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Factors Affecting Receipt of Nutrition Information Among a Select Group of University Students in the United States

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Abstract

Poor nutrition affects academic performance. Students receiving nutrition information interventions often have better dietary behaviors than peers not receiving such information. The link between educational institutions successfully providing nutrition information and student demographics has not been fully explored. Improved understanding of these student characteristics is needed to aid institutions in effectively meeting information needs. This study provides an analysis of U.S. data from a nationally representative group of university students to examine relationships between receiving nutrition information and variables of age, residence, academic year, gender, and dietary behaviors. Associations were found between failure to receive nutrition information and age and residence status. High percentages of students expressed interest in nutrition information but reported they have not received it. Information outreach efforts at one institution with comparatively positive scores are highlighted. Study findings and a review of relevant research from multiple countries indicate institutions worldwide must pay greater attention to needs of diverse student groups.

Keywords

health promotion; nutrition; information literacy; colleges and universities

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Poor nutrition, overweight, and obesity are critical global problems (World Health Organization, 2014). Individuals who seek postsecondary education are set to become the leaders, informed citizens, care providers, and drivers of the world's economy. Despite pursuance of education, these individuals are far from immune to dietary pitfalls that threaten academic success, later productivity, and overall well-being (Centers for Disease Control and Prevention, 2014; Florence, Asbridge, & Veugelers, 2008). Improved nutrition knowledge has been shown to lead to better eating decisions (Kolodinsky, Jean, Berlin, Johnson, & Travis, 2007; Ulla-Díez, Fortis, & Franco, 2012) and decreases in disordered eating (Rich & Thomas, 2008).

Due to the availability of online resources, advertising, and self-help materials, university students may supersaturate themselves with nutrition information if they choose. Having access to information does not mean one will seek it out or that the information is credible and useful. Even if quality information is found, individuals do not necessarily understand it or change their behaviors. As Pronk (2012) maintained, "At a time when access to scientific information is unprecedented, both the need for synthesis of such information and the need for reflection on its meaning are paramount" (p. 104). Due to the "bully pulpit" educational organizations hold, their contact with students, and their institutional missions, these schools are uniquely able to supply the credible nutrition information students need to make healthful decisions.

Research conducted in the United States has indicated key demographics such as students' residence (Freedman, 2010; Small, Bailey-Davis, Morgan, & Maggs, 2012) and year in school (Pliner & Saunders, 2008) have marked effects on dietary behaviors and weight. These findings do not appear limited to one country, though. Belgian students found making healthy eating decisions while at school challenging due to issues of food access, cost, and peer influence to consume unhealthy foods (Deliens, Clarys, De Bourdeaudhuij, & Deforche, 2014). Half of Maltese undergraduates interviewed by Cefai and Camilleri (2011) stated they consumed between one and two servings of fruits and vegetables per day and cited quality of school cafeteria food as a major factor contributing to such low consumption. Surveyed Canadian students were more likely to gain weight during the first year of university if they lived away from home (Vella-Zarb & Elgar, 2010), and students living away from home at universities in Bulgaria, Denmark, Germany, and Poland reported poorer dietary practices than similar students who lived at home and commuted to school (El Ansari, Stock, & Mikolajczyk, 2012).

Though much of the research indicates students who live away from campuses have better dietary behaviors than on-campus peers, nutritional practices for both groups are far from perfect (Quintilani, Bishop, Greaney, & Whitely, 2012). Strong evidence has not been found promoting one type of dietary intervention (in-person, online, or environmental) for university students in

general (Kelly, Mazzeo, & Bean, 2013), and the literature provides even fewer examples of such interventions focused on off-campus students. One U.S. example, a televised cooking show, met with mixed results (Clifford, Anderson, Auld, & Champ, 2009). Regardless of students' residence, research has indicated that those health information communications that are more specific to individuals' needs have greater positive impact than nontailored messages or those intended to scare recipients into healthy action (Kessels, Ruiter, Brug, & Jansma, 2011; Normand & Osborne, 2010).

Purpose

The purpose of this study was to explore the link between an academic institution's provision of nutrition information (including courses, school-wide communications, outreach at the individual level) and student demographics (e.g., residence, year in school).

Methods

Sample

The responses of more than 30,000 undergraduate and graduate students residing in the United States provided information for the American College Health Association's National College Health Assessment II (ACHA-NCHA II) Fall 2010 National Reference Group (NRG) data set, a representative sampling of 2- and 4-year institutions participating in the NCHA II. This data set was obtained from the ACHA, a process requiring submission of a formal data request and research plan. In the case of the NRG, 30,093 individual responses from 39 institutions were measured. ACHA reported the overall response proportion was 30.9%.

The local institution sample came from a U.S. coeducational, comprehensive university located in a rural, mountainous region of North Carolina. The school serves more than 9,000 undergraduate and graduate students. During the fall 2010 survey period, approximately 7,700 students, about 85% of the full student body, met criteria for participation in the ACHA-NCHA II. The local survey yielded responses from 923 undergraduate and graduate non-distance students, affording a representative sampling of the local institution's non-distance student population (confidence level of 95% and a confidence interval of ± 3). The overall local response proportion was 12.4%.

Nutrition Information Measures in Place

The local institution's current 42–credit hour general or liberal studies program for undergraduates includes a 3–credit hour wellness requirement. Freshmen may also take a personal nutrition course to complete a separate seminar

requirement. Students may receive credit for coursework deemed comparable taken at other institutions.

In addition to formal courses, the institution offers other nutrition information opportunities. Those interventions and resources include peer counseling within nutrition classes and nontherapeutic nutrition guidance offered by graduate students in the institution's Dietetic Internship Program. In addition, students have access to academic and consumer health resources on healthier eating through the institution's library and to a medical librarian who provides group and individual instruction on health information evaluation. For all university dining establishments, nutrient information is available online and onsite.

Instrument

The ACHA-NCHA II was used in this investigation. This widely used assessment collects data on physical, emotional, and academic factors of wellness affecting students in higher education. Since 2000, ACHA has used the assessment to collect information on student demographics and health behaviors in the United States. Since 2013, Canadian institutions have also begun to participate in the ACHA-NCHA II. Data from the ACHA-NCHA are rigorously analyzed for validity and reliability (ACHA, 2013).

The Institutional Review Board (IRB) granted approval to conduct the survey at the local institution. Non-distance students over age 18 received e-mail invitations to participate in the online survey, and flyers, posters, articles in campus publications, and notes in wellness and nutrition course syllabi provided further publicity.

Data Analysis

The authors analyzed data using SPSS statistical software. Groups were compared using a merged data set comprising the local group and a comparably sized random sampling of the national group. Missing values (i.e., responses left blank or illegible) were excluded. No more than 4% of cases were missing in local institution tabulations, and no more than 5% were missing in NRG tabulations. Where proportional depictions best represented results, simple percentages were rounded from .5 and higher to the next whole number where percentages were greater than 1. Dependent variables consisted of two dichotomous questions (with a yes/no response option for each): "Have you received information on the following topics from your college or university?" and "Are you interested in receiving information on the following topics from your college or university?" Independent variables were residence, age, year in school, gender, desire for information, body mass index (BMI), and daily fruit and vegetable intake.

Through matching institutional code numbers within the NRG data, the authors determined that all 923 participants at the local university remained in the NRG and comprised 3% of the full NRG. Comparisons between the local institution and the NRG were first run with local data preserved in the NRG and then with local data removed. Although only small statistical differences between tabulations were noted, results from secondary analyses are reported (where appropriate) in an effort to present more accurate comparisons.

Pearson's chi-square testing was performed to determine relationships between information reception and the independent variables. Relationships were defined as statistically significant when present at the $p < .05$ level. Where appropriate, variables having comparatively few responses were grouped into closely matching categories.

The authors conducted additional analyses using a random sampling of 863 participants (roughly 3% of national participants) in comparisons with the 923 respondents in the local group. Use of this sampling method decreased skewing of results caused by overrepresentation of the national group.

Results

Table 1 shows participant characteristics from the full NRG and the local sample. Small differences in sample sizes exist per characteristic as some respondents did not provide answers for all relevant questions and some answers were illegible.

Analysis of Residence, Age, and Year in School

Most local and NRG students were aged 18–23, defined as the "traditional" age for undergraduates (Justice & Dornan, 2001). Likelihood of students living away from campus increased with age. Nearly 90% (n = 150) of local, nontraditional-aged participants lived off campus, and just over 20% (n = 159) of traditional-aged students resided away from campus. For the NRG, approximately 95% (n = 4,406) of nontraditional-aged participants lived off campus compared to approximately 40% (n = 9,282) of 18- to 23-year-olds.

Incidence of residing on campus decreased as participants' year in school (first-year undergraduate through graduate student) increased in the local and national groups. Greater than 95% (n = 298) of local and approximately 80% (n = 7,737) of NRG first-year undergraduates resided on campus. In comparison, more than 40% (n = 44) of local group and nearly 30% (n = 997) of NRG fourth-year undergraduates lived on campus.

Differences between similarly aged participants living on campus in local and national groupings may owe to the rural location of the local institution and to the NRG's inclusion of 2-year institutions (3 out of 39 institutions, or 8%). Two-year colleges often do not offer campus housing.

Table 1
Characteristics of Local and National Groups

Participant Characteristic	Local	Percentage	NRG	Percentage
Gender				
Male	282	31%	9,997	35%
Female	616	65%	18,417	65%
Transgender	5	.6%	52	.2%
Age				
18-23 (Traditional)	741	80%	23,664	81%
24+ (Non-Traditional)	168	18%	4,667	16%
Residence				
On-Campus	572	64%	14,366	50%
Off-Campus	278	31%	12,519	44%
Other	49	5%	1,631	6%
Year In School				
1st Year	311	35%	9,670	34%
2nd Year	177	20%	5,598	20%
3rd Year	160	18%	5,488	19%
4th Year	102	11%	3,508	12%
5th Year	52	6%	1,247	4%
Graduate/Professional	88	10%	2,635	9%
Non-degree/Other	6	.6%	243	.9%
BMI				
Underweight	48	5%	1,562	6%
Desired Weight	484	54%	1,7411	62%
Overweight	201	23%	5,868	21%
Obese	161	18%	3,154	11%
Fruit/Vegetable Intake				
0 servings per day	76	8%	2,015	7%
1-2 servings per day	553	61%	17,677	61%
3-4 servings per day	248	27%	7,802	27%
5 or more servings per day	37	4%	1,381	5%
Trying to Change Weight				
Not trying to change	141	15%	4,176	15%
Stay the same	226	25%	7,631	26%
Lose weight	472	52%	14,312	50%
Gain weight	77	8%	2,752	10%
Received Information				
No	270	30%	12,574	44%
Yes	651	71%	16,275	56%
Interested in Information				
No	380	42%	11,982	42%
Yes	532	58%	16,429	58%

Receipt of Nutrition Information

The authors used chi-square tests with the merged data set to measure relationships between receiving nutrition information and variables of group (NRG vs. local), gender, age, residence, year in school, BMI, fruit and vegetable intake, whether students were trying to change their weight, and interest in nutrition information. A statistically significant difference existed between receipt of nutrition information and group, with a larger proportion of the local group (approximately 70% vs. 55% of the NRG) reporting reception of nutrition information ($p < .001$). Strong associations existed between receiving nutrition information and variables of residence and age in both the local ($p < .001$) and national groups ($p < .001$). Residence and age are highly connected due to the greater likelihood of older students living off campus.

Associations between gender and having received nutrition information did not appear statistically significant within or between the local and national groups ($p < .001$). A relationship between year in school and having received nutrition information showed statistical significance in the local group ($p < .001$), but not in the NRG ($p = .17$). This difference may owe to the local group's larger concentration of on-campus residents. BMI differences were significant with regard to receipt of nutrition information in the NRG ($p < .001$), but when compared to the local group, no significant differences existed. A significant difference was found between the number of servings of fruits and vegetables consumed per day and reception of nutrition information in both the local and national groups ($p < .001$). However, when groups were compared, no significance was shown.

Desire for information appeared related to whether individuals reported successfully receiving information. More than 60% ($n = 9,916$) of NRG and nearly three quarters ($n = 388$) of local participants with a stated interest in nutrition information received the information compared with one half ($n = 5,934$) of national and one third ($n = 127$) of local participants who stated they were uninterested in receiving such information.

Approximately 60% of both national ($n = 17,064$) and local ($n = 549$) participants stated they were trying to change their weight at the time of the survey. Greater than 55% ($n = 9,527$) of national and 70% ($n = 392$) of local participants who reported trying to change their weight also reported having received nutrition information.

Strong statistical significance existed in the relationship between receiving nutrition information and fruit and vegetable intake in the national group ($p = .001$), but not in the local group ($p = .76$). National participants who reported having received nutrition information from their institutions were more likely to consume three or more servings of fruits and vegetables per day. Analysis showed no difference in the local group. As this difference was marked between

the groups, analysis of the full national data set (minus local group data) was re-run, confirming statistical significance for receiving nutrition information and higher intake of fruits and vegetables in the national group. As reasons behind this difference are not immediately apparent, institutions wishing to draw conclusions from this particular finding may wish to use national group data as this larger group should provide greater opportunity for generalization.

Discussion

Key Demographics and Benchmarking

Correlations have long been held between residence and academic success, with retention and other measures positively associated with on-campus living (Schudde, 2011; Tinto, 1993; Turley & Wodtke, 2010). Findings from this study highlight additional challenges in communicating nutrition messages to off-campus and nontraditional students. In the national and local groups, students were more likely to report receiving nutrition information if they resided on campus, were younger, and desired (and may have sought out or were more likely to remember having received) this information.

A greater proportion of the local institution's students reported receiving nutrition information compared to the national sample. This finding bolsters the institution's current activities. However, decreased information receipt in off-campus and older student populations and deficits between desire for information and actual receipt indicate a need for greater local action.

Broad Applicability

Though this study drew from U.S.-based data, implications of providing reliable nutrition information to students are internationally applicable. As with local and national groups analyzed in this study, college and university students across the globe engage in poor nutritional practices and struggle with related health effects (El Ansari et al., 2011; El Ansari, Labeeb, Moseley, Kotb, & Houfy, 2013).

Effectiveness of practices already in place at the local institution, such as required wellness courses, is correlated with this investigation's findings and research from across the globe. Researchers in Australia (Pearce & Cross, 2013), Canada (Emrich & Mazier, 2009; Higgins, Lauzon, Yew, Bratseth, & McLeod, 2010), China (Huang, Liu, & Tsou, 2013), India (Rani et al., 2013), Malaysia (Wan Putri Elena, Mohd Razif, & Pei Lin, 2014), and the United States (Everhart & Dimon, 2013; Hager, George, LeCheminant, Bailey, & Vincent, 2012) found wellness and nutrition courses improved students' health knowledge and positively impacted their dietary behaviors.

Positive effects of peer-to-peer nutrition education models also appear wide reaching. Evidence from Australia (Roberts et al., 2009), Canada (Lo et

al., 2008), China (Li et al., 2009), and the United States (Kicklighter, Koonce, Rosenbloom, & Commander, 2010) supports the efficacy of such interventions in improving students' nutrition knowledge and dietary practices.

Limitations

This inquiry focused on data pertaining to nutrition information. However, the ACHA-NCHA II tool did not place the term *information* in context. Information may be taken to mean knowledge gleaned from classroom instruction, websites, counseling, books, or a host of resources. Participants may have attributed one or none of these meanings. The connotation of the term *institution* used in the assessment may be broadly interpreted as well. Participants may not have considered entities internal to the institution (dining hall, library, etc.) as part of the institution. Fallibility of human memory presents another limitation as students may have received information from institutions but too quickly recycled pamphlets or forgotten about information sessions.

The eternal quandary of causation versus correlation (Clapham & Nicholson, 2009) also limits findings of this study. Though correlations existed in several relationships dealing with receipt of nutrition information and issues of residence, desire to change weight, fruit and vegetable intake, and desire for nutrition information, causative effects of these variables cannot be measured with current data.

Recommendations and Conclusion

Recommendations for Future Research

Among the recommendations listed in their systematic review of dietary interventions for university students, Kelly et al. (2013) called for "more rigorous methodologies, including RCTs [randomized controlled trials], long-term follow-up analyses, attention to potential mediators, and standardized dietary assessment methods" (p. 312). Echoing this call, future researchers should incorporate stronger methodologies such as pretests and posttests and randomization of intervention recipients to enable better interpretation of the relationships between information interventions and changes in knowledge and behavior.

Of note to future researchers, implementing more rigorous methodology may be complicated in groups of comparative size or larger than the several thousand participants studied in the current research. Multiple universities would need to agree upon, and then successfully complete, the offering of similar interventions and administration of similar surveys prior to and following interventions. Involvement of large accrediting bodies, governmental entities, and/or the World Health Organization may be needed to coordinate efforts.

Institutions with staff desiring to replicate the current study have several

options. For institutions participating in the ACHA-NCHA II in the United States and Canada, staff may request data specific to their institutions from the ACHA as well as limited national reference group data and run the same or similar analyses. Reports for both U.S. and Canadian (spring 2013 forward) NRGs are freely available through the ACHA-NCHA II reports website (http://www.acha-ncha.org/reports_ACHA-NCHAII.html).

For non-U.S. and Canadian institutions and other institutions that do not participate in the ACHA-NCHA II, staff may create their own surveys. Samples of ACHA-NCHA II Web and paper surveys are available via the ACHA-NCHA survey website (http://www.acha-ncha.org/sample_survey.html). Although ACHA does not permit reproduction, question text may provide limited guidance for new survey crafting.

However, the authors recommend that new surveys, regardless of location, incorporate more queries dealing with information reception and dietary behaviors. The ACHA-NCHA II used in the current research is limited in terms of garnering information about nutrition behaviors and information environment. Only one question dealing with food intake exists in the current survey. Methods by which students receive nutrition information are not delineated in the survey.

Although the ACHA-NCHA II has limits in these areas, the authors did not identify other assessments for this population covering these issues during the review of the literature and in broad searches of English language resources online. Development and validation of a nutrition-related survey that identifies how students receive nutrition information and whether they desire this information, as well as specific questions about nutrition-related behaviors, is recommended. If such an assessment is found to be already available, that tool should be adapted, translated, and, if needed, revalidated for use in institutions across the globe.

Recommendations for Changes in Practice

The following practice recommendations are based on findings from the current study. First, given the global public health burden of overweight and obesity, the issue of students not receiving nutrition information in institutions of higher education needs immediate further exploration. Colleges and universities should assess their current nutrition information environment, including students' living arrangements and desire for and receipt of nutrition information. Nutrition and health education interventions should focus on methods of information provision that do not rely on physical presence on a campus or even desire for such information as students may not fully realize the importance of proper nutrition to academic success and well-being.

Second, findings of this study offer an opportunity for institutions of higher education to conduct nutrition education programming with select groups,

including nontraditional-aged students and students who live away from campus. Despite information outreach practices at the local institution, students interested in nutrition information, particularly those not at their desired weight, sometimes did not receive it. Information receipt was lower for students at the national level. Since nutrition behaviors correlate with weight status, providing nutrition information and education to students in greatest need is paramount. The authors recommend that researchers use findings from the current study to pilot nutrition information and educational programs and share results with the international community for program replication and improvement.

Finally, information provided within interventions should be of high quality, but not so academically focused that it is difficult to understand for individuals not specializing in nutrition. Information professionals such as librarians may assist in finding good resources, and many governments and nutrition organizations may provide credible dietary guidance. Information resources should be available at points of need (in restaurants, through mobile applications, etc.) and, whenever possible, be spread by students themselves.

Conclusion

Nutrition information bombarding students from popular culture and well meaning "experts" in many cases may be deemed questionable at best. Success in meeting the health information needs of all students—not only individuals fitting within "traditional" student demographics—calls for a unified approach from individuals invested in students' health: health educators and other instructors, nutrition and wellness professionals, administrators, food services staff, librarians and other information professionals, residential living professionals, parents, spouses, and students themselves.

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