

## Prevalence and predictors of alcohol and tobacco consumption in adolescence: The role of weight status, clinical status and psychosocial dimensions

Marta Freitas-Rosa<sup>1</sup>, Sónia Gonçalves<sup>1\*</sup> and Henedina Antunes<sup>2</sup>

*1 School of Psychology, University of Minho, Portugal*

*2 Pediatric, Gastroenterology, Hepatology and Nutrition Unit of Braga's Hospital; Life and Health Sciences Research Institute (ICVS), School of Health Sciences, University of Minho; ICVS/3B's - PT Government Associate Laboratory, Braga/Guimarães, Portugal*

**Título:** Prevalencia y factores de predicción de los consumos de alcohol y tabaco en la adolescencia: el papel de la condición de peso, de la condición clínica y de las dimensiones psicosociales

**Resumen:** El objetivo de este estudio ha sido examinar la prevalencia de consumo de alcohol y tabaco en adolescentes ( $N = 370$ ) con edades comprendidas entre 14 y 19 años en tres grupos: 205 adolescentes con peso normal, 82 adolescentes de la comunidad con el exceso de peso u obesidad, y 83 adolescentes con exceso de peso u obesidad y en el tratamiento ambulatorio para el control de peso. También se examinaron los roles de edad, género, peso, condición de tratamiento y las variables psicosociales (los síntomas psicopatológicos, el apoyo social y las habilidades emocionales) en la presencia de estos consumos. Nuestros principales hallazgos fueron que el grupo clínico de los adolescentes con sobrepeso tenían menos conductas de riesgo, que en el grupo de la comunidad de sobrepeso y los controles de peso normal, sobre todo para las conductas de riesgo relacionadas con el consumo de alcohol. La mayor edad y una menor satisfacción con la familia predijeron el consumo de tabaco. La mayor edad, la no asistencia a un tratamiento para el control del peso y una mayor satisfacción con las relaciones íntimas predijeron el consumo de alcohol. El peso no fue un factor de predicción de consumo de alcohol y tabaco. Este estudio analiza las implicaciones teóricas y prácticas de estos hallazgos.

**Palabras clave:** Tabaco; alcohol; sobrepeso; adolescencia.

**Abstract:** The aim of this study was to examine the prevalence of alcohol/tobacco consumption among adolescents ( $N = 370$ ) aged 14 to 19 years in three groups: 205 adolescents with normal weight, 82 adolescents from the community with overweight or obesity, and 83 adolescents with overweight or obesity and in outpatient treatment for weight control. We also examined the roles of age, gender, weight, treatment condition, and psychosocial variables (psychopathological symptoms, social support, and emotional skills) in the presence of those risk behaviors. Our major findings were that the clinical group of overweight adolescents had fewer risk behaviors, than the overweight community group and the normal weight controls, particularly for risk behaviors related to alcohol use. The increase of age and lower satisfaction with family predicted tobacco consumption. The increase of age, not being integrated in a treatment for weight control and higher satisfaction with intimate relationships predicted alcohol consumption. Weight status was not a predictor of alcohol and cigarette use. This study discusses the theoretical and practical implications of these findings.

**Key words:** Tobacco; alcohol; overweight; adolescence.

### Introduction

Over the last two decades, childhood and adolescent overweight and obesity have become a major threat to public health worldwide. Adolescence is a developmental period characterized by increased risk, due to greater autonomy and exposure to social contexts that create opportunities for young people to engage in risky behaviors (Schulenberg, Maggs, & Hurrelmann, 1997). Therefore, little is known about the relationship between being overweight or obese and risk behaviors in adolescence, where these behaviors are considered a primary threat to adolescents. Risk behaviors are frequently studied in adolescents in general, as well as in specific populations with eating disorders, such as anorexia and bulimia nervosa (Fisher & Grange, 2007; Haug, Heinberg, & Guarda, 2001). However, only a few recent studies (e.g., Peltzer & Pengpid, 2011; Croezen, Visscher, Bogt, Vellin & Haveman-Nies, 2009; Arif & Rohrer, 2005; Strauss, 2000) have attempted to understand the relationship between weight status and risk behaviors in adolescence.

In this study, we will focus on two specific risk behaviors alcohol consumption and tobacco consumption. According to the literature (e.g., Cha & Nolen-Hoeksema, 2008; French & Perry, 1996; Strauss, 2000; Fonseca & Matos, 2005), these behaviors are associated with issues with weight. Although

some investigators have found positive associations between these risk behaviors and obesity (Sansone, Sansone & Fine, 1995; Shan, et al. 2010), other studies found no such association. As Ratcliff, Jenkins, Reiter-Purtill, Noll and Zeller (2011) recently observed, the rates obtained by obese adolescents for the majority of risk behaviors, were similar to those of their normal weight peers.

With regard to alcohol and tobacco consumption, it is unclear whether these behaviors are risk factors for overweight, because studies have equally reported positive, negative or no associations. In a recent study, alcohol consumption was positively associated with overweight in second- and fourth-grade adolescents (Croezen, et al., 2009). Another study found that female adolescents with alcohol use disorders may have an increased risk of being overweight/obese compared to adolescent females without alcohol use disorders (Naude, Senekal, Laubscher, Carey, & Fein, 2011). Griz and colleagues (2010) found that obesity was more frequent in students who smoked and used alcohol. In addition, Peltzer and Pengpid (2011) found that smoking cigarettes was associated with overweight or obesity among school-aged adolescents. However, the same study did not find a positive association between overweight and alcohol use, obtaining similar levels of alcohol consumption for girls and boys.

In contrast, Gearhardt and Corbin (2009) demonstrated an inverse relationship between alcohol consumption and body mass index (BMI). Another study from low- and mid-

\* Dirección para correspondencia [Correspondence address]:  
Sónia Gonçalves. School of Psychology. University of Minho. Campus de Gualtar (Portugal). E-mail: [sgoncalves@psi.uminho.pt](mailto:sgoncalves@psi.uminho.pt)

dle-income countries found that among adolescents from Mexico and Egypt, ever smoking was inversely associated with BMI, whereas occasional smoking or previous smoking was not associated with BMI (Salazar-Martinez et al., 2006). Thus, adolescents, particularly girls, may use smoking as a means to control body weight, and the association between adolescent smoking and overweight, may differ depending on the dimension of weight concern considered, with the strongest evidence for dieting behaviors (Potter, Pederson, Chan, Aubut & Koval, 2004). According to Arif and Rohrer (2005), there is a diversity of results with regard to alcohol use in overweight adolescents because this use differs depending on patterns of alcohol drinking. In that study, the odds of overweight and obesity were significantly greater among binge drinkers and those who consumed four or more drinks per day, whereas current drinkers had lower odds of obesity compared to non-drinkers. Similarly, the odds of obesity were significantly lower among those who reported drinking frequently and consuming less than five drinks per week (Arif & Rohrer, 2005).

Based on the literature, the association of overweight with risk behaviors may operate through multiple psychological mechanisms. Given the inconsistency of existing results, it becomes imperative to explore the role of psychosocial variables that may interfere in the relationship between weight status and engagement in substance use.

Strauss (2000), for example, have examined the role of self-esteem and psychopathological symptoms and found that obese children with low levels of self-esteem demonstrate significantly high rates of sadness, loneliness, and nervousness and are more likely to engage in high-risk behaviors such as smoking or alcohol consumption.

Peers' characteristics, such as peer weight and social networks, can also have an important impact (Palmer & Rutland, 2011). Two recent studies (Trogon, Nonnemaker & Pais, 2008; Valente, Fujimoto, Chou & Spruijt-Metz, 2009), showed that overweight adolescents were more likely to have overweight friends than their normal weight peers. These results suggest a social contagion of obesity and the development of affiliations by obesity status that may have far-ranging consequences for adolescent development. The data also suggest that overweight girls are slightly less likely to be named as a friend than are normal weight girls. This social marginalization may lead to poor mental health states, which, in turn, may lead to other deleterious behaviors (Valente et al., 2009).

Despite the recent study by Ratcliff and colleagues (2011) that evaluated high risk-behaviors of adolescents with extreme obesity compared with their healthy weight peers, the present study is the first, as far as we know, to compare high risk-behaviors of overweight adolescent students with their healthy weight peers by considering both community and clinical samples. Thus, the aim of the present research was to assess differences in risk behaviors related with alcohol and cigarette use, between groups according to weight status and to examine the cumulative role of certain varia-

bles, such as age, gender, weight status, treatment condition, psychopathology, social support, and emotional skills, as potentially influencing factors on the presence of tobacco and alcohol consumption.

## Method

### Participants

A total of 370 participants- aged 14 - 19 years comprised the three groups of adolescents of both genders in the 9<sup>th</sup> to 12<sup>th</sup> grades at elementary schools, who were recruited in the north of Portugal: a) a *Community Group with normal weight*: 205 adolescents with healthy weight (percentiles values between P5 and P85), who were randomly recruited in three public schools and were not following a medical or nutritional program for weight control; b) a *Community Group with overweight*: 82 adolescents with overweight or obesity (percentile values  $\geq$  P85) who were not receiving any kind of medical or nutritional treatment for weight control, randomly recruited in three public schools; and c) a *Clinical Group with overweight*: 83 adolescents with overweight or obesity (percentile values  $\geq$  P85) who were receiving medical or nutritional treatment recruited at the Gastroenterology, Hepatology and Pediatric Nutrition outpatient unit of Braga's Hospital in Portugal.

### Measures

**Weight status:** The kg/m<sup>2</sup> ratio was used to calculate BMI adjusted by sex and age. Adolescents with normal weight were defined as having a BMI lower than the 85th percentile. Overweight and obese adolescents were defined as having a BMI in the 85th to 94th percentiles and in the 95th percentile or higher, respectively, according to the Centers for Disease Control and Prevention growth charts for US children (Kuczmarski et al, 2000).

**Socio-demographic and substance consumption questionnaire:** Basic demographic information was collected from all participants (e.g., age, school year, gender and parent's occupation). Socioeconomic status was measured with data on parents' education level (i.e., elementary school, secondary school, trade school or university). The questionnaire assessed clinical features of alcohol and tobacco use, such as age of initiating consumption and smoking and drinking patterns (i.e., frequency, quantity and circumstances of consumption).

**Brief Symptom Inventory (BSI; Derogatis, 1982; Portuguese version by Canavarro, 1999).** The BSI is an abbreviated form of the *Symptom Checklist-90* (SCL-90) and is used to identify self-reported, clinically relevant psychological symptoms as well as their intensity (from 0 to 4) at a specific time point. The BSI consists of 53 Likert-type items that cover nine symptom dimensions (Somatization, Obsession-Compulsion, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism) and three global indices of distress (Global

Severity Index (GSI), Positive Symptom Distress Index, and Positive Symptom Total). These global indices measure current or past symptomatology levels, the intensity of symptoms, and the number of reported symptoms, respectively. The global severity index (GSI; the mean of the 53 symptoms) was used in all analyses, where higher scores indicate more psychopathological symptoms. The psychometric characteristics of the Portuguese version attest to its satisfactory internal consistency, which justifies its use in identifying psychological disturbances. The BSI has been shown to be a reliable and valid measurement of Portuguese adolescents. Our sample obtained a high level of internal consistency ( $\alpha=0.96$ ).

**Social Support Satisfaction Scale (SSSS; Pais-Ribeiro, 1999):** This self-report questionnaire consists of 15 items/statements. Its scale yields a total score of 1-5 in which 1= "totally agree" and 5= "totally disagree". The SSSS has a total index (with a maximum value of 75) and four subscales: satisfaction with friendships, satisfaction with intimacy, satisfaction with family and satisfaction with social activities. Higher scores represent higher self-reported levels of satisfaction with social support. The internal consistency in the current sample, as reflected by Cronbach's alpha was 0.83.

**Emotional Skills and Competence Questionnaire (ESQC; Taksic, 2000, Portuguese version by Faria & Lima Santos, 2006):** This self-report measure was originally developed in Croatia by Taksic (2000) and has been used in different contexts (academic and professional). The ESCQ is classified as a "trait emotional intelligence" or "perceived emotional intelligence" measure. The ESCQ contains 45 Likert-type items ranging from 1= "never" to 6= "always", with higher scores reflecting superior emotional skills. It has three subscales: i) the ability to perceive and understand emotion (15 items); ii) the ability to express and label emotion (14 items); and iii) the ability to manage and regulate emotion (16 items). The Cronbach's alpha coefficient in the current sample was 0.92.

### Procedure

This study was approved by the Ethics in Research Committee of Braga's Hospital in Portugal and followed the ethical procedures outlined in the Declaration of Helsinki. An initial request explaining the research goals and data collection procedures was sent to the medical and academic institutions. Parents and adolescents provided written informed consent and were assured that their data would remain anonymous and confidential.

At schools, the weights and heights of participants were objectively measured by the investigator, after they completed the questionnaires. To avoid constraints related to weight, each participant's weight was measured in private standing without shoes, looking forward and positioned in the center of the balance. Participants' heights were measured with feet together and knees against a wall. At the hospital, the an-

thropometric evaluation was performed by nurses prior to the individual administration of the questionnaires.

Exclusion criteria precluded individuals who had neurological problems and BMIs below the 5th percentile in the normal weight group to avoid biasing the sample with possible cases of eating disorders, such as anorexia nervosa. The cross-sectional study design included two types of risk behaviors and compared the three groups, two by two: the normal weight group vs. the overweight community group; the normal weight group vs. the overweight clinical group; and the overweight community group vs. the overweight clinical group. In the present study, we dichotomized the two risk behaviors, following guidelines similar to those outlined by the 2007 National Youth Risk Behavior Survey (YRBS) Data Users Manual. Dichotomous variables represent the percentage of adolescents who report that they do or do not participate in a behavior. Respondents were considered to be current smokers and drinkers, if they acknowledged these behaviors at the time of the administration of the questionnaire. Participants were considered to have previously tried smoking cigarettes or drinking alcohol, if they reported having experimented with these substances on at least one occasion. Participants were considered to have excessive consumption of tobacco, if they reported smoking more than ten cigarettes per day. Participants were considered to be binge drinkers if they had been inebriated and/or had three or more drinks on at least one occasion in the previous 30 days.

### Data Analysis

We conducted all of the analyses using SPSS statistical software (Version 19.0 for Windows; SPSS Inc). Standard descriptive analyses of the entire study sample and their socio-demographic features were performed in the first step. In the next step, substance consumption behaviors were compared across the three groups using a binary logistic regression analysis.

The data were also analyzed using hierarchical logistic regression. The two risk-taking behaviors were treated as outcome variables, and age, gender, weight status, treatment status (receiving or not receiving treatment) and psychological dimensions were treated as predictive variables. For each analysis, the outcome variable was dichotomized into the presence or absence of each behavior and all risk variables were dummy coded (1=risk). Gender, weight status and treatment status were entered as dichotomous variables. *P*-values below 0.05 were considered statistically significant and values from 0.05 to 0.10 were defined as a trend.

## Results

### Participants' characteristics

As shown in Table 1, the mean ages of the control group, the overweight community group and the overweight clinical group were 16.20 years ( $SD = 1.19$ ), 16.29 years ( $SD = 1.57$ ) and 15.55 years ( $SD = 1.30$ ), respectively. We found significant between-group differences in mean age ( $p < .001$ ). Post-hoc analyses revealed that the overweight clinical group of adolescents was younger than both the overweight community group ( $p < .01$ ) and the normal weight group ( $p < .001$ ). The community groups did not differ with regard to age ( $p = .914$ ).

The mean BMIs of the clinical, overweight community and control groups were 30.63 kg/m<sup>2</sup> ( $SD = 3.95$ ), 29.49 kg/m<sup>2</sup> ( $SD = 4.19$ ), and 20.79 kg/m<sup>2</sup> ( $SD = 1.94$ ), respectively. As expected, we found significant differences in the mean BMI among the three groups ( $p < .001$ ). As expected, post-hoc analyses revealed significant differences between overweight groups and normal weight group ( $p < .001$ ). We also found marginally significant differences between the clinical and the overweight community groups ( $p = .06$ ). It is common for obese/overweight individuals in the general population to have BMIs that are slightly lower than clinical groups. This study did not find significant between-group differences with regard to sex ( $p = .13$ ) or socioeconomic status ( $p = .32$ ). The majority of the participants in the three groups (normal weight adolescents, overweight adolescents from the community and overweight adolescents in treatment) were from a lower-middle socioeconomic level (61%, 70.7% and 72.3%, respectively), and more than half of the

participants in each group were female (63.9%, 51.2% and 57.8%, respectively).

**Table 1.** Socio-demographic features by group.

Variables	Normal Weight	Overweight Community	Overweight Clinical	test
	<i>n</i> =205	<i>n</i> =82	<i>n</i> =83	
	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i>
<b>Age</b>	16.20(1.19)	16.29(1.57)	15.55(1.30)	8.58***
<b>BMI</b>	20.79(1.94)	29.49(4.19)	30.63(3.95)	419.34***
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	$\chi^2$
<b>Sex</b>				
Male	74(36.1)	40(48.8)	35(42.2)	.130
Female	131(63.9)	42(51.2)	48(57.8)	
<b>Socioeconomic status</b>				
Low	3 (1.5)	3(3.7)	2(2.4)	.323
Low-middle	125 (61)	58 (70.7)	60 (72.3)	
Middle	64 (31.2)	19 (23.2)	19 (22.9)	
Middle-high	11 (5.4)	1 (1.2)	2 (2.4)	
High	2 (1)	1 (1.2)	0 (0)	

+  $p < .10$  \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

### Prevalence and odds ratios (two by two groups) with regard to risk behaviors

Table 2 shows the data frequency of behaviors related to tobacco consumption, and alcohol consumption in the three groups. The percentages of current smokers were 24.4% in the healthy peers, 25.6% in the overweight adolescents from the community and 10.8% in the overweight adolescents in treatment. Greater percentages of current drinkers were found, including 68.8% of the normal weight group, 69.5% of the overweight community group and 32.5% of the overweight clinical group.

**Table 2.** Prevalence and Odds Ratios for Tobacco/Alcohol Behaviors among Community Groups with Normal Weight and Overweight and Clinical Group with Overweight.

Variables	Normal Weight Group <i>n</i> =205 <i>n</i> (%)	Overweight Community Group <i>n</i> =82 <i>n</i> (%)	Overweight Clinical Group <i>n</i> =83 <i>n</i> (%)	Normal Weight vs. Overweight Community Group OR(95% CI)	Normal Weight vs. Overweight Clinical Group OR(95% CI)	Overweight Community vs. Overweight Clinical Group OR(95% CI)
<b>Tobacco Consumption</b>						
Ever tried cigarette smoking	107(52.2)	42(51.2)	32(38.6)	1.04(.62-1.74)	1.74(1.03-2.93)*	1.67(.90-3.11)
Smoked a cigarette before age 13	11(5.4)	6(7.3)	3(3.6)	1.39(.50-3.90)	a	a
Smoked > 10 cigarettes per day	1(0.5)	5(6.1)	2(2.4)	a	a	a
Current cigar use	50(24.4)	21(25.6)	9(10.8)	.94(.52-1.69)	2.65(1.24-5.68)*	2.83(1.21-6.63)*
<b>Alcohol Consumption</b>						
Ever drank alcohol	177(86.3)	68(82.9)	54(65.1)	1.30(-.66-2.62)	3.39(1.86-6.20)**	2.61(1.26-5.42)*
Drank alcohol before age 13	20(9.8)	9(11)	5(6.0)	1.14(.50-2.62)	.59(.22-1.64)	.52(.17-1.62)*
Binge drinking	24(11.7)	12(14.6)	1(1.2)	.77(.37-1.63)	a	a
Current alcohol use	141(68.8)	57(69.5)	27(32.5)	.97(.56-1.68)	4.57(2.65-7.89)**	4.73(2.45-9.12)**

a odds ratios not considered (percentage of cells in the contingent table was superior to 20% with expected count less than five)

+  $p < .10$  \*  $p < .05$  \*\*  $p < .001$

*Overweight community group vs. Normal weight group:*

Overweight adolescents from the community were similar to their healthy weight peers in the prevalence of most behaviors related to alcohol/tobacco consumption (see table 2).

*Overweight clinical group vs. Normal weight group:*

The clinical overweight group was similar to the normal weight group in the prevalence of some risk behaviors related to tobacco and alcohol consumption. However, we found some exceptions. Compared with their healthy weight peers, overweight adolescents in treatment reported lower odds and frequencies of ever trying cigarette smoking (38.6% vs. 52.2%,  $p < .05$ ; OR=1.74), current cigarette use (10.8% vs. 24.4%,  $p < .05$ ; OR=2.65), ever drinking alcohol (65.1% vs. 86.3%,  $p < .001$ ; OR=3.39), binge drinking (1.2% vs. 11.7%,  $p < .05$ ; OR=10.87) and current alcohol use (32.5% vs. 68.8%,  $p < .001$ ; OR=4.57).

*Overweight community group vs. Overweight clinical group:*

Compared with the overweight community group, in the overweight clinical group, we found lower odds and frequencies of current cigarette use (10.8% vs. 25.6%,  $p < .05$ ; OR=2.83), ever drinking alcohol (65.1% vs. 82.9%,  $p < .05$ ; OR=2.61), and current alcohol use (32.5% vs. 69.5%,  $p < .001$ ; OR=4.73).

**Predictors of alcohol and cigarette use**

Regarding the prediction of the tobacco and alcohol consumption we applied a regression analysis with blocked entry procedures. For each logistic regression, age was entered firstly and gender was entered secondly in an initial step, followed by the cumulative impact of weight status and treatment condition in a middle step, and the introduction of psychological variables in the final step. Table 3 lists the  $\chi^2$  changes for the steps of each model as well as the Wald's value and relative risk ratio for the cumulative impact composite for each of the eleven outcomes.

**Table 3.** Predictors of adolescent tobacco and alcohol behaviors.

Risk Behaviors	Model	$\beta$	Wald	OR	$p$
<b>Cigarette Use</b>					
<i>Block 1: Age</i>	$\chi^2(1)=25.49^{***}$	.43	15.09	1.53	<b>.000</b>
<i>Block 2: Gender<sup>a</sup></i>	$\chi^2(2)=26.67^{***}$	.47	2.69	1.60	.10
<i>Block 3: Weight status<sup>b</sup></i>		-.01	.00	.99	.98
Treatment condition <sup>c</sup>	$\chi^2(4)=30.89^{***}$	.66	2.01	1.94	.16
<i>Block 4: Psychological dimensions</i>					
Psychopathology (total score)		.42	1.87	1.53	.17
Perceiving emotion		.39	1.54	1.48	.22
Expressing/labeling emotion		-.08	.07	.93	.79
Managing/regulating emotion		-.00	.00	.99	.99
Satisfaction with friendships		.30	1.46	1.35	.23
Satisfaction with intimacy		.01	.00	1.01	.95
Satisfaction with family		-.42	7.01	.66	<b>.008</b>
Satisfaction with social activities		.22	2.09	1.25	.15
	$\chi^2(12)=45.35^{***}$				
<b>Alcohol Use</b>					
<i>Block 1: Age</i>	$\chi^2(1)=56.21^{***}$	.58	33.69	1.82	<b>.000</b>
<i>Block 2: Gender<sup>a</sup></i>	$\chi^2(2)=58.18^{***}$	.42	2.57	1.52	.11
<i>Block 3: Weight status<sup>b</sup></i>		-.03	.01	.97	.93
Treatment condition <sup>c</sup>	$\chi^2(4)=81.29^{***}$	1.34	13.08	3.83	<b>.000</b>
<i>Block 4: Psychological dimensions</i>					
Psychopathology (total score)		.20	.56	1.23	.45
Perceiving emotion		-.19	.44	.83	.51
Expressing/labeling emotion		.03	.02	1.03	.89
Managing/regulating emotion		-.06	.05	.94	.83
Satisfaction with friendships		-.19	.86	.82	.36
Satisfaction with intimacy		.31	3.31	1.36	<b>.06</b>
Satisfaction with family		-.08	.26	.93	.61
Satisfaction with social activities		.04	.10	1.05	.75
	$\chi^2(12)=86.02^{***}$				

<sup>a</sup> Gender: 0 – female; 1 – male.

<sup>b</sup> Weight status: 0 – normal BMI; 1 – overweight

<sup>c</sup> Treatment condition: 0 – without treatment; 1 – in treatment for weight control

Starting with cigarette use, we obtained a significant model ( $\chi^2(12)=45.35$ ,  $p < .001$ ) that correctly identified

78.3% to 78.5% of the subjects across the outcomes. We controlled for the participants' age and gender in the first

two blocks and found an association between increase of age and cigarette use. In the second block, we found that weight status and treatment condition were not associated with cigarette use. The inclusion of psychological dimensions in the final block showed that cigarette use was predicted by lower satisfaction with family support.

Regarding alcohol use, we obtained a significant model ( $\chi^2(12)=86.02, p < .001$ ) that correctly identified 60.9% to 72.3% of the subjects across the outcomes. In the first block we found a positive association with age, but in the second block, we found no association between gender and cigarette use. In the third block, the weight status regression coefficients were not significant, but the condition of being integrated into an outpatient treatment to lose weight was associated with no alcohol use. The inclusion of psychological dimensions in the final block showed that alcohol use was predicted by higher satisfaction with intimate relationships with a marginal significance.

## Discussion

In this study, we explored the associations between weight and tobacco and alcohol consumption among adolescents and the role of age, gender, weight status, treatment condition for weight control, psychopathology, emotional skills and social support perceived by adolescents, for engagement in tobacco and alcohol consumption. These are the first published data characterizing the risk-taking behaviors of adolescents according to weight status (overweight or non-overweight) and treatment status for weight loss (receiving or not receiving treatment).

Our major findings were that the clinical group of overweight adolescents had fewer consumption behaviors, than the overweight community group and the normal weight controls, particularly to alcohol use. In addition, we obtained similar ratios of consumption behaviors in the overweight community group and the normal weight group, with the exception of those who smoked more than ten cigarettes per day. These results are consistent with the study by Ratcliff and colleagues (2011), which found similar ratios of most behaviors related to alcohol use in high school students with extreme obesity compared with their healthy weight peers. That study also found a few exceptions of a higher risk of engaging in some high-risk behaviors among obese individuals from the community, particularly, tobacco consumption.

In our study, the lower risk of engaging in consumption behaviors reported by the overweight clinical group may be explained by the fact that health care professionals, specifically pediatricians and pediatric nurse practitioners are well positioned to care for overweight children and to provide preventive counseling (Story et al, 2002). Thus, health professionals can alert their patients to the physical and psychosocial consequences of obesity, increasing their sensitivity to avoid certain risk behaviors such as substance use. In fact, there is evidence in the literature that access to care has been associated with a reduction in risky behaviors and an in-

crease in healthy habits (Klein, Wilson, McNulty, Kappahn, & Collins, 1999; Klein & Wilson, 2002). We also find evidence in the literature that less social contacts may prevent adolescents in enabling environments from engaging in risky behaviors (Zeller, Reiter-Purtill & Ramey, 2008). In contrast, the community groups of overweight and non-overweight adolescents in our sample may be less isolated than the clinical group and may therefore be more likely to be exposed to or engage in what might be considered normative high-risk behaviors, such as cigarette use, as Ratcliff and colleagues suggested (2011).

Another possible explanation may be social desirability because this evaluation was performed in a medical context. Although the confidentiality of the participants' data was ensured and the participants answered the questionnaires without their parents presence, there is evidence in the literature that in certain types of medical care, adolescents may worry about disclosing of sensitive health information to their parents (Ford, Millstein, Halpern-Felsher, & Irwin, 1997). According to Klein and Wilson (2002), adolescents are less likely to discuss the fact that they drink alcohol or smoke, due to concerns that the provider will subsequently disclose this information. Despite these possibilities, in general the results suggest that excess weight neither protects nor increases the risk of engaging in what might be considered somewhat normative adolescent risk-taking behaviors.

Regarding the prevalence of risk behaviors, particularly those related to cigarette use, the groups obtained rates of 10.8% to 25.6% for current cigarette use. Another study found similar results, with 39% of the girls and 25% of the boys from a sample of 743 adolescents aged 12-15 years, reporting having smoked cigarettes in the past 12 months (Whitbeck, Yu, McChargue & Crawford, 2009). We can also find evidence at earlier ages (9-11 years) of significant rates of preadolescents who had smoked at least one cigarette (12.3%) or had smoked within the previous 30 days (5.1%) (Sasco, Laforest, Benhai'm-Luzon, Poncet & Little, 2002).

The greater prevalence rates of current alcohol use (32.5% to 69.5%) were consistent with findings from a study of 7614 Mexican adolescents, which also found greater rates of alcohol consumption (30.2%), compared with the prevalence of current smoking (16.8%) (Ritterman et al., 2009). Another study with German adolescents, found a life time prevalence of alcohol consumption that was similar to or greater than our results, with rates varying from 93.7% to 86.6% in rural and urban areas, respectively (Donath et al., 2011). Our results support the evidence in the literature that rates of alcohol consumption among adolescents tend to be higher than smoking rates (e.g., Ritterman et al., 2009; Clark & Lohéac, 2007; Ruangkanhanasetr, Plitponkarnpim, Hettrakul, & Kongsakon, 2005).

Our findings regarding predictor variables for cigarette use suggest that increase of age and lower satisfaction with family were the most salient predictors of cigarette use. In contrast, weight status was not a significant predictor of cigarette use. According to Crow, Eisenberg, Story and Neu-

mark-Sztainer (2006) it seems that dieting behaviors and body dissatisfaction are more important than overweight status in the elevated risk for cigarette and alcohol use. The authors found that dieting was associated with similarly elevated rates of body dissatisfaction and substance use (such as cigarettes, alcohol and marijuana) in both the non-overweight and overweight groups. Our results regarding age were consistent with findings of several studies which verified that the prevalence of smoking in adolescents increased with age (Faeh, Viswanathan, Chiolero, Warren & Bovet, 2006; Hagger-Johnson et al., 2013).

As shown by Alfonso, Huedo-Medina, and Espada (2009), a good family support in terms of preventive education can lead to a decrease in tobacco consumption. In contrast, peer influence can interact with high levels of family dysfunction, resulting in higher frequencies of health-risk behavior (Prinstein, Boergers, & Spirito, 2001). These findings are consistent with our findings on the predictive role of lack of satisfaction with family for cigarette use.

Regarding predictors of alcohol use, the most influential factors were the increase of age, the absence of an outpatient treatment and a higher satisfaction with intimate support. Our results regarding age were consistent with findings of studies which found a high-risk for drinking or a higher prevalence of regular use of alcohol in late than early adolescence (Jackson et al., 2014; Hagger-Johnson et al., 2013; Cable, & Sacker, 2008; Faeh et al., 2006).

Once again, weight status was not a significant predictor of alcohol use. Thus, our findings support previous research in which overweight in adolescents was not associated with alcohol consumption (Peltzer & Pengpid, 2011), but our findings contrast with other studies that observed this association (Croezen, et al., 2009; Griz et al., 2010). As highlighted by Alfonso and colleagues (2009) the intimate relationships between peers is also a powerful predictor of youth's involvement on the use of alcohol. Regarding the predictive role of higher satisfaction with intimate relationships for alcohol use, our results showed that stronger intimate relationships with peers were related to alcohol use. These data were consistent with previous research (Engels & Knibbe, 2000) that found that partnership in males was associated with a smaller increase in alcohol consumption in public drinking places compared with adolescents who never had a partner or who had no partner at the time of measurement. Other studies observed that for 6<sup>th</sup>- and 7<sup>th</sup>-graders, there was a significant trend in which dating adolescents demonstrated higher rates of drinking compared with non-dating adolescents (Aikins, Simon & Prinstein, 2010). Thus, drinking in adolescence may be part of a lifestyle that involves first experiences with intimate relationships.

It is plausible that some psychological dimensions are better predictors of cigarette/alcohol use than weight status per se. Our results support this assumption because the regression models of these consumption behaviors became in general, stronger with the inclusion of psychological dimensions. Although it is not possible to infer the direction of the

relationship from the results of this study, it is reasonable to consider that higher satisfaction with intimate support, lower satisfaction with family support and the absence of a medical or nutritional care for weight control may lead to maladaptive trajectories among healthy and overweight adolescents. It is important to emphasize the importance of establishing relationships between teens and their parents or intimate partners and to provide guidance in enhancing communication to reduce the influence of drinking and smoking companions.

This study has several important strengths, such as the criterion of treatment condition (of receiving or not receiving treatment for weight control), as an explanatory factor for some differences in the prevalence of risk-taking behaviors among overweight adolescents. This is the first published study to detail risk behaviors among adolescents by considering not only weight status but also the type of population (clinical or non-clinical) and observing the impact of integrating medical and nutritional outpatient treatment.

This study also has some limitations. Only self-reports were used for measuring psychosocial variables and the study had a cross-sectional design. Although we found evidence that psychosocial dimensions predict risk behaviors in adolescence, we were unable to establish a causal direction, which suggests the need to conduct studies with a longitudinal design. However, the current approach was used instead of a longitudinal analysis because our goal was to test the hypothesis of prediction rather than to explore developmental pathways. After analyzing predictors of youth risk behaviors, the next step in future research should investigate: How the relationship between overweight/obesity and consumption behaviors develop over the time? And which comes first when associated with psychosocial factors: weight gain or consumption behaviors? Another limitation of this study was the age differences between groups namely the differences between the overweight clinical group and the other groups. The contribution of this research may be found in the intervention and prevention of such behaviors, particularly among overweight and obese adolescents.

In conclusion, the findings of the present study support the hypothesis that the rates of risk-taking behaviors in overweight adolescents are similar, if not lower (in the case of the clinical group) than the rates among their normal-weight peers. Thus, overweight adolescents are not necessarily at increased risk of consuming alcohol and tobacco. Other variables related to outpatient treatment for weight control, perceived body image and social support are more closely linked to substance consumption, than is weight status. The results highlight the importance of considering these variables and the different patterns of substance consumption when measuring and preventing risk behaviors in youth populations.

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