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Prevalence of At-Risk Drinking among a National Sample of Medical Students

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Abstract

Background—Limited research exists on medical students' substance use patterns including over-consumption of alcohol.

Objective—To determine prevalence and correlates of at-risk drinking among a national sample of medical students.

Design—Cross-sectional, anonymous, web-based survey. 2710 medical students from 36 U.S. medical schools (1st – 4th year) completed the survey. Included in the instruments was a 10-item scale (AUDIT) to assess at-risk drinking behaviors within the last 12 months.

Results—Over 15% of the subjects (n= 412) scored positive for at-risk drinking ($8 \geq$). Multivariate analysis of the data revealed the following independent predictors were statistically significant ($p \leq 0.05$) for at-risk drinking: being of younger age, male, unmarried, using illicit drugs, smoking tobacco products within the last 30 days, having low perception of risk, showing impulsive behavior, being depressed, and having gambling problems.

Conclusions—Findings from this study provides initial data for investigating further associations between risky drinking behavior, lifestyle, and psychosocial factors, as well as effectiveness of curriculum or campus wide policy interventions to reduce over-consumption of drinking among this population.

Keywords

medical student; medical school; alcohol; at-risk drinking; risky behaviors; behaviors

INTRODUCTION

Over-consumption of alcohol has been cited as one of the leading preventable costs to society due to illness and disease. It has been associated with many preventable injuries such as motor vehicle accidents, falls, drowning, homicides, suicides, child abuse and domestic violence and numerous health consequences such as alcohol poisoning, hypertension, heart attacks, pancreatitis, and liver cirrhosis (1–3). Alcohol has been blamed for over 85,000 deaths in 2000 making alcohol the third leading cause of death among the U.S. population (4).

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Conflict of Interest:

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Limited data on substance abuse amongst national and international medical students imply over-consumption of alcohol among this segment of population (5–10). Existing literature suggests that the year of medical schooling is associated with higher rates of drinking (6,11–13). This may be due to a change in the source of anxiety as students move from preclinical to clinical curricula with different levels of academic pressure, workload, and an increase in the frequency of burnout (14–18). Some studies have proposed that high levels of anxiety and stress during medical schooling may have negative effects on health-related, decision-making of medical students (9,11,14,19). Substance abuse, including over consumption of alcohol, has been recognized as one of the prevalent methods of stress reduction amongst national and international medical students (5–10).

An extensive literature search of recent U.S. publications revealed a paucity of research on the prevalence of at-risk drinking among U.S. medical students as well as its relation to year of medical schooling. With this gap in research, the purpose of this study was two-fold: 1) to assess the prevalence of at-risk drinking among a national sample of medical students and 2) to examine the role of “year of medical schooling” in presentation of at-risk drinking while controlling for a host of covariates that have been identified by previous studies to have impact on at-risk drinking. The findings of this study are of potential interest to the medical field since today’s medical students will become tomorrow’s health care providers and health promoters.

MATERIALS AND METHODS

This was a cross-sectional structured web-based survey of a sample of current medical students (1st–4th year medical student during the 2004–2005 academic school year) from 36 accredited U.S. M.D.-granting medical schools across the country. No individual was excluded based on age, sex, race, or any other demographic profile. The Associate Dean of Student Affairs, or equivalent official, was asked to forward an e-mail to their respective student body explaining the purpose of the study and a web link to the online survey. A cover letter posted on the online survey clearly stated the purpose of the survey was to study the lifestyle behaviors of medical students in an effort to encourage medical schools to provide resources that are attuned to the lifestyles of medical students. It was further mentioned that no incentive was offered for participation and that the study was conducted under the approval of the Charles Drew University of Medicine and Science Institutional Review Board.

The online questionnaire required approximately 10 minutes to complete and was available for 10 weeks between April 9, 2005 and June 18, 2005. No identifiers such as the individual’s name, IP address, or location at time of submission were recorded.

Alcohol Use Disorders Identification Test (AUDIT) was used to assess at-risk drinking in the past 12 months (20–22). AUDIT is a ten-item screening tool developed by the World Health Organization to detect at-risk, hazardous, and alcohol dependence based on an individual’s total score (22). It has questions on quantity and frequency of alcohol consumption, drinking behavior, and alcohol-related problems. Responses to each question were scored from 0 to 4. The AUDIT has been reported to have high sensitivity (92%) and specificity (94%) at the cutoff point of 8 (20–22). Subjects who scored less than 8 were classified as “Low-risk drinkers” and set as the reference group while subjects scoring 8 or greater classified as “At-risk drinkers”.

Other aspects of student lifestyle, including tobacco use, illicit drug use, risky sexual behavior, and gambling, were measured to assess whether variations in at-risk drinking follow a pattern similar to variations in other measures of lifestyle. Current tobacco use was derived from the following question: “From the list of tobacco products which have you used during the last 30 days?” (i.e., cigarettes, bidis, cigars, blunts, chewing tobacco, clove cigarettes, snuff, and

other). Respondents who scored 0 were classified as “No tobacco users” while respondents who scored 1 or greater were classified as “Tobacco users”.

Current drug use was derived from the following question: “During the last 12 months did you take any or use any of the following: sedatives, analgesics or other prescription painkillers, speed or amphetamines, cocaine or crack, tranquilizers, heroin or opium, methadone, marijuana or tetrahydrocannabinol, PCP or other hallucinogen, or other drugs. Prescribed use of psychotherapeutic drugs were not included in the assessment of drug use. Respondents who scored 0 were classified as “No drug users” while respondents who used 1 or more of the drugs were classified as “Illicit drug users”.

The level of risky sexual behavior was measured by the following questions; in the last 6 months: 1) “Have you had sex (oral, vaginal or anal sex)?”; 2) “How many sexual partners, regular or casual, have you had?”; 3) “How often have you used condoms when having sex with your regular partner?”; and 4) “How often have you used condoms when you had sex with a casual partner?”. Response categories included: “never”, “rarely”, “sometimes”, “most of the time”, or “every time”. Respondents were classified in a “Low-risk” group if they met any of the following criteria: 1) reported having no sexual activities; 2) reported having one “regular partner” in the last 6 months regardless of their condom use; or 3) reported having one regular or casual partner in the last 6 months but “often” or “always” used condom. On the other hand, respondents were assigned to a “High-risk” group if they met any of the following conditions: 1) reporting having one “casual partner” and responded “sometimes”, “rarely”, or “never” using condoms; 2) reporting two or three sexual partners in the last 6 months and responded “sometimes”, “rarely”, or “never” using condom with regular or casual partner; or 3) reported having four or more sexual partners in the last 6 months regardless of their condom use. A similar measure of risky sexual behavior has been used in other studies (23,24).

The South Oaks Gambling Screen was used to measure gambling. It is a twenty-item screening tool which can detect a serious gambling problem based on an individual’s total score (25). Subjects who scored less than 5 were classified as “Not pathological gambler” while subjects who scored 5 or greater classified as “Probable pathological gambler”.

Several measures used by previous studies were utilized to assess the role of potential psychosocial covariates such as depression, stress, impulsivity, and risk perception on at-risk drinking. Depression was measured by the Center for Epidemiologic Studies Depression Scale (CES-D), a scale measuring the level of depressive symptomatology over the last 7 days (26). Respondents with the overall sum 19 or less were classified as “Not depressed” while respondents with the overall sum more than 19 were classified as “Depressed”.

The Social Readjustment Rating Scale (SRRS), a 43-item scale was used to measure participants’ level of stress (27,28). Using this scale, an individual’s stress score was computed by adding predefined values for each question a respondent endorsed “yes” as an answer. For example, “Death of a spouse” was scored 100 representing the most stressful event one could report, and “Minor violation of laws” was scored 11 representing the least stressful event a respondent could report. Respondents’ total scores ranged from 0 to 683. Individuals with the score less than 300 were categorized as “Low to mild stressed” group, and those with the score 300 or above were categorized as “Major stress” group. Social support was measured using a 15-item Likert scale with a possible score ranging from 15 to 75. Subjects who scored greater than the group mean (> 63) were classified as having “more support” while subjects who scored equal or less than the group mean (≤ 63) were classified as having “less support”.

Impulsivity was measured by a 10-item, 4-point Likert scale with a possible score ranging from 10 to 40 (29,30). Subjects who scored equal or less than the group mean (≤ 20) were classified

as being “less impulsive” while those who scored greater than the group mean (> 20) were classified as being “more impulsive”.

Risk Perception was measured using a 6-item, 4-point Likert scale with a possible score ranging from 6 to 24 (29,31). Participants were instructed to respond to how likely something bad would happen to them under different risky conditions. Subjects who scored equal or greater than the mean (≥ 14.76) were classified as having “High risk perception” while subjects who scored less than the group mean (< 14.76) classified as having “Low risk perception.”

Year of medical school was measured as 1^{st} & $2^{nd} = 0$ vs. 3^{rd} & $4^{th} = 1$ corresponding to pre-clinical and clinical years, respectively. Other potential covariates in the model include age, gender, and marital status.

All statistical procedures were performed using the Statistical Package for Social Science (SPSS) software (version 12.0, SPSS Inc., Chicago, IL). In addition to descriptive statistics, bivariate and chi square-tests were used to assess the relation between the at-risk drinking and variables listed in Table 2. In addition, multiple logistic regression analyses were conducted to adjust for other potential confounding variables.

RESULTS

This cross-sectional study obtained information on 2710 consented medical students who completed the anonymous, online survey during the 10-week period. First through 4th year medical students represented 32.5%, 25.2%, 23.3%, and 19.0%, of the sample, respectively. Sixty percent (60%) of the respondents were females. The age range of the student pool was from 20 to 48 years with a mean age of 26 years (S.D. 3.2 years). Twenty-seven percent (27%) of the sample was married.

Table 1 illustrates characteristics of those in the sample who consumed alcohol in the past 12 months. Approximately 86% (n=2308) of the medical students drank alcohol. Of those who drank, 42.7 % drank 2 to 4 times a month and 23.4% drank 2 to 4 times a week. Binge drinking (drinking 6 or more drinks in one sitting for men and 4 or more for women), was reported for 40.0%, 20.%, and 8.4% of the students on a ‘less often than once a month’, ‘monthly’, and ‘weekly’, respectively. And finally, 18.1% (n=417) of the student drinkers scored positive for at-risk drinking, as assessed by an AUDIT score of ≥ 8 .

Table 2 (2nd column) reveals overall characteristics of the sample in regard to other lifestyle behaviors and psychosocial factors. Nearly sixteen percent (15.8%) of the respondents reported having tried one or more tobacco products in the past 30 days with cigarettes being the most common at 10.2%. Of the sample, 33.4% reported using one or more illicit drugs in the past 12 months with marijuana being the most common at 14.3% followed by analgesics or prescription pain killers at 13.1%. Approximately seventy-six percent of the sample (75.7%) reported having sex in the last 6 months: 67.6% stated sexual activity with one partner and 9.2% with 2 or more partners. Nearly sixty-two percent (61.8%) of sexually active students reported “never to sometimes” using condom with regular partners and over fifty percent (51.3%) reported “never to sometimes” using condom with casual partners.

The third column in Table 2 reveals findings regarding the relationship between at-risk drinking with years of medical school along with other lifestyle and psychosocial variables. Those who reported being 1st and 2nd year medical students were more likely to be at-risk drinkers compared to 3rd and 4th year students (17.1% vs. 13.3%; $p < 0.01$). The following variables were detected to be associated with at-risk drinking at the bivariate level (Table 2): age ($p < 0.01$), male students (22.7% vs. 10.7%; $p < 0.001$), unmarried individuals (18.8% vs. 6.6%; $p < 0.001$), smokers (40.3% vs. 10.8%; $p < 0.001$), illicit drug users (26.4% vs. 9.9%; $p < 0.001$),

individuals engaging in risky sexual behavior (27.6% vs. 13.2%; $p < 0.001$), gamblers (41.5% vs. 14.7%; $p < 0.001$), depressed individuals (20.5% vs. 11.9%; $p < 0.001$), individuals showing impulsive behavior (22.0% vs. 8.5%; $p < 0.001$), those under moderate to major stressors (18.3% vs. 12.4%; $p < 0.001$), and individuals showing lower risk perception (22.4% vs. 10.1%; $p < 0.001$).

Table 3 reveals the independent impact of the year of medical school on at-risk drinking while controlling for other lifestyle and psychosocial variables. Contrary to what was found in the bivariate association, in the multiple logistic regressions an individual's year of medical school lost its significance in predicting at-risk drinking. Among the lifestyle variables, the following remained statistically significant: smoking [OR 3.04, CI (2.32–3.97), $p < 0.001$], using illicit drugs [OR 2.04, CI (1.60–2.60), $p < 0.001$], reporting risky sexual behavior [OR 1.71, CI (1.28–2.29), $p < 0.001$], and being a pathological gambler [OR 2.04, CI (1.20–3.47), $p < 0.01$]. Among psychosocial variables those who were depressed [OR 1.72, CI (1.34–2.21), $p < 0.01$], showed more impulsive behavior [OR 1.78, CI (1.37–2.31), $p < 0.001$], were more stressed [OR 1.49, CI (1.16–1.91), $p < 0.01$] and had low risk perception [OR 1.79, CI (1.39–2.29), $p < 0.001$] were more likely to report at-risk drinking. Other predictors of at-risk drinking were: being of younger age [OR 1.05, CI (1.01–1.10), $p < 0.05$], male [OR 1.71, CI (1.33–2.20), $p < 0.001$], or unmarried [OR 2.71, CI (1.89–3.88), $p < 0.001$].

DISCUSSION

Medical students are a group of individuals who, by social standard, are considered to be highly motivated and successful. The plethora of academic demands that medical students face may contribute to raising the risk for drinking (32). Our findings show a high percentage of medical students (86%) consume alcohol, 23% drink 2 to 4 drinks a week, 20% binge on a monthly basis, and 18% at-risk drinking. Our findings are consistent with others. Baldwin et al., reported in 1991 that among senior medical students in 23 medical schools, 87.5% reported consuming alcohol in the 30 days preceding the survey (33). In 1988, Conard et al., reported that among 13 medical schools in different regions of U.S., 87.8% of the respondents reported consuming alcohol in the previous 30 days (34). Comparing our findings with national and college data reveals that, in the last 30 days, 47% of the U.S. adult population (age 21 and over) and 55 to 89% of college students (aged 18 to 22) consumed alcohol (2,35,36). At-risk drinking among U.S. adults in the general population was reported at 30% (37) and alcohol abuse was reported at 18% among students in one medical school during the 1st two years of medical education (38). Alcohol misuse has been reported among medical students internationally: 28% in Germany (using binge drinking), 19.2% in Norway (using hazardous drinking), 20 to 22% in Turkey (using CAGE), 11.9% in Poland (using AUDIT), and between 27 to 52% in United Kingdom (using CAGE and AUDIT) (5,7,39–41). Our findings suggest a high prevalence of drinking among medical students—a finding fairly comparable with their national and international cohorts. As far as at-risk drinking, recent national data are not available to support our findings. Therefore these findings should be further explored in future national studies.

In our sample, 3rd and 4th year medical students reported a lower percentage of at-risk drinking (13%) than 1st and 2nd year students (17%), but the difference was not statistically significant when controlling for other lifestyle, psychological, and demographic variables. Among a sample of 54 medical students alcohol use increased and health-related activities decreased from the beginning, to the mid-term, to the finals in a given semester (11). Croen showed an increasing trend in alcohol consumption in first- and third-year medical students from 91.8% to 95%, respectively. Newbury-Birch showed a similar trend in medical students in the United Kingdom (6,12,13).

Given the social, physical, and economic consequences of alcohol problems and that medical students of today are physicians of tomorrow, with the responsibility of reinforcing and supporting health habits among their patients, it may be useful to develop a model of alcohol curriculum for medical students (42). This curriculum may include what has been learned about college drinking, drinking consequences and implication of prevention as well as guidance for screening, interventions, and treatment. Faculty development on the signs and stimuli for medical student alcohol risk, as well as curriculum delivery will be necessary. Inclusion of alcohol education in medical curricula could influence the drinking behaviors of medical students compared to other graduates and, benefit future patient care, as well. Peer support strategies have also been helpful for medical student with substance abuse problems (43). Furthermore, campaigns targeting to limit or curb risky drinking behaviors have not been as popular as, for example, as anti-smoking campaigns suggesting that the social desirability of changing drinking behaviors is not as popular. Interventions are needed to test the effectiveness of health promotion campaigns that include alcohol control policies, in medical campuses. Peer support strategies have also been helpful for medical student with substance abuse problems (43).

On the other hands, screening for at-risk drinking and brief consultation is another method of intervention. This method has not been as routine in campus settings as it has been in the clinical/medical settings (44–49). To determine the extent and nature of alcohol screening and referral services provided by college health centers, Foote conducted a state-stratified, random sampling of 25% of 327 four-year accredited U.S. colleges and universities with health centers (50). Of the 249 survey respondents, 32% routinely screened students for alcohol use, however only 11.7% of the sample reported they used standardized instruments, predominantly the CAGE. Findings suggest that the majority of college health centers are not providing routine alcohol screening for students or using standardized screening instruments. However, intervening on an individual bases with students who are at risk for harmful consequences of alcohol use in combination with curricula related intervention may be a more effective approach to curb at-risk drinking among medical students.

In this study we were able to identify a number of lifestyle and psychosocial factors that could shed light on revealing the portfolio of an at-risk drinker among this sample (Table 3). Among lifestyle factors, tobacco smoking (3 times more), using illicit drugs (2 times more), reporting risky sexual behaviors (more than 1.5 times more), and gambling (2 times more) were associated with at-risk drinking. Our results also suggest that depression (1.7 times), low perception of risk (1.7 times), moderate to major stress (1.4 times), and impulsivity (1.7 time) are likely to be risk factors for engaging in at-risk drinking. Longitudinal data are needed to assess mechanism of association between these factors and risky drinking behaviors among medical students.

LIMITATIONS

There are limitations to our study that should be acknowledged. First, although, the sample for this study is from 36 different medical school campuses, this is a non-randomized, cross-sectional study limiting our ability to generalize the finding to the overall medical student population. Second, study variables were measured through self-reported data, therefore, subject to recall bias and social desirability. Third, individuals who were more likely to participate in high-risk behaviors may not have completed the survey, adding non-response bias to the limitations of the study results. Forth, data collection occurred during the end of the medical school academic year, which may have falsely overestimated the results of risky behaviors due to exams or other stressors. Finally, data used for this study was collected electronically rather than via conventional paper and pencil. However, previous studies have found no differences in the quality of findings between the two methods suggesting the final

outcomes of web-based survey are comparable with paper-and-pencil survey approach and subject may in fact feel more comfortable to answer sensitive questions (51–53).

Despite the above limitations, our study provides valuable information regarding the prevalence and profile of at-risk drinkers among a large sample of U.S medical students. Findings from this study also provided initial data for medical educators who may be interested in pursuing further investigations of the impact of alcohol education curriculum and/or alcohol control policies on medical campuses.

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Table 1

Frequency of drinking among medical students that consume alcohol.

Profile	N	%
Drinking alcohol in the past 12 months	2308	85.6
Drinking 2–4 times per month	986	42.7
Drinking 2–4 times a week	539	23.4
Binge drinking less than a month	932	40.0
Binge drinking monthly	464	20.1
Binge drinking weekly	194	8.4
At-risk Drinking	417	15.4

Table 2

Unadjusted linear regression to determine factors associated with at-risk drinking (n=417).

Proportion of Total Sample		General Characteristics		At-risk Drinking 18.1 [*]
		<i>f</i>	% [¶]	p-value [¶] %
Age	Mean (SD)	25.6 (3.2)		0.002
Gender				0.000
Male ^{**}		1076	40.0	22.7%
Female		1616	60.0	10.7%
Marital Status				0.000
Single/separated/divorced ^{**}		1958	72.8	18.8%
Married		730	27.2	6.6%
Year of School				0.007
1 st /2 nd Yr. ^{**}		1550	57.7	17.1%
3 rd /4 th Yr.		1137	42.3	13.3%
Tobacco Use				0.000
None in last 30 days ^{**}		2275	84.2	10.8%
Have used in last 30 days		426	15.8	40.3%
Illicit Drug Use in 12 months				0.000
No drug use ^{**}		1799	66.6	9.9%
Drug use		902	33.4	26.4%
Sexual Risk				0.000
Low risk ^{**}		2252	84.2	13.2%
High risk		421	15.8	27.6%
Gambling Problem[†]				0.000
Low risk (< 5) ^{**}		2592	96.9	14.7%
Probable gambler (≥ 5)		82	3.1	41.5%

Proportion of Total Sample	General Characteristics		At-risk Drinking 18.1 [*]
	<i>f</i>	% ^{//}	p-value [¶] %
Depression [‡]			0.000
Not depressed (< 19) ^{**}	1590	59.3	11.9%
Depressed (≥ 19)	1093	40.7	20.5%
Support			NS
Less support (≤ 63) ^{**}	1100	41.0	15.6%
More support (> 63)	1585	59.0	15.3%
Stressors [§]			0.000
Low to mild stressors ^{**}	1274	47.4	12.4%
Moderate to major stressors	1413	52.6	18.3%
Impulsivity			0.000
Less impulsive (≤ 20.59) ^{**}	1284	47.8	8.5%
More impulsive (> 20.59)	1402	52.2	22.0%
Risk Perception			0.000
Low risk perception (≤ 14.76) ^{**}	1184	44.1	22.4%
High risk perception (> 14.76)	1500	55.9	10.1%

* Based on AUDIT 10 criteria

[‡] Based on South Oaks Gambling Screen criteria

[‡] Based on CES-D criteria

[§] based on SRRS criteria

^{//} Values rounded to the nearest tenths; percentages may total more than 100.0%.

[¶] p < .05; NS = Not Statistically Significant

^{**} Reference Group

Table 3

Multivariate regression analysis (adjusted results) for at-risk drinking behavior.

Variable	At-Risk Drinking Model	95% CI
	OR [*] , [†]	
Younger Age	1.055 ^{//}	[1.001–1.105]
Male Gender	1.709 [‡]	[1.326–2.203]
Unmarried	2.710 [‡]	[1.894–3.876]
Current Tobacco Use	3.036 [‡]	[2.323–3.969]
Illicit Drug Use	2.039 [‡]	[1.598–2.601]
Risky Sexual Behavior	1.712 [‡]	[1.282–2.287]
Gambling	2.039 [§]	[1.197–3.473]
Depression	1.719 [‡]	[1.339–2.207]
Stressed	1.485 [§]	[1.157–1.907]
Impulsive Behavior	1.775 [‡]	[1.367–2.306]
Low Risk Perception	1.786 [‡]	[1.393–2.294]

* Odds Ratio displayed if value statistically significant

[†] β -value[‡] $p < 0.001$ [§] $p < 0.01$ ^{//} $p < 0.05$