaluating generalizability of the findings. Descriptive statistics including frequencies and measures of central tendencies (mean, median, mode) and dispersion (range and standard deviation) were used to explore and describe the demographic variables of age, race, classification, self-reported body image, and BMI. Tables with percentages, means, standard deviations, and ranges were used to summarize the data. The demographic results for the sample were compared to the demographics of the university population to confirm that the sample was representative of the population being investigated.

The demographic characteristics of respondents in this study are exhibited in Table 1. Forty-nine percent of the respondents were male students and 51% were female. Sixty-eight percent of the respondents were White and 15.1%, 12.4%, 2.8% and 1.6% were Asian, Hispanic, African-American, and other, respectively. The most frequently occurring classification

Table 1. Demographic characteristics (N=251)

		Frequency	Percent
Gender	Male	122	48.6
	Female	129	51.4
	Total	251	100
Ethnicity	White	171	68.1
	Hispanic	31	12.4
	African-American	7	2.8
	Asian	38	15.1
	Other	4	1.6
	Total	251	100
Classification	Freshman	11	4.4
	Sophomore	105	41.8
	Junior	54	21.5
	Senior	53	21.1
	Graduate	28	11.2
	Total	251	100

Table 2. Correlation of objective knowledge and subjective knowledge

	Subjective knowledge	Subjective knowledge 1 ^a	Subjective knowledge 2 ^b	Subjective knowledge 3 ^c
Nutrition confidence	0.14*	0.12	0.17**	0.06
Overall subjective knowledge		0.87**	0.89**	0.84**
Subjective knowledge 1 ^a			0.67**	0.59**
Subjective knowledge 2 ^b				0.61**
Subjective knowledge 3 ^c				

Note: * $p < .05$, ** $p < .01$.

^a= I am knowledgeable about nutrition information.

^b= I have more nutrition knowledge compared to my peers.

^c= I am confident in knowing which food is good for health.

group was Sophomore (41.8%), followed by Junior (21.5%), Senior (21.1%), Graduate (11.2%) and Freshman (4.4%). The average of the all respondents' age was 21.98 (SD=3.783) and male students (M=22.75, SD=4.11) were older than female student (M=21.23, SD=3.282; $t(231.20)=3.22$, $p < .001$). The respondents were predominantly between 18 and 25 years of age. With regard to respondents' frequency for using university foodservice, about half of the respondents answered "more than two times a week" (47.4 %).

Objective Nutrition Knowledge and Nutrition Confidence

None of the respondents were able to answer all eight nutrition questions correctly. Overall, respondents answered 51% of the objective nutrition questions correctly. Their level of nutrition confidence, how confident they were in their knowledge of nutrition, was just at the mid-point (M=3.49, SD=.75), indicating that they considered themselves somewhat knowledgeable about nutrition. There was no significant difference between male and female students' objective nutrition knowledge. To compare their objective knowledge and nutrition confidence, the points of objective knowledge were categorized in five segments based on the number of correct answers: (1~2=not at all knowledgeable, 3=not knowledgeable, 4=neutral, 5=knowledgeable, and 6~7=very knowledgeable).

As shown in Table 2, there was significant correlation between objective nutrition knowledge and nutrition confidence. This study used a mean value of

nutrition confidence as an indicator of overall nutrition confidence. The result of the correlation showed overall subjective knowledge had significant correlation with all three nutrition confidence items. In addition, nutrition confidence had a significant correlation with overall subjective knowledge. One item asked about the level of agreement with statement "I have more nutrition knowledge compared to my peers."

Nutrition Information Sources

Table 3 shows that the primary nutrition information sources used by the respondents included: internet (22.2%), television (17.9%), their friends and/or relatives (17.8%), and nutrition related classes (17.6%). Books on nutrition (10.6%), research journal or magazines (8.0%), and newspaper (4.9%) were other resources providing nutrition information for

Table 3. Nutrition information sources

Information sources *	Frequency	Percent
Books on nutrition	84	10.6
Television	142	17.9
Research journal of magazines	63	8.0
Internet	176	22.2
Friends or family members	141	17.8
Classes	139	17.6
Newspaper	39	4.9
Other	8	1.0
Total	792*	100

* Multiple choices allowed

the responding college students. According to a study conducted by Freislinga, Haas, and Elmadfa (2010), television and internet as a source of nutrition information are positively associated with daily fruit and beverage consumption among adolescents. It appears that mass media plays an important role as a source of nutrition information.

Body Mass Index (BMI) and Self-Reported Body Image of Respondents

Body Mass Index (BMI) was calculated from respondents' weight and height using the BMI formula (Figure 1). Calculating BMI is one of the easy methods for assessment of underweight, normal weight, overweight, or obese populations. Because the calculation requires only height and weight, it is an inexpensive and easy-to-use method for clinicians and for the general public. The use of BMI allows people to compare their own weight status to that of the general population. Since nine respondents (3.6%) did not report their weight, it was not possible to calculate their BMI. Figure 1 shows the histogram and normal curve of BMI. The x-axis shows the BMI for respondents to the survey, and the y-axis reports the frequency or count for occurrences of BMI. The histogram illustrated the central tendency of the dataset.

Means of the BMI were compared among the demographic groups with regard to their ethnicity, classification, and age. As shown in Table 4, significant

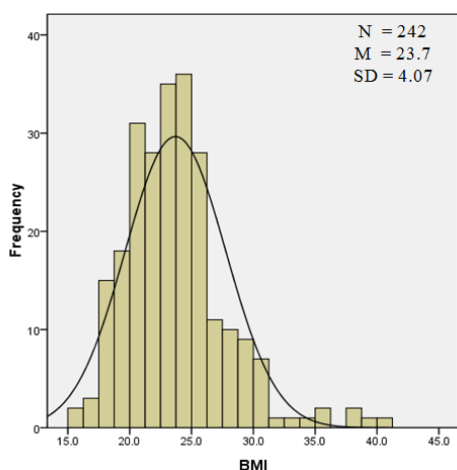


Figure 1. Histogram and normal curve of respondents' BMI.

differences were found among demographic groups regarding the means of the BMI. Respondents with different demographic backgrounds had different levels of BMI. The 20 or younger age group ($M=21.38$, $SD=2.50$), Asian ($M=21.94$, $SD=3.80$), and Freshman groups ($M=21.81$, $SD=2.55$) had a significantly lower level of BMI than other groups.

The self-reported body image and BMI between male and females was compared. As shown in Table 5, results of the t-test showed that there were significant differences in terms of self-reported body image and actual BMI. Female students' self-reported body image ($M=3.09$, $SD=.67$) and BMI ($M=21.85$, $SD=3.20$) were significantly lower than male students' self-reported body image ($M=3.30$, $SD=.80$) and BMI ($M=25.59$, $SD=4.00$).

These findings are consistent with previous study. According to Davy, Benes and Driskell, (2006) there was a significant difference by sex for self-reported heights and weights. Moreover, in the study, BMI values were significantly different by sex (25.2 ± 3.6 men, 22.4 ± 3.5 women) in Table 5.

IMPLICATION

The purpose of this research was to assess university students' nutrition knowledge, confidence, information sources and their body image. This study used an online survey engine to collect data from college students. Out of 253 questionnaires collected, 251 questionnaires (99.2%) were used for the statistical analysis. About half of the respondents (47.4%) used on-campus foodservice more than two times a week. Respondents' objective nutrition knowledge was tested by eight questions. Respondents answered 51% of the questions correctly, overall. Their level of Nutrition Confidence was just at the mid-point ($M=3.49$, $SD=.75$), indicating that they considered themselves somewhat knowledgeable about nutrition. Significant correlation was found between objective nutrition knowledge and nutrition confidence. Descriptive statistics found that the top five importance factors were: taste, price, familiarity, time, and nutrition. For college students' food choices, the most important factors were taste ($M=4.44$, $SD=.76$) and price ($M=4.26$, $SD=.91$). Independent t-test was employed to find the differences in the reasons for

Table 4. Result of ANOVA between BMI and demographics (N=242)

		N	M	SD	F
Classification	Freshman	11	21.81 ^a	2.55	3.94**
	Sophomore	100	24.78 ^b	4.39	
	Junior	51	23.08 ^{a,b}	4.10	
	Senior	52	23.48 ^{a,b}	3.58	
	Graduate	28	22.13 ^{a,b}	3.18	
	Total	242	23.70	4.07	
Ethnicity	White	166	23.77 ^{a,b}	4.13	3.68**
	Hispanic	29	25.70 ^b	3.76	
	African-American	6	23.27 ^{a,b}	1.81	
	Asian	37	21.94 ^a	3.80	
	Other	4	23.38 ^{a,b}	2.04	
	Total	242	23.70	4.07	
Age	20 or younger a	12	21.38 ^a	2.50	4.26**
	21~25	191	23.68 ^{a,b}	4.01	
	26~30	24	26.02 ^b	4.73	
	31 or older	13	22.93 ^a	2.21	
	Total	240	23.76	4.04	

Note. ** $p < .01$.

^{a-c} The mean difference is significant at the $p < .05$ level in post hoc (Duncan) test.

Table 5. Gender comparison of self-reported body image and BMI

	Male			Female			t
	N	M	SD	N	M	SD	
Self-reported body image	122	3.30	0.80	129	3.09	0.67	2.25*
BMI	120	25.59	4.00	122	21.85	3.20	8.03**

Note. * $p < .05$, ** $p < .001$.

food choice between male and female college students. The result revealed that female students had significantly higher score for Nutrition than male students. Otherwise, male and female students had similar patterns in food choice procedure.

This study compared the self-reported body image and BMI between male and female students. Results of a t-test showed that there are significant differences in terms of self-reported body image and BMI. Female students' self-reported body image (M=3.09,

SD=.67) and BMI (M=21.85, SD=3.20) were significantly lower than male students' self-reported body image (M=3.30, SD=.80) and BMI (M=25.59, SD=4.00). Chi-square test revealed that there was strong association between self-reported body image and BMI status ($\chi^2=160.54, p < .001$). The results showed that most of the respondents an accurate body image.

Although the results of this study revealed that nutrition knowledge was significantly associated with nutrition confidence, these results should be viewed

with limited generalizability. Therefore, these results may not be representative of all college students. These findings need to be validated by applying the research design to other consumer groups and other circumstances. In addition, the participants were volunteers therefore, this group may have been more motivated or interested in learning about healthy food than those who did not participate in the survey. Further research with other college students throughout the country is needed to confirm the findings.

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