



## Literature Reviews

# Alcohol and Tobacco Consumption Associated Factors Among College Students: A Review

Fatores Associados ao Consumo de Álcool e Tabaco em Estudantes Universitários: Uma Revisão

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## Abstract

**Aim:** Alcohol and tobacco consumption, common among college students, may lead to future health and social problems. We aim to identify the factors associated with those consumptions among college students.

**Method:** A literature review was performed using PRISMA recommendations. Records were selected through PubMed and Scopus. Through inclusion and exclusion criteria, data from the selected studies were analysed through meta-syntheses.

**Results:** Twenty studies were included in the analysis. Tobacco consumption was associated with having smoker friends, sedentary behaviours and male sex. Drinking was associated with having parents/friends who drink, having smoker friends and male sex.

**Conclusion:** This review contributes to identify the consumption factors, allowing health care workers to develop and improve the effectiveness of possible interventions for this population, such as health education programs or psycho-educational interventions, aiming to decrease consumptions behaviours, by targeting the students who are at risk.

*Keywords:* alcohol consumption, tobacco use, health education, student health services, college students

## Resumo

**Objetivo:** O consumo de álcool e tabaco, comum em estudantes universitários, poderá acarretar futuros problemas sociais e de saúde. Assim, pretende-se identificar os fatores associados a estes consumos entre estudantes universitários.

**Método:** Foi realizada uma revisão da literatura segundo as recomendações PRISMA. Os estudos foram pesquisados através da PubMed e Scopus. Através dos critérios de inclusão e exclusão, os estudos foram selecionados e os dados foram analisados através de uma metátese.

**Resultados:** Vinte estudos foram incluídos para a análise. O consumo de tabaco associou-se com ter amigos fumadores, comportamentos sedentários e sexo masculino. Por outro lado, o consumo de álcool associou-se com ter pais/amigos que consomem bebidas alcoólicas, ter amigos fumadores e sexo masculino.

**Conclusão:** Com esta revisão foi possível identificar fatores de consumo, permitindo aos profissionais de saúde desenvolver e melhorar a eficácia de possíveis intervenções nesta população, através de programas de educação para a saúde ou intervenções psicoeducativas, objetivando a diminuição de comportamentos de consumo em estudantes com maiores níveis de risco para consumos.

*Palavras-Chave:* consumo de álcool, consumo de tabaco, educação para a saúde, serviços de saúde académico, estudantes universitários

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The consumption of alcohol and tobacco represents a problem among young adults, being related to social, financial and health problems (World Health Organization, 2014). In the academic environment students smoke (Nolen-Hoeksema, 2004) and drink socially (O'Malley & Johnston, 2002), and concurrent consumption is common (Martin, Clifford, & Clapper, 1992), suggesting that consumption within this population may occur in a favourable environment to try out and/or start consumption (Reed, McCabe, Lange, Clapp, & Shillington, 2010).

Regardless of the efforts of health education and promotion, students continue to present harmful health-related behaviours (Cooke, Sniehotta, & Schuz, 2007; Davoren, Shiely, Byrne, & Perry, 2015; Paschall, Ringwalt, Wyatt, & Dejong, 2014). These behaviours do not only have an impact on health but also on the cognitive and behaviour levels (Davoren et al., 2015), such as academic impairment, absenteeism and compromised memory and attention (Houston et al., 2014; White & Hingson, 2014). Nevertheless, changing these risk factors may enhance health status, decreasing the risk of developing health problems (Dawson, Schneider, Fletcher, & Bryden, 2007).

The process of behavioural change to reduce drinking and smoking behaviours is influenced by multiple factors or determinants, such as demographic and biological, psychological, behavioural, social and cultural factors (Buscemi, Martens, Murphy, Yurasek, & Smith, 2011; Caudwell & Hagger, 2015; Creamer et al., 2018; Neighbors, Lindgren, Knee, Fossos, & DiBello, 2011).

Alcohol and tobacco represent the substances with a higher prevalence of addictive consumption behaviours, with an estimated 4.9%, and 22.5% of the world's adult population suffering from alcohol and tobacco use disorder, respectively (Gowing et al., 2015). Consequently, attributable disability-adjusted life-years (DALYs) were highest for smoking tobacco (170.9 million DALYs), followed by alcohol consumption (85.0 million DALYs) (Peacock et al., 2018).

In this context, understanding the factors of drinking and smoking habits may be an approach to provide data and evidence to develop health education interventions by targeting consumption factors and improving behavioural change, leading to decreasing the risk of the mortality and morbidity related to drinking and smoking habits (Witkiewitz et al., 2012). Therefore, it is important to identify risk factors concerning alcohol consumption to plan and manage health-based interventions in this population, to reduce alcohol related problems (Witkiewitz et al., 2012). Acting on this population might represent an advantage due to the high number of individuals that can be targeted by this intervention, of easy recruitment and to be in a life stage where they might be receptive to a change in lifestyle (Epton et al., 2013).

This literature review aims to identify the factors associated with the consumption of alcohol and tobacco among college students.

## Method

A literature review, according to Fitzgerald and Rumrill (2005), guided by PRISMA recommendations, using the 27-item checklist (Moher et al., 2015), was performed. All phases in this review were performed by two researchers to reduce the risk of bias, who agreed on the inclusion/exclusion criteria and quality evaluation (Higgins & Green, 2011).

Table 1

*Studies' Inclusion and Exclusion Criteria (PICOS)*

Feature	Inclusion Criteria	Exclusion Criteria
Population of interest	University students (undergraduate) with $\geq 18$ years old	Postgraduate students
Intervention of interest	Alcohol and Tobacco consumption	Studies which evaluate other consumption besides alcohol and tobacco without separated analysis
Comparisons of interest	Studies of alcohol and tobacco consumption factors/determinants of university students (self-reported)	Studies of factors/determinants of alcohol and tobacco consumption on other individuals' perspective (parents, staff personnel, healthcare professional workers)
Outcomes of interest	Sociodemographic variables; Variables related to alcohol and tobacco consumption (cigarettes, e-cigarettes and other forms of tobacco products), e.g. age of first consumption, having parents/friends who consume).	Variables related to consumption of illicit substances (e.g. cannabis) when assessed as comparison of interest; Variables related to religion and ethnicity
Study design <sup>a</sup>	Quantitative studies; Cohort studies; Case-control studies; Clinical trials; Prevalence studies.	Qualitative studies; Reviews; Opinion articles; Letters to the Editor

<sup>a</sup>Decision made due to the intention to analyse primary data.

This review considered records published in English, Portuguese and/or Spanish about alcohol and tobacco consumption factors among college students.

The assessment of the records' eligibility was guided by inclusion/exclusion criteria [by participants, interventions/exposure, comparisons, outcomes and study design (PICOS; Moher et al., 2015)] regarding i) population/sample; ii) intervention and comparisons; iii) research design and iv) variables (Table 1).

To assess the records' quality, an examination was performed using the Critical Appraisal Tools (The Joanna Briggs Institute, 2016).

The studies were identified through PubMed and Scopus, due to these databases comprising peer-reviewed literature in varied fields of interest for the present study (e.g. medicine, nursing, public health, epidemiology, and social sciences). Using search terms ("smoking"; "drinking"; "university"; "students"; "risk"; "factors")<sup>ii</sup> in the last five years (on October 20th, 2015), the search through these databases was performed.

After the studies selection, data about consumption associations were collected through Pearson's correlation coefficients, t-tests, chi-squared tests and multivariate linear or logistic regression models (a significance level of .05 was used). To explore the main results of the studies, a meta-synthesis was performed, considering i) tobacco consumption: students who perceived themselves as smokers, nicotine dependents, smoke regularly or socially; ii) alcohol consumption: students who drink at least one time per week, students who drink socially or having alcohol consumption disorders; and iii) binge-drinking: the intake of four drinks for women and five drinks for men in the same occasion (National Institute on Alcohol Abuse and Alcoholism, 2004). The results were analysed and classified in different categories (sociodemographic variables, health and consumption behaviours related variables).

Afterwards, the observed proportions of the associations were assessed using as the denominator the number of studies which evaluated that specific association (e.g. the number of studies that evaluated the association between gender and alcohol consumption).

## Results

After screening through the search terms, 232 studies were obtained, which after checking for duplicates and their exclusion ( $n = 42$ ) 190 articles were obtained to be screened by title and abstract. From these 190 studies, considering the inclusion and exclusion criteria, 48 studies were considered for full-text analysis. Of these, 43.0% were excluded due to sample meeting exclusion criteria; 39.4% were on variables meeting the exclusion criteria, and 17.6% were excluded due to used methodologies. Moreover, nine articles were excluded due to full-text not being available, 11 articles due to the sample meeting exclusion criteria, five articles due to not assessing variables related with alcohol and tobacco consumption, and three articles for being published in other languages than those described as inclusion criteria. Finally, 20 studies were included for qualitative analysis. For all the 20 studies it was assessed their quality eligibility, and no study was excluded by this reason (see Figure 1).

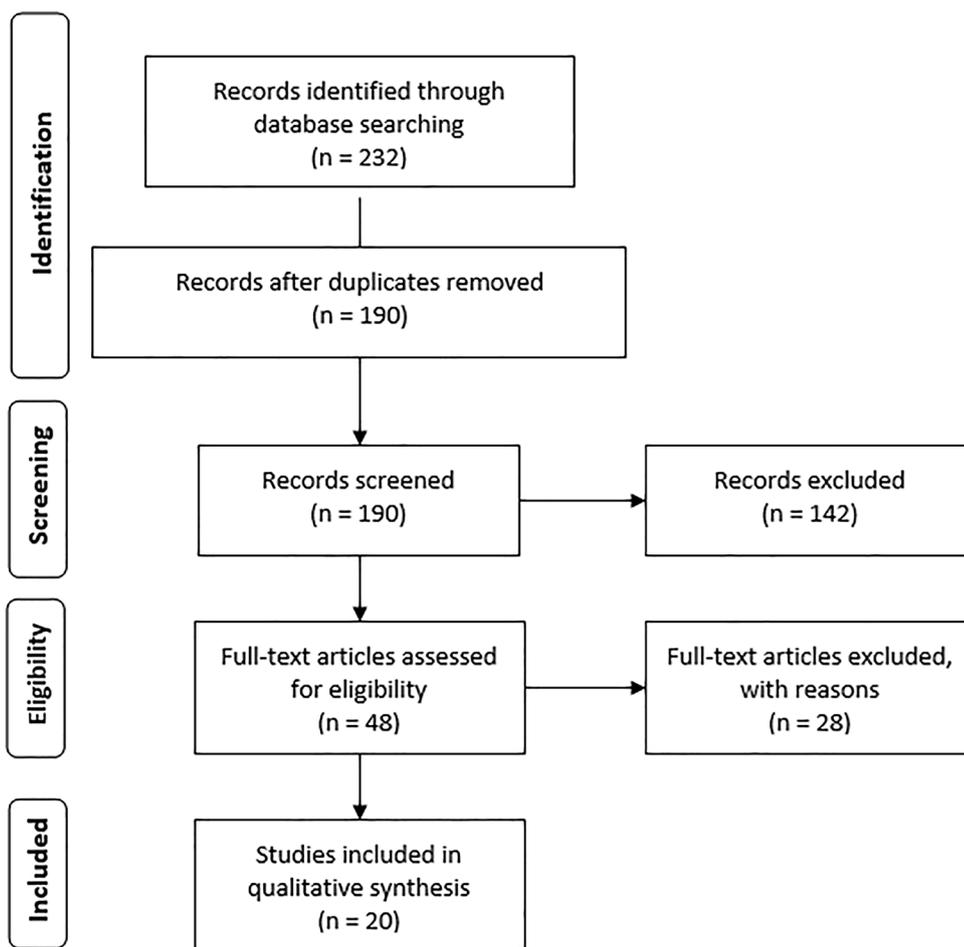


Figure 1. Review Flow Diagram (adapted from Moher et al. 2015)

Table 2

*Selected Studies Characterization (n = 20)*

Study	Sample (n)	Male (%)	Aims
Al-Naggar, Bobryshev, & Mohd Noor (2013)	1,100	46.0	Identify the relation between lifestyles with individual's health
Deressa & Azazh (2011)	622	68.5	Identify the prevalence of substances consumption with behavioural determinants
Dhanookdhary et al. (2010)	509	46.9	Identify the prevalence of alcohol/tobacco/marijuana consumption
Eisenberg, Golberstein, & Whitlock (2014)	1,641	46.0	Explore the peer effect on health risk factors: binge-drinking, smoking, illicit substance
El Ansari, Vallentin-Holbech, & Stock (2014)	3,484	22.1	Explore the relation between sociodemographic characteristics with illicit substances consumption
Gasparotto, Fantineli, & de Campos (2015)	1,599	49.3	Identify the association between sociodemographic variables with alcohol/tobacco consumption
Gebreslassie, Feleke, & Melese (2013)	764	58.7	Identify the association of alcohol/tobacco consumption
Kiyohara, Kawamura, Kitamura, & Takahashi (2010)	12,872	75.96	Explore the relation between lifestyle and tobacco consumption
Kračmarová et al. (2011)	345	56.6	Identify the prevalence of illicit substance consumption
Kraemer, McLeish, & O'Bryan (2015)	389	27.8	Explore the relation between intolerance to uncertainty with alcohol consumption
Luo, Agle, Hendryx, Gassman, & Lohrmann (2015)	1,185	31.0	Explore the relation between lifestyles with health behaviours
Moreno-Gómez et al. (2012)	987	45.5	Identify the associations between consumption and lifestyles
Peltzer & Pengpid (2014)	16,953	No data	Identify the association of tobacco with health believes, knowledge and behaviours
Petroianu, Reis, Cunha, & Souza (2010)	332	48.2	Identify the prevalence of alcohol/tobacco/illicit substances consumption
Pohjola, Rannanautio, Kunttu, & Virtanen (2014)	8,514	34.7	Identify the association between dental fear with alcohol/tobacco consumption
Primack et al. (2012)	111,245	34.0	Identify the determinants concerning substances consumption
Ramis et al. (2012)	485	46.1	Identify the prevalence of alcohol/tobacco consumption
Saddleson et al. (2015)	1,437	38.8	Identify the associations of electronic cigarettes consumption
Silva & Petroski (2012)	738	59.2	Identify the prevalence and factors related to health risk behaviours
Underwood, Fox, & Manogue (2010)	384	No data	Identify the prevalence of alcohol/tobacco/illicit substances consumption

The features of the included studies can be observed in [Table 2](#). Concerning the type of study, 95% were cross-sectional. Regarding consumption behaviours, a tobacco prevalence between 1.8% and 35.9% was observed. For alcohol, it was observed a consumption prevalence from 4.5% to 85.2%. Additionally, some studies reported a binge-drinking prevalence ranging from 31.0% to 54.0%.

The proportion of variables distribution considered in the studies about tobacco and alcohol consumption can be observed in [Table 3](#). About tobacco consumption, a higher proportion of associations were observed between having a smoker friend (100.0%), having sedentary behaviours<sup>i</sup> (66.7%), being a male student (56.3%), having lower health literacy and health status levels (50.0%), and having prior/current alcohol consumption (50.0%). With a lower proportion, but who are still more likely to present smoking habits, are older students (38.6%), living alone, with friends/roommates and outside family household (33.3%) and those having prior/current tobacco consumption (16.7%).

Furthermore, having parents and friends who drink alcohol (100.0%), having smoker friends (50.0%), being a male student (46.2%), and having prior/current smoking behaviours (42.9%) were the variables with the highest

Table 3

*Distribution of the Proportion of the Observed Associations of the Studies About Tobacco and Alcohol Consumption*

Variable	Tobacco <sup>a</sup> n (%)	Alcoholic beverages n (%)	
		Drinking <sup>b</sup>	Binge-Drinking <sup>c</sup>
<b>Sociodemographic and Health Related Variables</b>			
Sex			
Male	9 (56.3)	6 (46.2)	1 (33.3)
Female	0 (0.0)	1 (7.7)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 16</i>	<i>n = 13</i>	<i>n = 3</i>
Age			
Older students	5 (38.6)	2 (20.0)	1 (100.0)
<i>Total of records<sup>d</sup></i>	<i>n = 13</i>	<i>n = 10</i>	<i>n = 1</i>
Residence			
Living alone, with friends/roommates, outside family home	2 (33.3)	1 (20.0)	0 (0.0)
Outside university campus	1 (16.7)	0 (0.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 6</i>	<i>n = 5</i>	<i>n = 2</i>
Physical activity			
Sedentary or low physical activity	2 (66.7)	1 (33.3)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 3</i>	<i>n = 3</i>	<i>n = 1</i>
Knowledge and auto-perception of health status			
Low auto-perception of health status	1 (50.0)	0 (0.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 2</i>	<i>n = 1</i>	<i>n = 0</i>
Low levels of health knowledge	1 (50.0)	0 (0.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 2</i>	<i>n = 1</i>	<i>n = 0</i>
<b>Consumption Behaviours Related (Themselves and Their Network)</b>			
Related to tobacco consumption			
Smoker friends/colleagues	2 (100.0)	1 (50.0)	1 (50.0)
<i>Total of records<sup>d</sup></i>	<i>n = 2</i>	<i>n = 2</i>	<i>n = 2</i>
Prior experimentation of tobacco/being smoker	1 (16.7)	3 (42.9)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 6</i>	<i>n = 7</i>	<i>n = 0</i>
Related to alcohol consumption			
Friends with alcohol consumption	0 (0.0)	2 (100.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 0</i>	<i>n = 2</i>	<i>n = 0</i>
Parents with alcohol consumption	0 (0.0)	2 (100.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 0</i>	<i>n = 2</i>	<i>n = 0</i>
Prior consumption of alcohol/being consumer	5 (50.0)	0 (0.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 10</i>	<i>n = 7</i>	<i>n = 0</i>
Related to illicit substances			
Prior consumption/being consumer	1 (11.1)	0 (0.0)	0 (0.0)
<i>Total of records<sup>d</sup></i>	<i>n = 9</i>	<i>n = 7</i>	<i>n = 0</i>

<sup>a</sup>Tobacco consumption: smokers, nicotine dependents, smoke regularly or socially. <sup>b</sup>Drinking: drink at least one time per week, students who drink socially or having alcohol consumption disorders. <sup>c</sup>Binge-drinking: the intake of four drinks for women and five drinks for men in the same occasion. <sup>d</sup>Total of studies that evaluated the specific association.

proportion of associations with alcohol consumption. Binge-drinking behaviours were associated with being a man (33.3%), with older students (100.0%), and having smoker friends (50.0%).

## Discussion

With this review, we aimed to identify the factors associated with the consumption of alcohol and tobacco among college students, where it was verified that smoking behaviours are associated with social environment of the students (having a smoker friend, type of residence), with sociodemographic features (sex, age, self-perception of health literacy and health status and sedentary behaviours), and consumption behaviours (prior/current alcohol/tobacco consumption). Moreover, drinking behaviours are related with students' social environment (having parents/friends who drink and having smoker friends), with their sociodemographic characteristics (sex and age), and with consumption behaviours (prior/current smoking behaviours).

Concerning the influence of social environment on alcohol and tobacco consumption, proximal references groups, like parents and friends, present an effect on the student behaviour to a specific consumption, by influencing the descriptive (perceived consumption of the reference group) and injunctive (perceived approval from the reference group regarding a particular consumption) norms (LaBrie, Hummer, Neighbors, & Larimer, 2010; Neighbors et al., 2008). Also, the consumption of these substances may be influenced by social identity (Rimal & Real, 2005) and their sense of belonging (McGloin, Sullivan, & Thomas, 2014), causing consumption to become a social experiment (Reed et al., 2010), influenced by social norms and public policies (e.g. implementation of bans policy) (Luís & Palma-Oliveira, 2016). The descriptive norms, as well as social identity, were found to be predictors of consumption among college students (Scott-Sheldon, Carey, Elliott, Garey, & Carey, 2014), explaining the association observed between the type of residence (where students live) with alcohol and tobacco consumption.

Moreover, it was observed concurrent consumption, where a smoker student is more likely to have drinking consumption and vice-versa. These results are aligned with the evidence where students who smoke appear to be at an increased risk for drinking and alcohol involvement (e.g. binge-drinking behaviours) (Harrison, Hinson, & McKee, 2009; Myers, Doran, Edland, Schweizer, & Wall, 2013) and smoke more during drinking episodes (Witkiewitz et al., 2012). Moreover, the consumption of tobacco and/or alcohol may be associated with illicit substances use (e.g. cannabis) (Metrik, Gunn, Jackson, Sokolovsky, & Borsari, 2018; Tomczyk, Hanewinkel, & Isensee, 2015). Also, the peer's behaviours could influence alcohol and/or tobacco consumption, represented by a combination of different influences, such as the explicit offer of the substance from their peers and modelling (e.g. when a student's behaviour agrees with another student's concurrent drinking/smoking behaviour) (Borsari & Carey, 2001).

Concerning sociodemographic characteristics, low health literacy is associated with sedentary and poor dietary habits (Geboers, Reijneveld, Jansen, & de Winter, 2016) and with tobacco consumption behaviour (Stewart et al., 2013), being aligned with the results of the present study. However, the association between sociodemographic factors with drinking is explained by the common presence of concurrent consumption, such as tobacco, among college students (McKee, Hinson, Rounsaville, & Petrelli, 2004). As for age and sex, the association between being a male with these consumptions is also in agreement with the evidence showing that male students are more likely to experience or consume alcohol and tobacco (King & Chassin, 2007) and that age acts as a predictive factor of substance consumption (Lamont, Woodlief, & Malone, 2014). As for socioeconomic status (SES), this is considered in the literature as a use predictor, smoking being associated with lower SES, and drinking with higher SES (Lamont et al., 2014; Patrick, Wightman, Schoeni, & Schulenberg, 2012) and should not be disregarded.

The observed relation between health-related variables with alcohol/tobacco consumption may be due to the poor health attitudes clustering effect (Busch, Van Stel, Schrijvers, & de Leeuw, 2013), namely, for instance, a student who presents poor health-related behaviour tend to have other poor health habits (Conry et al., 2011). This effect can explain the associations observed between binge-drinking (where the present results met with the literature) with male gender, type of residence, physical activity, and other risk behaviours such as the use of tobacco, cannabis, and alcohol (Tavolacci et al., 2016).

The study has some limitations, namely the type of study of the selected records and the fact that most studies have used self-reported questionnaires that have not been validated, leading to a risk of bias within selected individual studies. This represents a limitation in the measurement of certain variables that may be associated with the consumption of alcohol and tobacco. Also, a quantitative meta-analysis was not performed to assess the different effect-sizes on alcohol and tobacco consumption and to assess possible bias by observing the funnel plot (Higgins & Green, 2011). Despite these limitations, by using two researchers to assess eligibility, the selection bias was reduced, and quality evaluation was improved (Higgins & Green, 2011).

Future research could be developed to assess which strategies are more effective to decrease or prevent risky alcohol and tobacco consumption behaviours, and to evaluate which methods are more effective to identify those students who are at higher risk.

In general, it was found that smoking habits were associated with having smoker friends, sedentary or low physical activity, and the male gender. On the other hand, drinking behaviours were associated with having parents and friends who drink, being a male student, and having smoker friends.

Therefore, this study highlights the importance of knowing the factors associated with alcohol and tobacco consumption of college students, and identifying potential students who are at a higher risk of consumption. This could lead to the creation, planning, management and to the application of more effective interventions in health education programs or psychoeducational and motivational interventions, to lessen consumptions behaviours and to raise the students' awareness to these issues.

Through the awareness of the consumption factors, healthcare professionals and health educators could be able to intervene with those who are at higher risk, through the evidence-based development of health education strategies, aimed to the enhancement of students behaviours (Grønkjær, Curtis, De Crespigny, & Delmar, 2011). Additionally, an interdisciplinary action regarding students' consumption policies should not be disregarded. On this subject, evidence has shown that changes in rules and laws are desirable as they lead to changes in students' social norms (Luís & Palma-Oliveira, 2016).

## Notes

- i) Defined as any waking behaviour characterized by an energy expenditure  $\leq 1.5$  METs (multiples of the basal metabolic rate) while sitting, reclining or lying down (Tremblay et al., 2017).
- ii) Boolean operator: [{"smoking" (MeSH Terms) OR "smoking" (All Fields)] AND [{"drinking" (MeSH Terms) OR "drinking" (All Fields) OR "alcohol drinking" (MeSH Terms) OR [{"alcohol" (All Fields) AND "drinking" (All Fields)] OR "alcohol drinking" (All Fields)] AND [{"universities" (MeSH Terms) OR "universities" (All Fields) OR "university" (All Fields)] AND [{"students" (MeSH Terms) OR "students" (All Fields)] AND [{"risk factors" (MeSH Terms) OR [{"risk" (All Fields) AND "factors" (All Fields)] OR "risk factors" (All Fields)}]} AND ("2010/10/22" [PDat]: "2015/10/20" [PDat])

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The authors have declared that no conflict of interest exist.

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