Comparison of Health Status and Health Behaviors Between Female Graduate and Undergraduate College Students

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Abstract

Objective: Graduate females represent a substantial and growing proportion of the college student population, yet health promotion research and programming has traditionally focused on undergraduates. This study compared health status and health behaviors of female graduate and undergraduate students at a public university in the northeastern U.S. Methods: Data were collected from students in randomly selected courses during the spring 2008 semester using the American College Health Association-National College Health Assessment (ACHA-NCHA) survey instrument. Data were analyzed using bivariate and regression procedures. Results: Graduate females were similar to their undergraduate counterparts on all measures of health status and behaviors with the exception of reporting significantly better health status, fruit and vegetable intake, routine gynecological exam participation, and more drinking and driving. After controlling for demographic variables there were no significant differences in any measures of health status or health behaviors between groups. Conclusions: University health promotion efforts typically focus on undergraduate student health behaviors. These data support the expansion of campus programming to include and target graduate females. Additional research is needed to gain insight into health needs, preferred programming, and barriers to participation for this population so that effective interventions and services can be developed and implemented.

Introduction

For the past several decades, assessing and understanding the health status and health behaviors of undergraduate students in the United States have been the focus of numerous research studies. Exploring a diverse array of topics, these studies have investigated areas such as alcohol and other drug use, smoking, sexual behaviors and sexually transmitted diseases, physical activity and fitness, dietary behaviors and nutrition, violence, stress, depression and suicide (American College Health Association [ACHA], 2009). The resulting body of knowledge has informed the identification of priorities for college health education and health promotion programs (ACHA, 2002). The potential short-term and long-term impact of such programs on the health and well-being of college students has long been recognized. Alcohol education programs, for example, have been mandated since 1989 for all colleges and universities accepting federal funding (DeJong & Langenbahn, 1996).

Although rarely excluded per se, graduate students have not typically been targeted for college health promotion programming. In addition, very few research studies, beyond the thesis or dissertation level, have examined the health status and health behaviors of graduate students. This may be related to an assumption that graduate students are more mature and committed to their studies than undergraduates and, therefore, less likely to engage in risky behaviors, such as alcohol binge drinking. Interestingly, the few studies that have compared graduate with undergraduate students have reported findings that contradict this assumption. In his study of alcohol-related sexual activity on campus, Meilman (1993) found no difference between undergraduate and graduate students in alcohol-induced sexual activity or in alcohol-related abandonment of safe-sex practices. Nelson, Lust, Story and Ehlinger (2008) reported that graduates and older students were more likely to have substantial credit card debt, which in turn was associated with increased binge drinking, overweight/obesity, and unhealthy weight control behaviors including the use of laxatives and diet pills, binge eating and induced vomiting. On the other hand, Zahran, Zack, Vernon-Smiley and Hertz (2007) found that younger graduate students (less than 25 years old) reported overall fewer risky behaviors and better self-rated health and mental health than undergraduates. In another study, White, Becker-Blease and Grace-Bishop (2006) reported lower misuse and abuse of stimulant medication in graduate and nontraditional students than younger undergraduate students. Other studies have included graduate students, but either did not make comparisons with undergraduates or the sample size of mixed level students was insufficient for analysis of graduates as a subset (Lanier, Nicholson, & Duncan, 2001; Leong, Mallinckrodt & Kralj, 1990; McKenzie, Altamura, Burgoon & Bishop, 2006; McWhorter, Wallmann & Tandy, 2002; Parker, Lyons, & Bonner, 2005). Furthermore, no studies were found focusing exclusively on female graduate students' health status and health behaviors.

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This lack of research, particularly about women, and the conflicting findings in what few studies are available is concerning in light of trends in graduate school enrollment. Since 1976, enrollment has increased 67% and is projected to exceed 2.6 million students by 2,017 (Planty et al., 2008). Enrollment trends by gender have also changed during the past 30 years. In 1976, the majority of graduate students were men (54%), but since 1984, women have exceeded men and today make up over 60% of graduate school enrollment. This trend of a predominantly female graduate school population is projected to continue. Given the relatively little research currently available and the increasing female enrollment trend, a better understanding of female graduate students' health status and health behaviors is needed. The current study was designed to expand knowledge in this area. The purpose of this study was to compare health status, preventive practices, health behaviors and alcohol behaviors between female graduate and undergraduate college students.

Methods

Study Population

All undergraduate and graduate students who were enrolled in courses during the spring 2008 semester were eligible to participate in this study. This manuscript examines only data collected from female participants. At the time of this study there were approximately 3,900 full-time female undergraduate students, and 2,400 female graduate students (700 full-time; 1,700 part-time) enrolled in this urban public university located in the northeastern region of the United States. On this campus approximately 63% of undergraduate and 76% of graduate students are female and approximately 78% report their race/ethnicity as white.

Proportional stratified random sampling was used to select courses for recruitment and courses were stratified based on academic level. Initially, a total of 50 courses (total enrollment of 1,344 students) were selected in proportion to the campus enrollment for undergraduate and graduate students at each year level. The professor of record was then contacted via e-mail and asked for permission to allow researchers to collect data during one of their class sessions within a specific 2-week period of time. Thirty seven professors (74%) with a total enrollment of 1,030 students provided permission for data collection; 778 students (75.5%) were in attendance on data collection dates and of those, 760 (97.8%) agreed to participate. Thirteen surveys were discarded due to improper completion resulting in an overall response rate of 747 (96%) for those present in class on data collection dates. This study only examines data provided by female participants (n = 448).

Data Collection

Data were collected during regularly scheduled class sessions by the primary investigator and two graduate research assistants. Prior to participation each data collector completed an online certification for protection of human participants and two training sessions with the primary investigator. These sessions included a rigorous review of all procedures, forms and scripts, and role playing for class visits. Each data collector described the purpose of the study, provided instructions for survey completion and emphasized that participation was anonymous and voluntary. Students were spread out in classrooms to provide confidential settings for survey completion. Once completed, each student placed her survey booklet in a large envelope at the front of the room. As an incentive, all participants were invited to enter a raffle for gift cards to the campus bookstore. Contact information for the raffle was collected in an envelope that was separate from the survey forms. The survey took students an average of 30 minutes to complete. The Institutional Review Board for the university study site provided approval for this study.

Instrumentation

The American College Health Association National College Health Assessment, fall 2007 version (ACHA-NCHA, 2010a) was used to collect data for this study. This extensive survey instrument has been widely utilized since 2000 on college and university campuses throughout the U.S. to assess students' health status and health behaviors. Construct validity, content validity and item reliability of the ACHA-NCHA has been established through a systematic process of comparison with other nationally representative college health surveys and databases (ACHA-NCHA, 2010b). Separate analyses were conducted for groups of related items. "The reliability analyses showed consistent standardized alphas and average inter-item correlation coefficients when compared with the CDC's National College Health Risk Behavior Survey (NCHRBS)" (ACHA, 2005, p. 200). Cronbach's alpha scores for inter-item reliability fell within the acceptable range of 0.4-0.9 (ACHA, 2004). "The construct validity analyses showed similar correlation coefficients when compared with the National College Women's Sexual Victimization Study (NCWSV), and measurement validity showed similar odds ratios derived from a multiple variable logistic regression analysis when compared with the College Alcohol Study (CAS)" (ACHA, 2005, p. 200).

This study utilized the ACHA-NCHA survey to measure 16 variables from four content areas: health status, preventive health practices, health behaviors and alcohol behaviors. In each case, survey questions offered participants multiple response options. For this study, all response options were recoded into dichotomous categories reflecting whether the participant engaged in a behavior or met an established criterion for that variable. Responses of *don't know*, *don't remember*, *not applicable*, or *never did this activity* were re-coded as not having engaged in that behavior. Tables 1-3 provide a description of each variable, the wording of the corresponding survey question and the criterion established for inclusion in the frequency count. Each student was classified as undergraduate or graduate based on her survey response.

Table 1

Health Status Variables and Measurements

Variable	Survey question	Survey response options	Standard for meeting criteria
Health status			
Excellent or very good health status	Considering your age, how would you describe your general health?	Excellent Very good Good Fair Poor Don't know	Excellent or very good
Overweight (self-description)	How do you describe your weight?	Very underweight Slightly underweight About the right weight Slightly overweight Very overweight	Slightly overweight or very overweight
Overweight or obese (BMI)	What is your height in feet & inches? What is your weight in pounds?	Write-in numbers	≤ 25 kg/m^2
Ever diagnosed with depression	Have you ever been diagnosed with depression?	Yes No	Yes
Felt so depressed it was difficult to function during the last year	Within the last 12 months how many times have you felt so depressed that it was difficult to function?	Never 1-2 times 3-4 times 5-6 times 7-8 times 9-10 times 11 or more times	1 time or more

For health status, five variables were assessed: (a) excellent or very good health status, (b) overweight (self description), (c) overweight or obese (BMI), (d) ever diagnosed with depression, and (e) felt so depressed that it was difficult to function during the last year.

For preventive health practices, three variables were assessed: (a) dental exam and cleaning in the last year, (b) breast self-exam in the last month, and (c) routine gynecological exam in the last year.

For health behavior, four variables were assessed: (a) recommended fruit and vegetable intake, (b) recommended physical activity, (c) condom use at last intercourse, and (d) cigarette use in last 30 days. The criterion for recommended fruit and vegetable intake was set at five servings per day based on the current United States Department of Agriculture guidelines of 5-13 servings per day (U.S. Department of Health and Human Services [USDHHS], 2005). Physical activity recommendations were set at 20 minutes of vigorous activity or 30 minutes of moderate activity five times per week based on current Centers for Disease Control and Prevention (CDC) recommendations (Pate et al., 1995). Data for condom use only included students who indicated they were sexually active.

For alcohol behaviors, four variables were assessed: (a) alcohol use in the last 30 days, (b) frequent alcohol use in the last 30 days, (c) drinking and driving in the last 30 days, and (d) driving after 5+ drinks in the last 30 days. A definition for *a drink* was provided with the survey questions.

Data Analysis

Upon completion of data collection all survey forms were packaged and mailed to the ACHA-NCHA for processing. Forms were scanned and entered into SPSS (13.0) software and returned to the researchers for analysis. Data files were prepared by selecting female cases, categorizing each as a graduate or undergraduate student, then calculating frequencies and percents for specific demographic questions within each group. Each set of variable responses was recoded into a dichotomous, yes/no response to indicate whether the participant had engaged in that behavior or met the established criterion for that measure (see Tables 1-3). Frequencies and percents were calculated for each variable using the recoded response categories and chi-square testing was performed on each variable to test for significant differences between graduate and undergraduate female

Table 2

Preventive Health Practices Variables and Measurements

Variable	Survey question	Survey response options	Standard for meeting criteria
Preventive health practices			
Dental exam and cleaning in the last year	Have you had a dental exam and cleaning in the last year?	Yes No Don't know	Yes
Breast self-exam in the last month	Have you performed breast self exam in the last month?	Yes No Don't know	Yes
Routine gynecological exam in the last year	Have you had a routine gynecological exam in the last year?	Yes No Don't know	Yes

students. T-test for independent sample means was used to test for significant differences in average age and average Body Mass Index (BMI) between groups. A significance level of $p < .05$ was used for each test. As a final step a series of logistic regressions were carried out to address the question of whether graduate student status was a unique predictor of observed differences in health behaviors. For each dependent variable demonstrating a significant difference between groups, graduate student status was initially entered alone and then entered together with each of the demographic control variables listed in Table 4 and tested for significance at $p < .05$.

Results

Description of the Sample

Table 4 summarizes the demographic characteristics of the sample for this study. The sample consisted of 316 undergraduate and 132 graduate female students. As would be expected, graduate students ($M = 27.16$ years, $SD = 5.93$) were significantly older than undergraduates ($M = 21.3$ years, $SD = 4.06$), and were significantly more likely to live off-campus, work full-time, be enrolled as part-time students, or be married compared to their undergraduate counterparts. The majority of both graduate (80.3%) and undergraduate students (75.6%) reported their race as White which was similar to the profile of the female undergraduate and graduate student population of the full university campus during the time period when this survey was completed.

A very high percentage of graduate (95.4%) and undergraduate (89.5%) students reported having health insurance at the time of the survey with graduate students more likely to report coverage. The high rate of health insurance among undergraduates was likely due to university policies requiring proof of health insurance coverage for full-time students. The large number of graduate students who reported working full-time may have contributed to their high rates of coverage since most full-time jobs provide this benefit.

Health Status

Table 5 provides a comprehensive summary of the 16 variables assessed for this study and the results of statistical testing for differences between graduate and undergraduate females. Graduate students were significantly more likely to rate their general health as excellent or very good compared to undergraduate students ($p = .002$). Only slightly more than half of undergraduate students (51.4%) assessed their health in this category compared to 64.4% of graduate students. This difference did not remain significant when data were controlled for age, full time student status, or full time work status. Classification of female students as overweight or obese was determined two ways: self-assessment; and BMI calculation of $\geq 25 kg/m^2$ based on self-reported height and weight (National Institutes of Health, 1998). For both measures, approximately one-third of female students in both groups described themselves as overweight or obese or reported heights and weights equivalent to BMI ≥ 25 kg/m^2. There were no significant differences between groups for either measure.

As indicators of mental health status, a larger percentage of graduate (21.5%) than undergraduate (17.6%) females reported a depression diagnosis. Further, nearly half of undergraduates (45.4%) reported one or more occasion of feeling so depressed it was difficult to function during the past year compared to 38% of graduates. For both measures, however, differences between groups were not significant.

Preventive Health Practices

Three different preventive practices were assessed in this study. A similarly high percentage of both graduate and undergraduate females reported having had a dental exam and cleaning in the last year (82.8%, 81.8% respectively). Also

Table 3

Health Behavior Variables and Measurements

Variable	Survey question	Survey response options	Standard for meeting criteria
Recommended fruit and vegetable intake	How many servings[1] of fruits and vegetables do you usually have per day?	I don't eat fruits and vegetables 1-2 3-4 5 or more	5 or more servings[1]
Recommended physical activity	On how many of the past 7 days did you participate in vigorous exercise for at least 20 minutes or moderate exercise for at least 30 minutes?	0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days	5 or more days
Condom use at last intercourse	If you are sexually active, did you use a condom the last time you had vaginal intercourse?	Never did this sexual activity Yes No Don't know / Don't remember	Yes
Cigarette use in last 30 days	Within the last 30 days, on how many days did you use cigarettes?	Never used Have used, but not in last 30 days 1-2 days 3-5 days 6-9 days 10-19 days 20-29 days All 30 days	1 day or more
Alcohol use in the last 30 days	Within the last 30 days, on how many days did you use alcohol (beer, wine, liquor)?	Never used Have used, but not in last 30 days 1-2 days 3-5 days 6-9 days 10-19 days 20-29 days All 30 days	1 day or more
Frequent alcohol use in the last 30 days	Same as above	Same as above	10 days or more
Drinking and driving in the last 30 days	Within the last 30 days, did you drive after drinking at all?	Not applicable / Don't drive Not applicable / Don't drink Yes No	Yes
Driving after 5+ drinks[2] in the last 30 days	Within the last 30 days, did you drive after having 5 or more drinks*?	Not applicable / Don't drive Not applicable / Don't drink Yes No	Yes

Note. [1] 1 serving = 1 medium piece of fruit, ½ cup of chopped, cooked or canned fruits/vegetables, ¾ cup fruit/vegetable juice, small bowl of salad greens, or ½ cup dried fruit. [2] A drink was defined as a 12 oz. beer, a 4 oz. glass of wine, a shot of liquor, or a mixed drink.

Table 4

Demographics of Sample

	Undergraduate students		Graduate students		
	n	%	*n*	%	*p*
Ethnicity	N = 316		N = 132		.284
White	239	75.6	106	80.3	
Non-white	77	24.4	26	19.7	
Residence	N = 313		N = 132		<.001**
On-campus	126	40.3	3	2.3	
Off-campus	187	59.7	129	97.7	
Work status	N = 312		N = 132		<.001**
Not working for pay	58	18.6	10	7.6	
Less than 20 hours	123	39.4	22	16.7	
20-39 hours	108	34.6	41	31.0	
Full time (≥ 40 hrs.)	23	7.4	59	44.7	
Relationship status	N = 312		N = 132		<.001**
Single	147	47.1	48	36.4	
Married/domestic partner	20	6.4	35	26.5	
Engaged or committed dating	145	46.5	49	37.1	
Health insurance status	N = 313		N = 130		.045*
Yes	280	89.5	124	95.4	
No/Don't know	33	10.5	6	4.6	
Student status	N = 315		N = 131		<.001**
Full time	298	94.6	76	58.0	
Part time	17	5.4	55	42.0	
Age	N = 310		N = 130		<.001**
	M = 21.3	SD = 4.06	M = 27.16	SD = 5.93	

* $p < .05$. ** $p < .01$.

similar was the number who had completed a breast self-exam during the last month (55.7%, 50.3% respectively). A high percentage of graduate females (87%) and undergraduate females (75.1%) had a routine gynecological exam in the past year with graduate females significantly more likely to have had this exam ($p = .010$). This difference did not remain significant when data were controlled for age or full time student status.

Health Behaviors

A wide range of health behaviors were assessed and compared between groups for this study. Very few students from either group reported meeting the standard of five or more servings of fruits and vegetables per day, but graduate females (10.2%) were significantly more likely to do so than undergraduates (3%; $p = .004$). This difference did not remain significant when data were controlled for age. Percentages meeting physical activity guidelines were similarly low in both groups with only 17.1% of graduate and 12.4% of undergraduate students indicating they were meeting the CDC standard of 30 minutes of moderate activity or 20 minutes of vigorous activity five or more days per week.

Condom use was also low among students and there was no significant difference between groups. Among sexually active females, only 31.3% of graduate and 35.3% of

undergraduate females reported using condoms the last time they had vaginal intercourse. For graduate and undergraduate students, cigarette smoking in the last 30 days was reported by 19.7% and 25.3% respectively but there was no significant difference in this behavior between groups.

Interestingly for this study, there were no significant differences between graduate and undergraduate students for alcohol use (69.5% vs. 66.5% respectively) or frequent alcohol use in the past 30 days (19.1% vs. 19.7% respectively). A high percentage of both graduate (44.3%) and undergraduate females (32.6%) reported drinking and driving during the last 30 days with graduate students significantly more likely to have engaged in this behavior ($p = .025$). This difference did not remain significant when data were controlled for residence, work status, or full time student status. Drinking and driving after 5+ drinks during the last 30 days was reported by a similar percentage of graduate (9.9%) and undergraduate females (8.7%). The results for all variables are provided in Table 5.

Discussion

Strengths and Limitations

Strengths in this study include use of a stratified random sample, standardized instrument, and data collection methods that allowed participants to answer sensitive questions with confidence that their information would be anonymous. Limitations include a study population at one public university campus and use of a health survey instrument that was largely tailored to undergraduate college students. Despite these issues, these results generate meaningful questions that merit further investigation. Future studies should explore the health status and health behaviors of both female and male graduate students using larger samples that represent campuses of various sizes, regions, and types. Additionally, new health assessment tools should be developed to allow for a more thorough investigation of health issues unique to graduate students who are typically older, more likely to

Table 5

Comparison of Female Undergraduate and Graduate Student Health Measures

	Undergraduate females		Graduate females		
	n (N)	%	*n* (N)	%	*p*
Health status					
Excellent or very good health status	162 (315)	51.4	85 (132)	64.4	.002**
Overweight (self-description)	111 (301)	36.8	48 (128)	37.5	.903
Overweight or obese (BMI $\leq$ 25kg/m^2)	103 (292)	35.3	40 (124)	32.3	.550
Ever diagnosed with depression	55 (312)	17.6	28 (130)	21.5	.337
Felt so depressed it was difficult to function in the last year	142 (313)	45.4	49 (129)	38.0	.154
Preventive health practices					
Dental exam and cleaning in the last year	251 (307)	81.8	106 (128)	82.8	.794
Breast self-exam in the last month	150 (298)	50.3	68 (122)	55.7	.334
Routine gynecological exam in the last year	223 (297)	75.1	107 (123)	87.0	.010*
Health behaviors					
Recommended fruit and vegetable intake	9 (297)	3.0	13 (127)	10.2	.004**
Recommended physical activity	39 (314)	12.4	22 (129)	17.1	.198
Condom use at last intercourse (sexually active)	76 (215)	35.3	30 (96)	31.3	.481
Cigarette use in the last 30 days	79 (312)	25.3	26 (132)	19.7	.202
Alcohol behaviors					
Alcohol use in the last 30 days	206 (310)	66.5	91 (131)	69.5	.537
Frequent alcohol use ($\leq$ 10 days in last 30 days)	61 (310)	19.7	25 (131)	19.1	.886
Drinking and driving in the last 30 days	100 (307)	32.6	58 (131)	44.3	.025*
Driving after 5+ drinks in the last 30 days	27 (311)	8.7	13 (131)	9.9	.678

* $p < .05$. ** $p < .01$.

have partners and/or children, and working more hours per week while attending school.

Comments

The primary purpose of this study was to conduct a group comparison analysis of the health status and health behaviors of graduate and undergraduate female college students. This study was not intended to explore a causal relationship between graduate school status and particular health behaviors but rather to reveal similarities and differences between these two campus populations for the purpose of informing campus health promotion programming efforts. Clearly, a typical cohort of graduate students will be older and more likely to be working, married/partnered, living off campus, and attending school part-time when compared to a typical cohort of undergraduates – all factors that may independently correlate with their health status and health behaviors.

The results of this study indicate that graduate females on this campus have similar health behaviors to their undergraduate counterparts. Using bivariate analyses this study examined 16 different variables and only found significant differences between groups in four areas. On the positive side, graduate females were more likely to rate their general health as excellent or very good compared to undergraduate females, more likely to eat five or more fruits and vegetables per day, and more likely to have had a routine gynecological exam in the last year. On the negative side, graduate females were more likely to report having driven a car after drinking alcohol during the past 30 days. Notably, graduate student status was not a significant predictor for any of these health behaviors once demographic control variables were entered into regression models. This indicates that demographic characteristics typical of graduate students may explain the few differences between groups observed in this study. Overall, these results provide a compelling case for expanding health promotion programming to the population of graduate females who appear remarkably similar in health status and health behaviors to their undergraduate counterparts.

For this study, approximately two-thirds of graduate women rated their health as excellent or very good, a percentage that is similar to that reported in the 2009 Health Interview Survey by U.S. women ages 18-64 (National Center for Health Statistics [NCHS], 2009). These findings are discouraging considering that graduate women in this study were predominantly young, White, insured, and educated with a minimum of a bachelor's degree – all demographic characteristics that place them at lower risk for health problems and complications. The results for undergraduate females are even more discouraging as only slightly more than one-half reported their health status as excellent or very good. Data from the 2008 ACHA-NCHA which sampled nearly 18,000 college women showed a similar profile with only 57% of females describing their health status at this high level (ACHA, 2009). It is important to examine whether unique factors are present within the college setting that contribute negatively to women's health status and perceptions of their health status. While the academic literature has repeatedly demonstrated an association between educational attainment and better health status in the general population (Kawachi, Adler, & Dow, 2010), the question emerges as to whether the experience of becoming educated may actually have negative health implications.

During the current decade, mental health has emerged as a major issue for college administrators and faculty across the U.S. (Zivin, Eisenberg, Gollust & Golberstein, 2009). Data from this study demonstrate this challenge clearly extends into the graduate population. Rates of depression and symptoms of depression were high among both graduate and undergraduate women. As colleges explore ways to enhance campus resources and counseling services to meet this increased demand for mental health services, it is important to assess the specific needs of graduate females and utilize that information to customize services for their unique circumstances. It is also important to examine associations between mental health status and health risk behaviors.

It is notable that a substantial percentage of graduate females in this study reported engaging in risky health behaviors including cigarette smoking, alcohol use, driving after drinking, and lack of condom use. Surprisingly, cigarette smoking was high among both graduate and undergraduate females and comparable to the rate for white females ages 18-34 in the general U.S. population (NCHS, 2009). One would expect to find a substantially lower percentage of graduate female smokers in this population since educational attainment is closely linked to cigarette use as "adults with less than a high school education are three times as likely to smoke as those with a bachelor's degree or more education" (NCHS, 2009, p. 24) Once again, it is important to explore the unique stressors and other factors associated with the graduate college experience and how they relate to risky health behaviors. It is also important to track cohorts of graduate women over time to see if their rates for smoking and other risky behaviors normalize to those with similar demographic characteristics in the general U.S. population once graduate school is completed.

Alcohol use is associated with health problems, injuries and poor academic performance among college students. Surprisingly, alcohol use and drinking and driving behavior among graduate females was not lower than among undergraduates in this study. Alcohol prevention activities on college campuses have traditionally focused on the undergraduate student population (Wechsler, Seibring, I-Chao, & Ahl, 2004) in part due to an assumption that alcohol consumption and other risky behaviors are part of the undergraduate college culture and rites of passage for this age group. These data bring this assumption into question and identify a population that is important to focus upon for future research and programming.

The finding that condom use among graduate females was not higher than among undergraduates was not completely unexpected since a higher percentage of graduate students

reported being married or in a committed dating relationship at the time of the study. Additionally, it is possible that some of these students may have been attempting to start families. This is one area where a tailored health questionnaire would have allowed for a more comprehensive understanding of risky sexual behaviors among graduate females.

In contrast with several measures where graduate females had poorer health indicators than women in the general population, it was encouraging to see them report lower rates of overweight and obesity. In this study, approximately two-thirds of both graduate and undergraduate females were at a healthy weight compared to only one-third of women ages 20-70 in the general U.S. population (NCHS, 2009). Still, this leaves approximately one-third of these college women at risk for health problems related to overweight and obesity and colleges should view themselves as an important resource to assist women with this serious health issue. Physical activity has been shown to assist in long-term weight management, reduce cardiovascular disease risk factors, strengthen bones, improve mental health and mood, and increase life expectancy (Pate et al., 1995) but alarmingly, less than one-fifth of graduate or undergraduate women reported engaging in exercise at the minimal level recommended by the CDC. This is not entirely surprising since tasks related to college work are largely sedentary with substantial hours spent sitting in classrooms, reading, and working on computers. Clearly, there are reasons to promote physical activity among all women in the college student population and college campuses can serve as an important resource.

While it is important to compare graduate females to undergraduates, it is also important to consider their health status and health behaviors in relation to national norms and recommendations. At this point in time, normative data for the college population is limited to undergraduate students or studies that have a mixed sample of predominantly undergraduate students. One of the most widely used sources for normative data on the health status and health behaviors of college females is the ACHA-NCHA reference report which is published annually. For the 2008 fall reference report, approximately 18,000 female students were surveyed but only 10.4% were graduate students (ACHA, 2009). It is important for national college health surveys to expand their efforts to recruit representative samples of graduate students so that individual campuses may have reference data available for comparison. These efforts should focus on both male and female graduate students. Health disparities based on gender have been are well documented with men having poorer health status and health behaviors across many measures (USDHHS, 2006).

Graduate females represent a substantial population on U.S. college campuses and this segment is projected to continue to grow in the coming years. This study provides an important first step toward gaining an understanding of the health behaviors and health promotion needs of this population. Females in the graduate student age group targeted in this study have traditionally been reached through their communities or workplaces for health promotion efforts. These data reveal an opportunity to reach females enrolled in graduate school through a third venue – their university campus. These data also identify health concerns for graduate females and evoke questions about the health impacts of the graduate school experience, especially when combined with other responsibilities such as partners, children and careers. Additional survey research should be completed with larger, more diverse samples of graduate females in order to further investigate the findings from this study. Additionally, the use of qualitative methods that promote in-depth exploration of graduate females' experiences are encouraged as a strategy for gathering valuable and essential insight into their unique health needs and barriers to their engaging in health promoting activities. Further research with this important population can inform future interventions and impact positively upon their health and the quality of their lives.

A process that includes comprehensive needs assessments and development of tailored interventions will be necessary as a generic college health promotion curriculum is not likely to reach the graduate female population effectively (Green & Kreuter, 1999). Targeted college health promotion interventions designed specifically for graduate women will consider their multiple competing demands and health needs, which in turn will enhance the quality of their lives as well as their years of healthy life.

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