

# Alcohol Consumption and Smoking and their Associations with Socio-demographic Characteristics, Dietary Patterns, and Perceived Academic Stress in Puerto Rican College Students

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**Objective:** College students often use different strategies, such as consuming alcohol and smoking, to cope with stress. We examined the associations between self-perceived academic stress, alcohol consumption, smoking, and dietary patterns in graduate students.

**Methods:** A representative stratified sample of 275 students from each school of the Medical Science Campus of the University of Puerto Rico (UPR-MSC) completed a 48-item questionnaire that solicited the following: socio-demographic data, estimates of self-perceived stress, estimates of the frequency of alcohol consumption and the type(s) of alcohol consumed, details regarding smoking habits, and information associated with diet (i.e., dietary patterns). Fisher's exact test and the Chi2 test were used to assess the associations between the different study variables.

**Results:** Only 3% were considered smokers (defined as > 1 cigarettes per day), with the greatest number of smokers among those aged 21-30 y ( $p < 0.05$ ). Smoking habits was not associated with academic load/stress or with dietary pattern. Most smokers reported that their main reason for using cigarettes was to cope with stress. About 70% of the students were considered drinkers (defined as > 0 drink/day), with a higher proportion found among women (63.5%), among those aged 21-30 years (90.6%), and among those with a low or moderate household income ( $p < 0.05$ ). Alcohol intake was significantly associated with academic stress, with a greater proportion of drinkers reporting experiencing moderate levels of academic stress ( $p < 0.05$ ), but it was not associated with dietary patterns or academic load ( $p > 0.05$ ). Most subjects classified as drinkers reported that alcohol consumption was not (in their experience) an effective strategy for the management of stress (81%).

**Conclusion:** Alcohol consumption was only associated with academic stress. No associations were found between smoking habits and academic stress/load and dietary patterns. [*PR Health Sci J* 2013;2:82-88]

*Key words:* Self-perceived academic stress, College students, Smoking, Alcohol consumption, Dietary pattern

University life and academic pressures may promote stress among college students. Therefore, many students use coping strategies to handle the demands; however, some college students adopt inadequate strategies for coping with stress, thereby exposing themselves to risks that can affect their health and quality of life (1). Furthermore, several studies suggest that social and/or economic stressors generally found outside of the academic environment may add to academic stress.

Among college students, consuming alcohol and smoking cigarettes are frequent coping strategies for stress management. According to previous studies, most college students who smoke do so to reduce stress (2), because they have a psychological addiction, or as an adaptive response to the impact that the daily stressors of the academic setting have on them (3). Academic

overload has been found to be the stressor with the highest prevalence among college students (4), and it often leads to smoking, drinking, or eating in excess (5). Drinking alcohol to cope is also very common among college students who might be attempting to avoid experiencing such negative affective states

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as depression and anxiety (6). Food patterns and appetite in college students may also be altered with alcohol consumption and cigarette use. A study in 282 United States (US) college students found a relationship between consuming alcoholic beverages and the changes in appetite that occur before, during, and after such consumption (7).

In the US, the prevalence of occasional alcohol abuse (binge drinking)—which is common among college-age students—in the general population in 2010 was 17.1% (8), while in Puerto Rico it was 15.3% in 2011 (9). With respect to cigarette use, the prevalence of current smokers in the US was 23.5% in men and 18.7% in women in 2011, while in Puerto Rico it was 20.8% in men and 9.4% in women (9).

Little is known about the association between academic stress, alcohol use, smoking, and dietary patterns in college students. Therefore, we conducted a study to determine the association between the level of self-perceived academic stress and load, alcohol consumption, smoking, and dietary patterns in college students in their first or second year at UPR-MCS during the academic period covering from January to May 2011.

## Subjects and Methods

This is a descriptive epidemiological study with a semi-quantitative approach in a representative sample of Puerto Rican college students. The study was approved by the UPR-MSC Institutional Review Board (protocol # A4540112).

### Subjects

The study population consisted of students who were enrolled in their 1st or 2nd year at UPR-MSC. The sample was selected by proportional sampling from each school at UPR-MSC (pharmacy, medicine, dental medicine, health professionals, public health, and nursing); the registration lists provided by the Office of Planning, Research, and Assessment on campus formed the basis of the selection. Stratification was performed by dividing the total population of each school by the overall population of students eligible for participation to obtain the proportion from each school. This proportion was then multiplied by the population of each school for a total sample of 252 students. Students in their third or fourth year, those in special enrollment programs or enrolled in joint programs, and those who were pregnant were excluded from participating in the study.

### Questionnaire

A questionnaire was specifically developed for this study and validated by experts. Participants were instructed to complete the questionnaire, retrospectively, based on their experiences during the academic period covering from January to May 2011. It took about 30 minutes for participants to complete the questionnaire; the survey was completed in August of 2011. A

copy of the questionnaire is available from the senior author upon request.

The questionnaire included the following sections

1. **Socio-demographic characteristics**, which section requested such information as age in years, gender, and annual household income (low [\$0–\$24,999], moderate [\$25,000–\$74,999], and high [\$75,000–\$100,000]).
2. **Academic course load**, which section asked each student to assess his/her academic load and categorize it using one of the following terms: low, moderate, or heavy
3. **Academic stress**, which section included a validated stress questionnaire, adapted from the Cognitivist Systemic Model Academic Stress (10). The model consisted of a 10-item Likert scale that explored the frequency with which each respondent experienced certain physiological, psychological, and behavioral responses to his/her academic environment; the items in the scale all had the same response options and corresponding values: Never (1), Rarely (2), Sometimes (3), Most of the time (4), and Always (5). Those with a total score of less than 25 points were classified as having low levels of stress; those whose total score ranged from 25 to 35 were classified as having moderate levels of stress; and those whose total score was greater than 35 were classified as having high levels of stress. The internal consistency of the stress questionnaire was tested using Cronbach's Alpha (0.895).
4. **Dietary patterns**, which section consisted of a semi-quantitative food frequency questionnaire that asked the respondent to report the number of meals per day he/she normally consumed throughout the period of time under study. It also included the frequency of consumption of grains and starchy vegetables, fruit, dairy products, meat and meat substitutes, oil, and water as well as the frequency of consumption of snacks (those typically found in the vending machines on campus), soft drinks, and nutritional drinks. The quality of the diet of each subject was assessed with a modified Diet Quality Index (DQI)—based on the 2010 USDA Food Pattern (11) using the following 3 primary aspects: variety, adequacy, and moderation. Scores for each component were calculated for each of the 3 main categories, and the scores for all 3 categories were tallied, resulting in a total DQI score that could range from 0 to 65. Based on participant's total score, dietary pattern was classified as adequate, if total scores ranged from 33 to 65 points (>50% of dietary recommendations) or inadequate, if total scores were less than 33 points (<50% of dietary recommendations). More details of the dietary pattern calculations have been published (12).
5. **Coping strategies**, which section asked for information about the use of prescription drugs and/or stimulating beverages, physical activity, alcohol consumption and smoking, and social support. The present analysis examines

only alcohol and smoking as stress coping strategies. Information regarding the other strategies has been published (13) or is being published elsewhere.

**Alcohol consumption**

In this subsection, respondents detailed their consumption habits with a frequency table that listed several types of alcohol (beer, wine, rum, whiskey, and brandy). The amount of alcohol consumed was determined based on the frequency of consumption, which included: 4 times per day, 2-3 times per day, 1 time per day, 5-6 times per week, 2-3 times per week, 1 per week, 2-3 times per month, 1 per month or never. The number of alcoholic beverages that the participant consumed was divided by the frequency of his or her consumption to establish the daily consumption of alcohol. The following categories were used to define (based on the frequency of daily alcohol consumption) the different types of drinker: non-drinker (never consumes alcohol) and drinker (consumes >0 drink/day); 1 drink was considered to be a 12-ounce beer, a 5-ounce glass of wine, a 1.5-ounce shot, or 0.6 ounces of brandy. Other questions explored the following issues: how the consumption of alcohol alters the appetite, the intake of food with little to no nutritional value, and/or replacing food with alcohol, as well as how alcohol consumption changes in periods of high stress, the effectiveness of using alcohol as a strategy for coping with stress, and the re-use of this strategy in future moments of stress.

**Smoking**

This subsection consisted of 6 questions related to the daily use of cigarettes. The data were dichotomized as “smoker” (> 1 cigarettes per day) or “non-smoker” (0 cigarettes per day). Other questions delved into the reasons for smoking, the changes in appetite and food consumption that occur concurrently when one smokes, the changes that occur in smoking patterns in periods of high stress, the effectiveness of smoking as a strategy for coping with stress, and the re-use of this strategy in future moments of stress.

**Statistical Analysis**

The following descriptive statistics were used to describe the sample’s profile demographics, dietary patterns, and perceptions of academic stress, according to socio-demographic characteristics: average, standard deviation and range for continuous variables and the percentage distribution of frequency for categorical variables. Fisher’s exact test and Chi<sup>2</sup> test were used to determine the association between study variables. The analyses were performed with the use of the statistical software SPSS (Statistical Package for the Social Sciences, version 17.0). Statistical significance was defined as a p-value of less than 0.05.

**Results**

The total sample consisted of 275 students, about 10% higher than estimated, with a compliance rate of 100% from each of the 6 schools of UPR-MSC. One participant did not answer the questions in the sections exploring alcohol consumption and cigarette use; therefore, the total sample for the present analysis consisted of 274 students. Most students were female (67.6%), ranged in age from 21 to 30 years (88%), and living in homes with low annual household incomes (42.7%). Academic load was reported as being light by 2.8% of the respondents, moderate by 28.6%, and heavy by 68.5%. Academic stress was perceived to be low by 13.2% of the respondents, moderate by 60.4%, and high by 26.4%. Academic load was significantly correlated with stress (R = 0.25; p<0.001).

**Smoking habits**

Three percent of the sample members reported that they smoked (Table 1). There was a significant association between smoking and age (p<0.05); those in the 21 to 30 years age range smoked more than did those not falling within that range. No associations were found between smoking habits and academic load or stress level (Table 2). Among smokers, 88% reported that their main reason for using cigarettes was to cope with stress, while 12% reported that they used them because they were addicted to nicotine. When smokers were asked about the effectiveness of smoking in coping with stress, 75% reported that they considered smoking to be an effective strategy in the management of stress.

**Table 1.** Profile of study sample by smoking behavior among men and women (n=274)

Variable	Non-smoker N (%)	Smoker N (%)	Total N (%)
Gender			
Male	85 (32.1)	3 (37.5)	88 (32.1)
Female	181 (68.0)	5 (62.5)	186 (67.9)
Age (years)*			
21-30	235 (88.3)	6 (75.0)	241 (88.0)
31-53	31 (11.7)	2 (25.0)	33 (12.0)
Household income**			
Low	113 (42.6)	4 (50.0)	117 (42.9)
Medium	98 (37.0)	3 (37.5)	101 (37.0)
High	54 (20.4)	1 (12.5)	55 (20.1)
Total	266 (97.1)	8 (2.9)	274 (100)

\*Significant association according to Chi<sup>2</sup> (p<0.05). \*\*Missing data from 1 subject

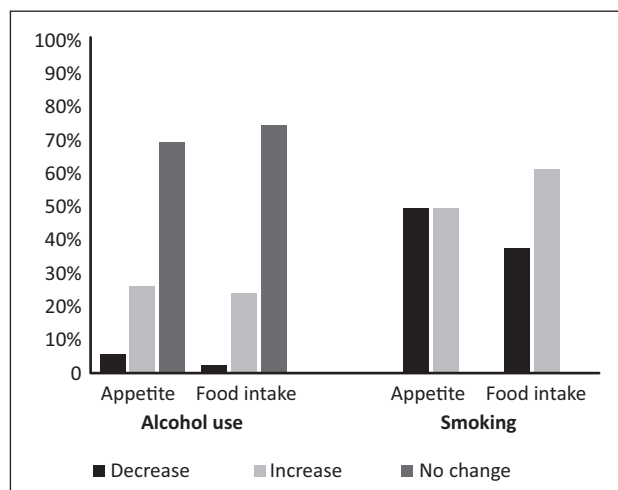
We also found that 50% of smokers reported a decrease in appetite and 50% reported an increase in appetite after smoking (Figure 1). Notwithstanding, 38% of the respondents reported decreases in their food consumption as a result of smoking, while 62% reported to the contrary—that their food consumption

increased as a result of their smoking (Figure 1). However, no association was found between smoking habits and dietary pattern (Table 2).

**Table 2.** Association between self-perceived academic load and stress levels and dietary pattern among non-smokers and smokers

Variable	Non-smoker N (%)	Smoker N (%)	Total N (%)
Academic load*			
Low	8 (3.0)	0 (0.0)	8 (2.9)
Moderate	73 (27.5)	5 (62.5)	78 (28.6)
Heavy	184 (69.4)	3 (37.5)	187 (68.5)
Academic stress**			
Low	36 (13.6)	0 (0.0)	36 (13.2)
Moderate	158 (59.6)	7 (87.5)	165 (60.4)
High	71 (26.8)	1 (12.5)	72 (26.4)
Dietary pattern***			
Inadequate	159 (62.4)	4 (50.0)	163 (62.0)
Adequate	96 (37.6)	4 (50.0)	100 (38.0)

No significant associations according to Chi<sup>2</sup> (p<0.05). \*Missing data from 1 subject; \*\*Missing data from 1 subject. \*\*\*Missing data from 11 participants.



**Figure 1.** Self-perceived changes in appetite and food intake with alcohol consumption and with cigarette use

### Alcohol consumption

Seventy percent of the sample members were categorized as being drinkers (Table 3). In the sample, proportionally more women than men were drinkers (63.5% vs. 36.5%, respectively). Similarly, students who were in the 21 to 30 years age group were more likely to be drinkers than were those in the 31 to 53 years age group (90.6% vs. 9.4%, respectively; p<0.05). Those who consumed alcohol were most likely to live in homes having low or moderate annual household incomes (p<0.05). Alcohol intake was significantly associated with academic stress, with a greater proportion of drinkers reporting experiencing moderate levels of academic stress (p<0.05) (Table 4). The reasons for alcohol consumption reported by those study participants

classified as drinkers were as follows: it (drinking) facilitates social relationships (27%); it aids in the celebration of special occasions (8%); it is part of their routine (8%); it helps them handle stress (8%); it (alcohol) tastes good (7%); other reasons (2%). Most drinkers (81%) reported that consuming alcohol did not effectively aid in the management of stress, while 19% of the respondents considered consuming alcohol to be an effective coping strategy. However, regardless of their beliefs regarding the efficacy of consuming alcohol to reduce stress, most (85%) reported that they will continue to use alcohol to manage their stress. Most (80%) reported a decline in their consumption of beer, rum, whiskey, and brandy in periods of high stress; only the consumption of wine remained the same (data not shown).

No significant associations were observed between alcohol use and dietary pattern (Table 4). However, among drinkers, 26% reported experiencing increases in appetite and 24% reported increased food intake after drinking alcohol (Figure 1). Most (71%) drinkers reported that they usually consumed snacks when drinking (data not shown).

**Table 3.** Profile of study sample by alcohol use among men and women

Variable	Non-drinker N (%)	Drinker N (%)	Total N (%)
Gender*			
Male	18 (22.0)	70 (36.5)	88 (32.1)
Female	64 (78.0)	122 (63.5)	186 (67.9)
Age (years)*			
21-30	67 (81.7)	174 (90.6)	241 (88.0)
31-53	15 (18.3)	18 (9.4)	33 (12.0)
Household income**			
Low	45 (55.6)	72 (37.5)	117 (42.9)
Moderate	29 (35.8)	72 (37.5)	101 (37.0)
High	7 (8.6)	48 (25.0)	55 (20.1)
Total	81 (29.7)	192 (70.3)	274 (100)

\*Significant association according to Chi<sup>2</sup> (p<0.05). \*\*Missing data from 1 subject.

**Table 4.** Self-perceived academic load and stress and dietary pattern among non-drinkers and drinkers

Variable	Non-drinker N (%)	Drinker N (%)	Total N (%)
Academic load			
Low	3 (3.6)	5 (2.6)	8 (2.9)
Moderate	26 (31.3)	53 (27.7)	79 (28.8)
Heavy	54 (65.1)	133 (69.6)	187 (68.3)
Academic stress*			
Low	12 (14.6)	24 (12.5)	36 (13.1)
Moderate	41 (50.0)	125 (65.0)	166 (60.6)
High	29 (35.4)	43 (22.4)	72 (26.3)
Dietary pattern**			
Inadequate	51 (63.8)	113 (61.4)	164 (62.1)
Adequate	29 (36.3)	71 (38.6)	100 (37.9)

\*Significant association according to Chi<sup>2</sup> (p<0.05). \*\*Missing data from 10 participants.

## Discussion

Academic overload has been found to be the stressor with the highest prevalence among college students (4); it often leads to smoking, drinking, or eating in excess (5).

In the present study, smoking was not associated with academic load, academic stress or with dietary patterns. Of those students in the sample who smoked, the majority reported that smoking helped them to reduce stress. In addition, alcohol consumption was associated with academic stress but not with dietary pattern or academic load. The main reason for consuming alcohol reported by the subjects was to facilitate social relationships.

In the present study, we also found a higher use of cigarettes among younger students. Previous studies in the US and Canada have also found that young adults (18-30 years) have the highest smoking rate of any age group (14). The risk of smoking initiation increases for young adults who are exposed to smoking, boredom, or stress.

No associations were found between smoking and either academic load or stress level in the present study. This was probably related to the low proportion of smokers in the sample (3%). Others have also found that most college students who smoke do so to reduce stress (2), because of a psychological addiction, or as an adaptive response to the daily stressors present in the academic setting (3).

Although no association was found between smoking habits and dietary patterns, 50% of the smokers reported experiencing decreases in appetite and 38% reported decreases in food consumption after smoking. The results found in the present study are not consistent with those of previous reports in other populations, which reports found an association between smoking and dietary pattern. Previous studies have demonstrated that smokers generally have less healthy diets than non-smokers do (15-17), which could help increase the risk of certain cancers and for cardiovascular disease (18). In terms of the dietary guidelines, smokers tend to eat less healthy diets than non-smokers do, with a negative dose-response relationship between the number of cigarettes smoked per day and dietary inadequacy (19). In addition, studies have found that smokers usually do not meet the dietary recommendations of 5 servings of fruits and vegetables a day (20). It would be desirable for smokers to have healthier food consumption habits in order to reduce the effects of tobacco and to meet some of the additional demands for various nutrients that are required by the members of this group (21). We also found that 50% of smokers reported experiencing decreases in appetite and 38% reports a decrease in food consumption after smoking. A possible explanation for this is that exposure to cigarette smoke is associated with a marked reduction of the enzyme monoamine oxidase, which enzyme is linked to mood (18). This effect results in the dysregulation of appetite (22). Nicotine's effects on the brain lead to the suppression of appetite,

and smoking can serve as a behavioral alternative to eating (23). In their previous study, Preston et al. (24) reported that future health professionals would be expected to have adequate knowledge of the risks and consequences of smoking.

With respect to alcohol consumption, we found a higher proportion of drinkers among women, among younger students, and among those from households having low or moderate annual incomes. A survey conducted in 1989/90 with 403 first-year students from MSC-UPR reported that 64% used alcohol, of which the proportion of males using alcohol (87.1%) exceeded that of females (58.3%) (25), which results are contrary to what was found in the present study. According to several studies of US medical school students, substance abuse, including the overconsumption of alcohol, has been recognized as one of the prevalent methods of stress reduction (26). The present study also found a higher proportion of drinkers in participants with moderate levels of academic stress. Many US college students consume alcohol to deal with stressors, and the level of involvement or academic performance in college is associated with drinking behavior (6). Students who drink to cope may be at high risk of developing habits related to alcohol dependency that will be difficult to modify after they leave college. Most students in our sample who consumed alcohol reported that such consumption was not an effective coping strategy. However, most stated that they will continue to use alcohol to handle stress. Frequent binge drink is related to negative consequences such as missing class, having a hangover, falling behind in schoolwork, and arguing with friends and/or family (6). These consequences may vary from person to person and need to be studied further in our population.

No association was found between alcohol consumption and dietary pattern in the present study; however, 26% of those who consumed alcohol reported experiencing increases in appetite and 24% reported increases in food intake after drinking alcohol; most reported eating food of low nutritional value when they drink. A cross-sectional study of 3,206 US college students found that binge drinking was associated with adverse dietary behaviors, including infrequent breakfast consumption, low intake of fruit and vegetables, high fast food consumption, unhealthy attempts at weight control, and reduced physical activity, and unhealthy dietary patterns (27). Alcohol-initiated eating, particularly of fast food and convenience foods, is a major theme cited by college students in describing their usual dietary patterns and is a contributor to poor dietary choices that are made before, during, and after episodes of drinking. Others have also noted increases in appetite after drinking, episodes of overeating, and occurrences of making unhealthy food choices, all following the consumption of alcohol (7).

According to the Dietary Guidelines for Americans 2010 (19), the consumption of alcohol can have beneficial or harmful effects depending on the type of drink being consumed, the amount consumed, and the age of the person drinking.

The present study has several limitations: Alcohol consumption was estimated from self-reported questionnaires, which included the frequency of alcohol consumption but not the amount of alcohol consumed per instance. Also, this was a cross-sectional study of data collected from January to May 2011; therefore, this type of study does not show cause-effect relationships. Some of the strengths of the study are that the sample was representative of all of the schools of UPR-MSU, validated questionnaires were used for estimating academic stress, and several coping strategies used by students for academic stress management were included.

In conclusion, in the present study the percentage of students who smoked was very low (3%), while the percentage of study participants that consumed alcohol was high (70%). We found higher rates of cigarette use among younger students compared to older students. In addition, there were a higher proportion of women, younger subjects, and respondents from households with relatively lower annual incomes classified as drinkers compared to men, older students and those with higher annual incomes. Alcohol intake was significantly associated with academic stress but not with load. No significant associations were found between cigarette use and academic load or stress. Dietary patterns were inadequate in most students; however, the use cigarettes and alcohol was not associated with these patterns. Smoking and drinking had opposing effects in terms of appetite and food intake.

Some college students report that they intend to continue drinking alcohol throughout their lives, a habit that may end up being related to the stress that they later experience in their lives; this habit also may have health implications and may promote alcohol dependency. Longitudinal studies are necessary to analyze any changes that might occur in these behaviors, both in the college years and beyond, and to analyze, as well, how these potentially harmful coping strategies affect their lives. Also, there is a need in most universities for educational programs that cover stress management, teach coping strategies, encourage healthier lifestyles, and educate students about nutrition.

## Resumen

**Objetivo:** Los estudiantes universitarios utilizan diferentes estrategias para afrontar el estrés, tales como consumo de alcohol y uso de cigarrillos. Se examinó la asociación entre estrés académico auto-percibido, consumo de alcohol, uso de cigarrillos y patrones alimentarios entre estudiantes universitarios. **Métodos:** Una muestra representativa de cada escuela del Recinto de Ciencias Médicas, Universidad de Puerto Rico (RCM-UPR), de 275 sujetos completaron un cuestionario que incluía datos socio demográficos, estrés y carga académica auto-percibido, consumo de alcohol, uso de cigarrillos y patrones alimentarios. Se utilizó la prueba exacta de Fisher de  $\chi^2$  y la prueba de  $\chi^2$  para evaluar la asociación

entre las diferentes variables del estudio. **Resultados:** Sólo el 3% se consideraron fumadores (definido como > 1 cigarro por día), con una mayor proporción de fumadores en estudiantes de 21-30 años ( $p < 0.05$ ). No se encontraron asociaciones entre el hábito de fumar con la carga o estrés académica o con los hábitos alimentarios. La mayoría de los fumadores informó que la razón principal para el uso de cigarrillos era para hacer frente al estrés. Sobre el 70% eran bebedores (definido como > 0 bebida por día), con una proporción mayor en mujeres (63.5%), en estudiantes de 21-30 años (90.6%) y en aquellos con bajo o moderado ingreso familiar ( $p < 0.05$ ). El consumo de alcohol se asoció significativamente con el stress, con mayor proporción de bebedores con estrés académico moderado ( $p < 0.05$ ), pero no se asoció con carga académica o patrones alimentarios. La mayoría de los clasificados como bebedores (81%) informaron que el consumo de alcohol no fue efectivo para manejar el estrés. **Conclusión:** El consumo de alcohol solo se asoció con el estrés académico. No se encontraron asociaciones significativas entre el hábito de fumar y el estrés/carga académica y patrones alimentarios.

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