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An online survey of cigarette use in college students: Using demographic information to influence health education, prevention and intervention efforts

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The purpose of this study was to compare the demographic characteristics of undergraduate smokers and non-smokers at a mid-sized, Mid-Atlantic university using a online survey. Five hundred ten students (77.7% response rate) participated. Data analysis revealed major, year, and athlete status were related to smoking, while gender and age were not. Twenty-three percent of participants reported being smokers, compared to 2.7% of athletes. Participants enrolled in health-related majors were half as likely to smoke (11.8%) than their counterparts. Implications include tailoring smoking education, prevention and intervention efforts for students with characteristics related to higher smoking rates.

According to data from the Monitoring the Future Study and the Harvard College Alcohol Study, both conducted in 2000, about 28% of American college students reported smoking (Patterson, Lerman, Kaufmann, Neuner, & Audrain-McGovern, 2004). It is important to know about smoking trends in college students, but current national statistics are difficult to obtain. By the time national surveys are published, they may be 3-5 years old. In order to educate, prevent, and intervene with negative smoking trends, there is a need to collect information about smoking within specific populations of college students.

One viable way of collecting timely smoking data that is specific to a university population is the use of online surveys. According to the Pew Internet & American Life Project, 86% of college students have gone online compared to 59% of general public (Jones, 2002). Furthermore, 85% of college students own a computer and 72% check their email at least once a day (Jones, 2002). College students are typically assigned university email addresses and therefore the entire target population is theoretically accessible. In addition to providing an accessible population, computer-based data collection has been demonstrated to be effective for gathering sensitive data. In a comparison of computer based and paper and pencil surveys about smoking, alcohol, and drug use, Wright, Aquilino, and Supple (1998) found increased reporting of sensitive information among 12 to 18-year-old respondents when using a computer-based survey. In addition, web-based survey administration has shown fewer missing responses to sensitive questions (Pealer & Weiler, 2003). In this research, conducting online surveys was viewed as an effective and efficient way to collect data about the sensitive issue of smoking in college students.

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Researchers have reported demographic data such as gender, race and age in association with smoking rates in college students (Moskal, Dziuban, & West, 1999; Murphy-Hoefer, Alder, & Higbee, 2004; Everett & Husten, 1999; Glover, Laflin, & Edwards, 1989; Wetter, et al., 2004). In a literature review by Patterson et al. (2004), cigarette smoking in college students was shown to be strongly influenced by socioenvironmental factors. Physical activity and athletic participation may protect against the uptake and progression of smoking behaviors (Patterson et al., 2004; Emmons, 1998). Although many factors have been shown to influence smoking in college students, the number of studies that focused on the socioenvironmental factors including year in school, major and athletic status in relation to smoking prevalence were limited. In order to learn more about ways to educate, prevent and intervene with smoking in a specific college population, data about smoking and demographic characteristics of college students was collected. The purpose of this study was to compare the demographic characteristics of undergraduate smokers to non-smokers at a mid-sized Mid-Atlantic university using a web-based survey.

Methods

As part of a larger study, students enrolled in a required fitness and wellness course were invited via email to participate in this investigation. In compliance with Institutional Review Board approval, informed consent was implied by survey completion and information provided by participants was confidential. Survey data were collected online using SelectSurveyASP (ClassApps, 2005). Demographic questions included age, gender, year in school, major, and athlete status. Students also identified their smoking status. Race was not used because of the lack of minorities in the population and as a result, lack of power in the analysis.

Data analysis

The data were evaluated to determine whether smoking status (smoker or non-smoker) was associated with gender, age, major,

year in school, or status as a varsity intercollegiate athlete. Prior to the analysis being conducted, majors were re-grouped as being physical health-related (Nursing, Athletic Training, Physical Education, Health Education, Exercise Science, Respiratory Therapy) or non health-related. An independent t-test was used to assess mean differences in age based on smoking status. Chi-square analyses were conducted on nominal data [gender (male/female), major (health-related/non health-related), athlete status (athlete/non-athlete), and year (freshman/sophomore/junior/senior)] to assess their effect on smoking status. All statistical tests were considered significant at the $p<0.05$ level. All statistics were run using SPSS 14.0 for Windows.

Results

Five hundred ten of 656 eligible students (77.7%) completed the survey. Of the responding population, 22% reported using cigarettes. Table 1 includes information on the distribution of demographic characteristics among the respondents. No significant differences between smokers (20.2±2.1) and non-smokers (20.1±3.4) with respect to age were observed, $t(508) = -0.244$, $p = 0.808$.

A Chi-Square analysis revealed an association between athlete status and smoking status, $\chi^2(1) = 8.394$, $p = 0.004$, see Table 2. Specifically, there were more non-athletes that classified themselves as smokers (109/473 or 23%) compared to athletes (1/37 or 2.7%). An additional analysis revealed an association between major and smoking status, $\chi^2(1) = 4.655$, $p = 0.030$, see Table 3. There were more students declaring non-health related majors that classified themselves as smokers (93/392 or 24%) compared to individuals declaring health related majors (17/118 or 14%). A third analysis revealed an association between year in school and smoking status, $\chi^2(3) = 7.877$, $p = 0.049$, see Table 4. In particular, there were more juniors and seniors that classified themselves as smokers (32/109 or 29% and 14/47 or 30%, respectively) compared to freshmen and sophomores (35/189 or 19% and 29/169 or 18%, respectively). A final analysis found no relationship between gender and smoking status, $\chi^2(1)= 0.655$, $p = 0.418$.

Table 1. ***Respondents' Demographics***

Variable	Sub-Categories	Frequency
Gender	Male	233 45.7%
	Female	277 54.3%
Year in College	Freshman	189 37.1%
	Sophomore	160 31.4%
	Junior	109 21.4%
	Senior	47 9.2%
	5th Year Senior	5 1.0%
Major	Non-Health Related	392 76.9%
	Health Related	118 23.1%
Athlete Status	Non-Athlete	473 92.7%
	Athlete	37 7.3%
Smoking Status	Smoker	110 21.6%
	Non-Smoker	400 78.4%

Table 2. ***Athlete Status vs. Smoking Status***

	Non-Smoker	Smoker	Total
Non-Athlete	364 77.0%	109 23.0%	473
Athlete	36 97.3%	1 2.7%	37
Total	400	110	510
$\chi^2(1) = 8.394$, $p = 0.004$			

Table 3. ***Major vs. Smoking Status***

	Non-Smoker	Smoker	Total
Non-Health	299 76.3%	93 23.7%	392
Health	101 85.6%	17 14.4%	118
Total	400	110	510
$\chi^2(1) = 4.655$, $p = 0.030$			

Table 4. ***Year in College vs. Smoking Status***

	Non-Smoker	Smoker	Total
Freshman	154 81.5%	35 18.5%	189
Sophomore	131 81.9%	29 18.1%	160
Junior	77 70.6%	32 29.4%	109
Senior	33 70.2%	14 29.8%	47
Total	395	110	505
$\chi^2(3) = 7.877$, $p = 0.049$			

Discussion

The online survey method used in this research yielded a response rate of 77.7%. Response rates of surveys about smoking in college populations vary significantly. For example, the Harvard

School of Public Health College Alcohol Study yielded a range of response rates from 22% to 86% among participating colleges (Moran, Wechsler, & Rigotti, 2004). A 60% response rate was reported for The National College Health Risk Behavior Survey (Everett, & Husten, 1999). Among Internet-delivered surveys about smoking, response rates varied from 2% to 31% (Kear, 2002; Reed, Wang, Shillingtion, Clapp, & Lange, 2007; Morrell, Cohen, Bacchi, & West, 2005). In comparison to other smoking surveys conducted online, a high response rate was achieved in this research.

There were no significant differences in rates of smoking regarding age, but year in school was related to smoking status. Most research reviewed reported smoking rates by age, but did not include the year in college (if applicable) of research participants; only three studies were found that reported this information (Moran, Wechsler, & Rigotti, 2004; Saules et al., 2004; Lenz, 2004). In this study, smoking for upperclassmen approached 30% (29.4% of juniors, 29.8% of seniors), which was 10% more than for freshmen and sophomores. This is similar to a trend reported by Saules et al. (2004), which followed college women from freshman to senior year, and found 55.2% of the smokers began smoking during their upperclassmen years.

Literature reviews about tobacco use and college students have suggested that physical activity may protect against the uptake and progression of smoking behaviors (Patterson et al., 2004; Emmons, 1998). Student athletes in this sample were significantly less likely to report smoking; only 2.7% of the athletic subset identified themselves as smokers. Morrell et al. (2005) reported that college students were more likely to be lifetime smokers if they were not college athletes. Assuming that most college athletes are physically active, this research supports the idea that physical activity may affect smoking behaviors.

Another way of examining the smoking habits of college students is by college major. The findings in this study indicated that students declaring health-related majors were less likely to smoke than those declaring non-health related majors. In the literature reviewed, there was very little information about the association between smoking and college major with the exception of the nursing literature. In a literature review about smoking in nursing students, tobacco use was fairly common, but findings were dependent upon country and time (Smith & Leggat, 2007). In this study, there were more students declaring non-health majors that identified themselves as smokers. It could be that students declaring non-health majors were exposed to less information about health in their curriculums and therefore may not have received as much information about the effects of smoking. Regardless of major, it is important that all college students be included in education, prevention and intervention efforts.

Implications

The online survey used in this research displays how information about student health behaviors can be collected on college campuses. Information from online surveys is available immediately and can provide an understanding about the most critical health issues on an individual campus which require education, prevention and intervention efforts. In this study, the increased smoking rates found in upperclassmen as compared to underclassmen suggests the need for tobacco education to take place throughout the college experience. Students identified as light smokers can be prevented from progressing to daily smoking, further supporting the need for smoking interventions throughout the college years (Kenford et al., 2005).

Athletes and students enrolled in health-related majors reported lower rates of smoking than their peers. In the future, education, prevention and intervention efforts could be tailored for those college students who are not athletes or health majors. Presumably, college students enrolled in health-related majors are aware of the dangers related to smoking, but still smoke. Tailored interventions to help current smokers quit and to guard against the uptake of tobacco use by college students may improve as studies continue to uncover information about the characteristics of college smokers.

Limitations

One limitation of this research was the convenience sample of one university that is not representative of other college populations. However, other universities may find this study valuable as a model for collecting similar data online to plan specific education, prevention and intervention efforts for each college population.

Another limitation of this study was self-report method of data collection, which may have resulted in students providing responses they deemed as favorable. This is especially important since they were invited to complete the surveys by their health and wellness course instructor.

Suggestions

The online mode of survey administration was chosen to promote honesty regarding sensitive information. In the future, online surveys about smoking could be delivered to all students at designated intervals (such freshman orientation, entrance into sophomore and junior years, and before graduation) rather than being associated with an academic course. Such longitudinal data would provide important information about the onset and progression of smoking behaviors in college students.

Although differences between smokers and non-smokers were identified in this research, there are several variables that require further exploration. Additional socioenvironmental factors, such as living in off-campus housing and drug or alcohol use, have been associated with cigarette smoking (Patterson et al., 2004; Emmons, 1998). Many university health promotion campaigns that focus on smoking prevention are conducted on campus and in on-campus housing. In order to reach all students, including those that live off campus and the increasing number of students that take online courses, future prevention efforts may include off-campus places that college students frequent including bars or apartment complexes and be delivered in online formats.

In addition to variables that may influence all college students, there is a need to explore variables that have been related to specific college subpopulations. For example, Rigotti (2000) found that while college athletes were not as likely to smoke cigarettes they were more likely to use smokeless tobacco. Future online surveys could include behavior questions that distinguish between smoking cigarettes and smokeless tobacco use to better understand

differences between college athletes and non-athletes.

Conclusion

The findings of this study have important implications for future education, prevention, and intervention efforts regarding the use of cigarettes in college populations. Athletes and students enrolled in health-related majors reported lower rates of smoking than their peers. Consequently, it may be necessary to find ways to tailor education, prevention, and intervention efforts focused on smoking for non-health majors and students that are not athletes or physically active. Online health surveys can provide immediate and important information about the health practices of college students and help determine the health promotion needs of individual universities. Consequently, education, prevention, and intervention efforts can be tailored to meet the needs of students and may lead to improved health outcomes in college populations.

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