

Differences in Tobacco Use Among Two-Year and Four-Year College Students in Minnesota

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Abstract. Objective: This study compares tobacco use rates among two-year and four-year college students and explores the demographic variables that predicted that behavior. **Participants:** 9,931 students at 14 two-year and four-year colleges in Minnesota participated. **Methods:** Students at 11 schools completed an online survey, and students at 3 schools completed a paper survey in 2007. **Results:** After controlling for sex, age, ethnicity, relationship status, hours of work per week, and number of school credits, attending a two-year college predicted current and daily smoking (odds ratio [OR]) = 1.70, 95% confidence interval [CI] = 1.52–1.89; OR = 3.47, 95% CI = 2.94–4.11) and smokeless tobacco use (OR = 1.65, 95% CI = 1.32–2.06; OR = 1.64, 95% CI = 1.06–2.53). **Conclusions:** Although two-year college students comprise approximately two fifths of the college student population, surveys of college student tobacco use have focused nearly exclusively on four-year college students. Two-year college students should represent a priority population for tobacco control because attending a two-year college predicts increased tobacco use.

Keywords: tobacco use, smoking, smokeless tobacco, college students, two-year colleges, four-year colleges

Tobacco use is the leading preventable cause of disease and premature death in the United States.¹ Between 2000 and 2004, cigarette smoking caused 443,000 deaths, 5.1 million years of potential life lost, and \$96.8 billion in productivity losses annually.² Smoking damages nearly every organ in the body, causing many disorders, including cancer, heart disease, stroke, asthma, and emphysema, and reducing overall health.³ Smokeless tobacco use is associated with oral lesions, oral cancer, gingival recession, and loss of tooth structure.⁴

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According to the 2008 National Survey on Drug Use and Health, among all age groups, young adults aged 21 to 25 and aged 26 to 29 report the highest rates of current cigarette use (37.1%), and those aged 18 to 25 have the highest rate of current smokeless tobacco use (5.4%).⁵ Among 18- to 20-year-olds, 33.5% smoked cigarettes in the previous 30 days.⁵

Colleges and universities in the United States enroll over 18 million students, with the majority of these students falling between the ages of 18 and 25.⁶ Colleges and universities therefore represent a potentially important venue to reach out to large numbers of young adults and young adult smokers.⁶ In fact, research by Hammond suggests that students may represent the largest group of young adult smokers compared to any single employment sector (e.g., sales, service, and manufacturing).⁷ According to the 2008 American College Health Association–National College Health Assessment (ACHA–NCHA), 15.9% of college students report smoking cigarettes on at least 1 day in the past 30 days, 3.6% report smoking cigarettes on all 30 of the past 30 days, 3.5% report using smokeless tobacco on at least 1 day in the past 30 days, and 0.5% report using smokeless tobacco on all 30 of the past 30 days.⁸ Although studies of tobacco use behavior among college students have provided invaluable information to the public health community, they have nearly exclusively focused on students in four-year institutions.^{8–11} Of the 106 colleges and universities that participated in the 2008 ACHA–NCHA, only 5 (4.7%) were two-year colleges.⁸

Although a majority of recent studies have focused on four-year institutions, prior research does provide some insight into differences between two-year and four-year college students. In 1995, the Centers for Disease Control and Prevention conducted the National College Health Risk Behavior Survey (NCHRBS).¹² The NCHRBS collected responses from 4,609 undergraduate students and nearly half (45.6%) of the respondents were students at two-year colleges. According to the NCHRBS, students who attended

two-year institutions were significantly more likely than students who attended four-year institutions to report lifetime daily cigarette use and smoking more than one-half pack per day. The NCHRS also identified student demographic differences associated with tobacco use. For example, students aged 25 years and older were more likely than students aged 18 to 24 years to report lifetime, lifetime daily, and current frequent cigarette use. In contrast, students aged 18 to 24 years were significantly more likely than students aged 25 years and older to report using smokeless tobacco in the previous 30 days.¹²

Demographic differences between students at two-year and four-year colleges are well recognized. According to the US Department of Education, compared to students attending four-year colleges, students attending two-year colleges and community colleges are more likely to be older, female, Black or Hispanic, from low-income families, working full-time, and attending school part-time.¹³ For example, approximately two thirds (67.0%) of students who attend a four-year public institution are 18 to 24 years old while just over half (52.4%) of students attending a two-year public institution are 18 to 24 years old.¹⁴ In addition, nearly 2 out of 3 (63%) four-year college students attend school full time, whereas less than one third (31%) of community college students attend school full time.¹³

Existing literature identifies demographic differences between students at two-year and four-year colleges and suggests that rates of tobacco use may be higher at two-year colleges. However, current information about rates of tobacco use at two-year colleges is lacking. In addition, the degree to which differences in student demographic characteristics account for any observed institutional differences in the rates of tobacco use is not clear. A clearer understanding of tobacco use at two-year colleges is highly important because nearly half of all college students attend a two-year college. To address this lack of information, we performed an analysis of survey data collected at 6 two-year and 8 four-year colleges in Minnesota. This work is critical for describing and better understanding possible reasons for institutional differences in smoking rates as well as for identifying segments of the young adult population at the greatest need for outreach and intervention to reduce the harms of tobacco use.

METHODS

Procedure

Students at 14 colleges and universities in Minnesota were recruited to complete the 2007 College Student Health Survey, developed by Boynton Health Service at the University of Minnesota. The 14 schools included 6 public two-year schools, 7 public four-year schools, and 1 private four-year school. The College Student Health Survey was designed to serve as a surveillance tool to monitor the health of college students in a number of areas: health insurance, health care utilization, mental health, tobacco use, alcohol and other drug use, financial health, personal safety, nutrition, phys-

ical activity, and sexual health. Based on each individual school's enrollment, either all students or a random sample of students 18 years of age or older were invited to complete the survey. The number of students at each school invited to complete the survey ranged from 306 (100% of student population) to 6,000 (13.7% of the student population). In February and March 2007, participants were contacted using multiple mailings. Selected students first received a postcard notifying them of their eligibility to participate in the survey. Students at 11 schools were e-mailed a link to an online version of the survey. Students at 3 schools that did not assign reliable e-mail addresses were sent a paper survey via US Mail. To encourage participation, students received reminder postcards and multiple e-mails (as appropriate) with all students receiving a minimum of 2 invitations to participate in the survey.

Each student invited to complete the survey received a cover letter that explained the survey's purpose and stressed that participation was anonymous and voluntary. The mailed survey packet instructed students to complete and return the survey in the addressed, postage-paid envelope included in the packet and to return a separate postcard indicating they either had completed the survey or did not wish to participate. This process separated the data from all individual identifiers yet identified nonresponders for the purpose of mailing a reminder postcard. Students invited to complete the online version of the survey received an e-mail containing a link to the survey and a link that allowed them to opt out of the survey process. Students who chose to participate in the survey by clicking on the survey link were directed to a survey consent page, where they had the option either to continue in the survey process by checking the "I consent to participate" box or to opt out of the survey.

A total of 24,018 students received an invitation to complete the survey. Because of incorrect e-mail or postal addresses, 149 surveys were undeliverable. Of the students who received an invitation to participate, 9,931 (2,790 two-year college students and 7,141 four-year college students) completed and returned a survey, resulting in a 41.6% response rate. Individual school response rates ranged from 28.7% to 57.3%. The response rate among the 3 paper survey schools (34.8%) was lower than the response rate among the 11 online survey schools (43.1%) ($p < .001$). In addition, the response rate among two-year schools (33.6%) was lower than the response rate among four-year students (45.8%) ($p < .001$).

As an incentive for participation, all students who responded to the survey received a \$5 gift card and entry into a drawing for gift certificates valued at \$3,000 (1), \$1,000 (1), and \$500 (2) at a variety of stores.

The University of Minnesota Institutional Review Board (IRB) approved this study, IRB 0712E22463.

Measures

The 2007 College Student Health Survey contained questions in a variety of health topic areas. Only questions related to demographic information and tobacco use were analyzed

TABLE 1. Demographic Characteristics of Survey Respondents, by School Type

| | All students | | Two-year college students | | Four-year college students | | <i>p</i> value |
|---|--------------|-----------|---------------------------|-----------|----------------------------|-----------|----------------|
| | <i>n</i> | % or mean | <i>n</i> | % or mean | <i>n</i> | % or mean | |
| All participants | 9,931 | | 2,790 | | 7,141 | | |
| Sex | | | | | | | |
| Male | 3,740 | 37.7 | 895 | 32.3 | 2,845 | 39.9 | <.001 |
| Female | 6,164 | 62.2 | 1,878 | 67.7 | 4,286 | 60.0 | |
| Transgender/other | 10 | 0.1 | 2 | 0.1 | 8 | 0.1 | |
| Mean age | 9,931 | 24.1 | 2,790 | 26.1 | 2,790 | 23.3 | <.001 |
| Ethnicity | | | | | | | |
| African American/Black | 221 | 2.2 | 87 | 3.1 | 134 | 1.9 | <.001 |
| American Indian/Alaska Native | 241 | 2.4 | 101 | 3.6 | 140 | 2.0 | <.001 |
| Asian/Pacific Islander | 602 | 6.1 | 75 | 2.7 | 527 | 7.4 | <.001 |
| Latino/Hispanic | 153 | 1.5 | 38 | 1.4 | 115 | 1.6 | .415 |
| Middle Eastern | 53 | 0.5 | 11 | 0.4 | 42 | 0.6 | .284 |
| White/Caucasian | 8,841 | 89.0 | 2,528 | 90.6 | 6,313 | 88.4 | .001 |
| Other | 144 | 1.5 | 32 | 1.1 | 112 | 1.6 | .135 |
| Relationship status | | | | | | | <.001 |
| Single | 4,455 | 45.0 | 1,007 | 36.4 | 3,448 | 48.3 | |
| Married/domestic partner | 1,557 | 15.7 | 718 | 25.9 | 839 | 11.8 | |
| Separated | 49 | 0.5 | 26 | 0.9 | 23 | 0.3 | |
| Widowed | 15 | 0.2 | 9 | 0.3 | 6 | 0.1 | |
| Divorced | 134 | 1.4 | 78 | 2.8 | 56 | 0.8 | |
| Engaged/committed dating relationship | 3,696 | 37.3 | 930 | 33.6 | 2,766 | 38.8 | |
| Hours of work per week | | | | | | | <.001 |
| 0 hours | 2,714 | 27.4 | 549 | 19.7 | 2,165 | 30.3 | |
| 1–19 hours | 3,787 | 38.1 | 725 | 26.0 | 3,062 | 42.9 | |
| 20–39 hours | 2,398 | 24.2 | 962 | 34.6 | 1,436 | 20.1 | |
| 40+ hours | 1,021 | 10.3 | 548 | 19.7 | 473 | 6.7 | |
| Mean number of school credits this term | 9,931 | 13.3 | 2,790 | 11.8 | 2,790 | 13.8 | <.001 |

in the current study. Demographic questions asked students their sex, age, ethnicity, and relationship status, the number of hours worked per week, and the number of school credits taken this term. To assess student tobacco use, students were asked the following questions: During the past 30 days, on how many days did you use smoking tobacco? During the past 30 days, on how many days did you use smokeless tobacco? The 2 questions listed 7 response options: 0 days, 1–2 days, 3–5 days, 6–9 days, 10–19 days, 20–29 days, and all 30 days. Students who reported they used these products on at least 1 day in the past 30 days were considered current users, and students who reported they used these products on all 30 days were considered daily users. These questions have been used to assess tobacco use in the ACHA-NCHA, NCHRBS, and Youth Risk Behavior Survey and their reliability and validity have been documented by previous research.^{8,12,15,16}

Data Analysis

SPSS 13.0 was used to analyze the 2007 College Student Health Survey data.¹⁷ *t* tests and chi-square tests were used to determine if the demographic information and the tobacco

use rates differed by school type. Multivariate logistic regression was used to examine school type and the demographic variables listed in Table 1 as predictors of current and daily smoking and smokeless tobacco use.

RESULTS

As seen in Table 1, the demographic characteristics of survey respondents at two-year colleges differed from those of respondents at four-year colleges. Compared to respondents at four-year colleges, respondents at two-year colleges were more likely to be female, older, African American/Black, American Indian/Alaska Native, non-Asian/Pacific Islander, and White/Caucasian, married or have a domestic partner, work 20 hours or more for pay per week, and take fewer school credits per term.

Table 2 presents the percentage of survey respondents who reported using tobacco products in the 30 days prior to the survey. Compared to respondents at four-year colleges, respondents at two-year colleges had significantly higher rates of current and daily smoking and smokeless tobacco use. Nearly one third (32.0%) of two-year college respondents

TABLE 2. Percentage of Survey Respondents Who Reported Using Tobacco Products, by School Type

| Behavior | All students | | Two-year college students | | Four-year college students | | <i>p</i> value |
|-------------------------------|--------------|-------|---------------------------|-------|----------------------------|-------|----------------|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % | |
| All participants | 9,931 | 100.0 | 2,790 | 100.0 | 7,141 | 100.0 | |
| Current tobacco use | 2,470 | 25.0 | 884 | 32.0 | 1,586 | 22.2 | <.001 |
| Daily tobacco use | 813 | 8.2 | 451 | 16.3 | 362 | 5.1 | <.001 |
| Current smoking tobacco use | 2,263 | 22.8 | 821 | 29.6 | 1,442 | 20.2 | <.001 |
| Daily smoking tobacco use | 718 | 7.2 | 415 | 15.0 | 303 | 4.2 | <.001 |
| Current smokeless tobacco use | 461 | 4.7 | 148 | 5.4 | 313 | 4.4 | .043 |
| Daily smokeless tobacco use | 103 | 1.0 | 39 | 1.4 | 64 | 0.9 | .027 |

reported using tobacco on at least 1 day in the previous 30 days, and almost 1 in 6 (16.3%) two-year college respondents reported using tobacco on all 30 days.

Smoking Tobacco Use

Table 3 presents student characteristics that predicted current and daily smoking tobacco use among respondents. School type, sex, ethnicity, relationship status, hours worked per week, and number of school credits this term all predicted current smoking tobacco use. Respondents were more likely to report currently using smoking tobacco if they were two-year college students, male, American Indian/Alaska Native, White, if they worked 20 to 39 hours per week, and if they were taking more school credits this term. Respondents were less likely to report currently using smoking tobacco if they were married or had a domestic partner.

School type, age, ethnicity, relationship status, and hours worked per week all predicted daily smoking. Respondents were more likely to report daily smoking tobacco use if they were two-year college students, older, American Indian/Alaska Native, separated, divorced, or in a committed dating relationship, and if they worked 20–39 hours per week. Respondents were less likely to report daily smoking tobacco use if they were married or had a domestic partner.

Smokeless Tobacco Use

Table 4 presents student characteristics that predicted current and daily smokeless tobacco use among respondents. School type, sex, and ethnicity all predicted current smokeless tobacco use. Respondents were more likely to report current smokeless tobacco use if they attended a two-year school and if they were male and White.

School type, sex, age, ethnicity, and number of school credits this term all predicted daily smokeless tobacco use. Like current smokeless tobacco use, respondents were more likely to report daily smokeless tobacco use if they attended a two-year school and if they were male and White. Addition-

ally, respondents were more likely to report daily smokeless tobacco use if they were older and taking more school credits this term.

COMMENT

The purpose of this study was to compare tobacco use behavior among two-year and four-year college students and explore the demographic variables that predicted the behavior. The results indicate that, after controlling for student demographic variables, attending a two-year college predicted increased current and daily smoking tobacco use and current and daily smokeless tobacco use.

Respondents at two-year colleges reported current and daily use of smoking and smokeless tobacco at significantly higher rates than respondents at four-year colleges. The most striking difference between these school types was seen in daily smoking tobacco use. More than 1 in 7 (15.0%) students at two-year colleges, compared to less than 1 in 20 (4.2%) students at four-year colleges, reported smoking cigarettes daily. In addition, nearly one third (29.6%) of two-year college students, compared to approximately one fifth (20.2%) of four-year college students, reported current smoking tobacco use. More than half of current smokers at two-year colleges reported smoking daily.

The rates of current and daily smoking and smokeless tobacco use among two-year college students in the current sample are higher than rates previously reported by college students in the 2008 ACHA-NCHA, whereas the rates among four-year college students in the current sample are similar to the rates reported by the 2008 ACHA-NCHA sample.⁸ The differences in tobacco use rates between two-year college students in the current sample and four-year college students in the current sample and in previous samples of college students highlight the need for including two-year college students in surveys assessing the health of college students.

After controlling for sex, age, ethnicity, relationship status, hours of work per week, and number of school credits

TABLE 3. Results of Multivariate Logistic Regression Predicting Current and Daily Smoking Tobacco Use by Survey Respondents

| Variable | Current smoking tobacco use (<i>n</i> = 2,263) | | | Daily smoking tobacco use (<i>n</i> = 718) | | |
|---------------------------------------|--|-----------|----------|---|------------|----------|
| | OR | 95% CI | <i>p</i> | OR | 95% CI | <i>p</i> |
| School type | | | | | | |
| 4-year | 1.00 | | | 1.00 | | |
| 2-year | 1.70 | 1.52–1.89 | <.001 | 3.47 | 2.94–4.11 | <.001 |
| Sex | | | | | | |
| Male | 1.00 | | | 1.00 | | |
| Female | 0.66 | 0.60–0.73 | <.001 | 0.89 | 0.76–1.06 | .187 |
| Transgender/other | 1.71 | 0.46–6.31 | .424 | 3.49 | 0.66–18.40 | .140 |
| Age | 1.01 | 1.00–1.02 | .178 | 1.04 | 1.03–1.06 | <.001 |
| Ethnicity | | | | | | |
| African American/black | 0.66 | 0.43–1.02 | .064 | 0.51 | 0.24–1.09 | .082 |
| American Indian/Alaska Native | 2.41 | 1.80–3.23 | <.001 | 1.81 | 1.17–2.80 | .008 |
| Asian/Pacific Islander | 0.84 | 0.60–1.16 | .286 | 1.19 | 0.69–2.02 | .535 |
| Latino/Hispanic | 1.45 | 0.98–2.16 | .067 | 0.91 | 0.44–1.89 | .800 |
| Middle Eastern | 1.75 | 0.93–3.30 | .085 | 1.07 | 0.32–3.63 | .912 |
| Caucasian/white | 1.41 | 1.07–1.87 | .016 | 1.22 | 0.77–1.91 | .399 |
| Other | 1.34 | 0.87–2.06 | .180 | 1.14 | 0.57–2.30 | .711 |
| Relationship status | | | | | | |
| Single | 1.00 | | | 1.00 | | |
| Married/domestic partner | 0.62 | 0.51–0.74 | <.001 | 0.74 | 0.56–0.96 | .025 |
| Separated | 1.50 | 0.81–2.79 | .196 | 2.28 | 1.10–4.75 | .027 |
| Widowed | 0.39 | 0.08–1.76 | .218 | 0.52 | 0.11–2.53 | .415 |
| Divorced | 1.22 | 0.80–1.86 | .350 | 1.84 | 1.13–2.99 | .014 |
| Engaged/committed dating relationship | 0.92 | 0.83–1.02 | .129 | 1.22 | 1.02–1.47 | .031 |
| Hours worked per week | | | | | | |
| 0 | 1.00 | | | 1.00 | | |
| 1–19 | 1.02 | 0.90–1.16 | .728 | 0.94 | 0.76–1.17 | .606 |
| 20–39 | 1.44 | 1.26–1.65 | <.001 | 1.26 | 1.01–1.57 | .043 |
| 40+ | 1.23 | 1.01–1.49 | .040 | 1.14 | 0.86–1.51 | .368 |

Note. OR = odds ratio; CI = confidence interval; *p* = *p* value. For each ethnicity, the reference group is students who did not select the indicated ethnicity.

taken, attending a two-year college predicted increased current and daily smoking tobacco use and current and daily smokeless tobacco use. In fact, while specific student demographic characteristics predicted 1 to 3 types of tobacco use, attending a two-year school was the only variable that predicted all 4 types of tobacco use examined: current and daily smoking and current and daily smokeless tobacco use. Compared to students at four-year colleges, students at two-year colleges were 1.7 times more likely to report current smoking tobacco use and 3.5 times more likely to report daily smoking tobacco use. Students at two-year colleges were 1.7 times more likely to report current smokeless tobacco use and 1.6 times more likely to report daily smokeless tobacco use compared to four-year college students. Although the NCHRBS previously documented differences in tobacco use rates by two-year and four-year college students, the current study strongly suggests that these differences are not due

to demographic differences in the student populations (e.g., older individuals attending two-year schools).¹²

Students at two-year and four-year colleges displayed many differences in demographic variables associated with tobacco use. Many of these differences predicted increased tobacco use by two-year college students. The mean age of two-year college respondents was significantly higher than the mean age of respondents at four-year colleges, and both daily use of smoking and smokeless tobacco increased with age. Previous research on the relationship between age and tobacco use by college students has produced mixed results. Several studies suggest no relationship exists between age and tobacco use.^{18–21} Alternatively, smoking has been found to increase with age, and smokeless tobacco use has been found to decrease with age.^{12,22} The relationship between age and smokeless tobacco use by college students warrants further investigation. Students at two-

TABLE 4. Results of Multivariate Logistic Regression Predicting Current and Daily Smokeless Tobacco Use by Survey Respondents

| Variable | Current smokeless tobacco use (<i>n</i> = 461) | | | Daily smokeless tobacco use (<i>n</i> = 103) | | |
|---------------------------------------|---|-----------|----------|---|-------------|----------|
| | OR | 95% CI | <i>p</i> | OR | 95% CI | <i>p</i> |
| School type | | | | | | |
| 4-year | 1.00 | | | 1.00 | | |
| 2-year | 1.65 | 1.32–2.06 | <.001 | 1.64 | 1.06–2.53 | .026 |
| Sex | | | | | | |
| Male | 1.00 | | | 1.00 | | |
| Female | 0.09 | 0.07–0.12 | <.001 | 0.02 | 0.01–0.05 | <.001 |
| Transgender/other | 0.93 | 0.12–7.57 | .949 | 3.79 | 0.42–34.37 | .237 |
| Age | 0.98 | 0.96–1.01 | .146 | 1.04 | 1.01–1.08 | .007 |
| Ethnicity | | | | | | |
| African American/Black | 0.75 | 0.27–2.10 | .585 | 2.20 | 0.22–22.42 | .507 |
| American Indian/Alaska Native | 0.79 | 0.34–1.83 | .576 | 0.75 | 0.10–5.60 | .779 |
| Asian/Pacific Islander | 0.67 | 0.30–1.50 | .329 | 1.09 | 0.12–10.12 | .939 |
| Latino/Hispanic | 1.84 | 0.87–3.92 | .114 | 1.18 | 0.15–9.05 | .876 |
| Middle Eastern | 1.20 | 0.27–5.30 | .806 | 0.00 | 0.00 | .997 |
| Caucasian/white | 2.14 | 1.08–4.24 | .029 | 17.61 | 1.49–208.49 | .023 |
| Other | 0.93 | 0.31–2.73 | .888 | 0.00 | 0.00 | .996 |
| Relationship status | | | | | | |
| Single | 1.00 | | | | | |
| Married/domestic partner | 0.73 | 0.49–1.09 | .122 | 0.94 | 0.48–1.83 | .847 |
| Separated | 1.36 | 0.31–6.03 | .687 | 0.00 | 0.00 | .997 |
| Widowed | 0.00 | 0.00 | .999 | 0.00 | 0.00 | .998 |
| Divorced | 1.28 | 0.42–3.88 | .663 | 1.39 | 0.28–7.00 | .692 |
| Engaged/committed dating relationship | 0.86 | 0.69–1.07 | .164 | 0.83 | 0.52–1.33 | .438 |
| Hours worked per week | | | | | | |
| 0 | 1.00 | | | 1.00 | | |
| 1–19 | 0.97 | 0.77–1.22 | .806 | 0.72 | 0.44–1.19 | .198 |
| 20–39 | 0.81 | 0.61–1.08 | .151 | 0.88 | 0.50–1.55 | .655 |
| 40+ | 1.07 | 0.71–1.60 | .752 | 1.29 | 0.64–2.59 | .474 |

Note. OR = odds ratio; CI = confidence interval; *p* = *p* value. For each ethnicity, the reference group is students who did not select the indicated ethnicity.

year colleges were significantly more likely than students at four-year colleges to identify themselves as American Indian/Alaska Native and White/Caucasian. Identifying oneself as American Indian/Alaska Native predicted increased current and daily smoking tobacco use, and identifying oneself as White/Caucasian predicted increased current smoking tobacco use and current and daily smokeless tobacco use. These findings agree with previous research that suggests that college students who identify themselves as American Indian/Alaska Native and White report higher rates of tobacco use.^{12,18–20} Students at two-year colleges were more likely than students at four-year colleges to be separated and divorced. Identifying oneself as separated or divorced predicted increased daily smoking tobacco use. No previous research has investigated the relationship between tobacco use and relationship status among college students. This may

be because the majority of research on tobacco use by college students has focused on four-year college students, and these students have low rates of separation and divorce. Compared to students at four-year colleges, students at two-year colleges were more likely to report working 20 to 39 hours per week and less likely to report working 0 hours per week. Working 20 to 39 hours per week predicted increased current smoking tobacco use. No previous research has investigated the relationship between tobacco use and hours of work per week. However, among adolescents between the ages of 14 and 18, working for pay while attending school has been shown to predict increased current tobacco use.²³

Additionally, several demographic differences between two-year and four-year college students predicted decreased tobacco use by two-year college students. Students at two-year colleges were more likely than students at four-year

colleges to identify themselves as female, which predicted decreased current smoking tobacco use and current and daily smokeless tobacco use. As with age, previous research on the relationship between sex and tobacco use by college students has produced mixed results. The majority of studies suggest that no relationship exists between sex and cigarette smoking among college students.^{12,18,19} However, several studies also suggest that female college students are more likely to smoke than male college students.^{20,21} Previous studies on smokeless tobacco use by college students all suggest that males are more likely than females to use smokeless tobacco.^{12,18,20,22} Compared to four-year college students, two-year college students were more likely to report they were married or had a domestic partner. Students who were married or had a domestic partner were less likely to report current smoking tobacco use. Students at two-year colleges reported taking fewer school credits per term than four-year college students, and reported current smoking tobacco use and daily smokeless tobacco use decreased as number of school credits decreased. Previous research has not investigated the relationship between number of school credits and tobacco use among college students. However, previous research suggests that academic stress motivates college students to use cigarettes, and academic stress may increase as the number of school credits taken increases.²⁴

Students enter college with demographic characteristics that differentially predict tobacco use. Colleges can do little to target these demographic characteristics that promote tobacco use. However, the results of this study indicate that, after controlling for student demographic variables, attending a two-year college predicted increased student tobacco use. Environmental factors associated with two-year colleges likely contribute to increased tobacco use by these students. Many possible explanations for the differences in tobacco use rates between two-year and four-year college students warrant further investigation and could form the basis for intervention on two-year college campuses. The majority of two-year colleges included in this survey have poorly defined campus tobacco-use policies that allow tobacco use in several outdoor locations on campus and do not have strict policy enforcement procedures in place.²⁵ Allowing tobacco use on campus increases its visibility and promotes the norm that smoking is an acceptable behavior. To reduce the rates of student tobacco use, two-year colleges can assess their existing campus tobacco policies and enact well-defined policies that prohibit tobacco use in all campus locations, including outdoors. Few two-year colleges offer health services on campus.²⁵ Among the 6 two-year colleges that participated in this survey, 2 have an on-campus health service.²⁵ In contrast, among the 8 four-year colleges that participated in this survey, 7 have an on-campus health service.²⁵ Only approximately one fifth of Minnesota's two-year colleges have an on-campus health service.²⁵ Because two-year colleges without on-campus health services likely lack the capacity to offer tobacco cessation services to students, two-year college students who want to quit smoking may not know how to access

services to help them quit. Two-year colleges can assess the cessation programs available to their students and inform students of the cessation resources available to them. Two-year colleges can partner with community health care providers to increase students' access to tobacco cessation information and services. In addition, two-year colleges can help students obtain cessation resources by directing them to telephone- or Internet-based quitlines. A study of quitline use over 14 years confirmed the results of studies of shorter time periods that young adults actively used telephone quitlines.²⁶⁻²⁸ Given that quitlines are effective interventions for adults in general, have been shown effective among young adults specifically, and are almost universally available in the United States, programs that aim to reduce tobacco use by young adults should consider promoting quitlines to serve these young smokers.^{28,29} Previous research shows that smoking prevalence is higher among blue-collar occupations, including material-moving occupations, construction laborers, and vehicle mechanics and repairers, than white-collar occupations.³⁰ Because two-year colleges have a greater focus on training students for blue-collar occupations, two-year college campuses may be more accepting of tobacco use. Students who live in a residence hall or with their parents report using tobacco at a lower rate than students who do not.³¹ Because two-year college students are older and more likely to be independent than four-year college students, they may be more likely to live in residences that allow tobacco use. Two-year colleges are likely unable to address tobacco use by intervening upon student demographic characteristics or occupation choice. However, a policy prohibiting tobacco use on campus may cause students to reduce or completely quit their tobacco use. Two-year college students, faculty, administrators, and other staff can all advocate for tobacco-free campus policies.

Limitations

The current study has some limitations. Because students at 3 schools included in the survey sample were not assigned school e-mail addresses and were not required to have reliable e-mail addresses, these students were sent paper surveys and returned the surveys via US Mail. The response rate was lower among the paper survey schools than among the online survey schools. The study could make no comparisons between students who completed the survey and students who received a survey but did not complete it. Therefore, it is unclear if the demographic variables and tobacco use measures among participants and nonrespondents differed. Participants self-reported their tobacco use on the survey, which may not have been as accurate as biochemical measures of tobacco use. Participants in this study were also primarily female and White/Caucasian. The demographics of the sample reflect the demographics of the colleges from which the sample was selected but do not reflect the demographics of American college students as a group. Therefore, the findings of the current study may not accurately describe the predictors of tobacco use among other college populations. Although nearly half of the schools that participated in this survey were

two-year colleges, two-year college students represented only 28.1% of the sample. In addition, the response rate among two-year schools was lower than the response rate among four-year schools. Although this sample of two-year college students is larger than samples included in recent surveys of college students, future research should place even greater focus on the health of these two-year college students.⁸⁻¹¹

Conclusions

Although two-year college students comprise approximately two fifths of the college student population, surveys of tobacco use among college students have focused nearly exclusively on four-year college students. However, two-year college students should represent a priority population for tobacco control because, after controlling for student demographic variables, attending a two-year college predicted increased current and daily smoking tobacco use and current and daily smokeless tobacco use. Factors within the two-year college environment, including poorly defined campus tobacco-use policies and lack of on-campus health services, may contribute to tobacco use by students and could represent points of intervention on two-year college campuses. Given these differences, future research might focus on assessing existing prevention and cessation resources available on two-year college campuses and developing interventions for decreasing both smoking and smokeless tobacco use among two-year college students, such as enacting policies that prohibit tobacco use on college campuses and increasing two-year college students' access to tobacco cessation information and services, as previous interventions among college students have minimally focused on smokeless tobacco use among college students and specific characteristics of two-year college students and environments.

ACKNOWLEDGMENT

The 2007 College Student Health Survey was funded by Blue Cross and Blue Shield of Minnesota.

NOTE

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