

This is the accepted manuscript of the following article:

Díaz-Geada, A., Moure-Rodríguez, L., Mallah, N., Corral, M., Platas Ferreiro, M. L., & Caamaño-Isorna, F. (2024). Nomophobia and Alcohol, Tobacco, and Cannabis Consumption in Adolescents in Galicia. *Cyberpsychology, behavior and social networking*, 27(4), 261–267.

<https://doi.org/10.1089/cyber.2023.0408>

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Nomophobia and alcohol, tobacco and cannabis consumption in adolescents in Galicia.

Abstract

This study aimed at exploring the association of nomophobia with alcohol, tobacco, and/or cannabis consumption among high school students. We carried out a cross-sectional study among high school and vocational training students in Galicia, Northwest Spain (n=3,100). Collected data included nomophobia, sociodemographic variables, and alcohol, tobacco, and cannabis consumption. Nomophobia was measured using the validated Nomophobia Questionnaire (NMP- Q). Adjusted odds ratios (ORs) and their 95% confidence intervals (CIs) were estimated using generalized linear mixed models. More than a quarter of the adolescents (27.7%) had Nomophobia. We found an association between nomophobia and a high level of tobacco smoking in the last month in boys (OR=2.16 95% CI: 1.55-3.03). Nomophobia was also associated with higher odds of binge drinking in both genders (girls OR=1.86 95% CI: 1.61-3.52; boys OR=2.29 95% CI: 1.68-3.13) and with cannabis consumption in boys (OR=1.74 95% CI: 1.07-2.81). Our findings highlight the importance of a comprehensive investigation of the factors underlying alcohol, tobacco, and cannabis consumption in the adolescent population.

Keywords: Nomophobia; Adolescent Behavior; Smartphone; Binge Drinking; Drug use.

Introduction

The use of mobile phones has become widespread in society, and it converted into a daily essential. Beyond facilitating immediate access to information and communication, it provokes changes in daily habits and behaviors¹. For some people, the mobile has become an indispensable part of the body and therefore of their identity². The need to constantly check our mobile and have it available seems to affect multiple spheres of our lives. Thus, the continued use of smartphones was associated with behavioral, mental, and physical health changes^{3,4} and the consequences of inappropriate mobile phone use have become a challenge for public health. For this reason, studies on problems associated with smartphone use are emerging.

Different studies have pointed to the relationship between the excessive use of the smartphone and other behaviors with common characteristics such as the consumption of psychoactive substances. Heavy smartphone use was associated with increased alcohol consumption in a study of Finnish adolescents⁵. Gallimberti et al.⁶ reported a greater risk of drunkenness among adolescents who use mobile phones intensively. In Catalonia - Spain, Muñoz-Miralles et al.⁷ found an association between the problematic use of smartphones and substance use in adolescents. The intensive use of mobile phones was also associated with tobacco use in various settings such as Spanish adolescents⁷ and Japanese university students⁸.

Excessive smartphone use was associated with emotional and cognitive changes^{4,6}, stress or depression⁹, difficulties in social interaction¹⁰, or appearance of anxiety component problems^{1,11,12} as is the case of Nomophobia (No Mobile phone Phobia). Nomophobia, rather than a standalone fear, is accurately described as the apprehension linked to the possibility of being without a mobile phone, with this anxiety intensified by the fear of isolation. This phobia is defined by the fear of being left without a mobile phone (forgetting it at home, running out of battery, not having coverage, or not receiving calls or messages for a while)¹³. Nomophobia is

expanding as the smartphone does in society¹ and converted into a public health problem¹². The dependence on mobile devices increases the chance that people, especially adolescents, suffer its consequences¹².

In many publications, heterogeneous terms and definitions of nomophobia were applied; contributing therefore to generating conceptual confusion in these investigations, which do not allow comparisons between populations to assess the scope of this phenomenon^{14,15}. Consequently, it is crucial to conceptualize and define the scope of nomophobia and the typology of associated disorders and to base research findings on data generated using validated instruments¹⁴.

The novelty of the construct has implied the development of validated tools for its monitoring. The Nomophobia Questionnaire NMP-Q is an adequate instrument for the quantitative measurement of the various elements of nomophobia which are mainly present in the form of fears or worries such as the fear of mobile battery draining^{12,16-18}. NMP-Q has been used in different contexts^{16,18,19}, nonetheless, studies vary with respect to the used cut-off points and therefore in outcome classification such as “risky or problematic use”, “risk of nomophobia” or “problematic nomophobia” or “mild, moderate or severe nomophobia”¹⁷. The cited reviews^{3,12,15} agree that most published studies of nomophobia use the NMP-Q questionnaire. However, although this may seem like a point in favor of comparability, there is still a lot of work to do in this regard. For example, as León Mejía et al¹⁵ refer, the information available on the version of the NMP-Q used must be improved, in this sense several of the studies carried out in India -the country with the most articles published on this topic^{20,21}- do not indicate whether they used the Indian or the English version of NMP-Q. Without going any further, the fact that there is more than one version of the questionnaire in the same language (as occurs in Spanish) also increases the difficulty in comparing data and possibly the heterogeneity of the results. The paucity of

research findings from other geographical regions as diverse as East Europe or Latin América has curtailed the reliability of the global pooled prevalence derived from this study. Additional investigations are needed in these territories to provide a more accurate estimate of the global prevalence of nomophobia, enhancing our understanding of its origins and impact, taking cultural influences into consideration²¹. This heterogeneity between studies has complicated the estimation of the true magnitude of the problem, with the prevalence of nomophobia ranging from 10% to 90% depending on factors like gender, age, or mobile use duration^{3,12,15}. Moreover, it complicates the comparison of findings of different studies and thus affects the ability to draw conclusions¹².

Literature shows heterogeneous findings regarding the differences in Nomophobia by gender³. Although there are inconsistencies according to the measured dimensions of the construct such as the inability to access information, giving up comfort, not being able to communicate, or loss of connection, different studies have pointed to a higher prevalence of nomophobia among women^{22,23}. As for age, it has been reported that nomophobia is prevalent at all ages^{23,24}, yet data point to a higher risk among the younger population^{12,15,16,22}. On the other hand, it has been suggested that there is an association between nomophobia and personality characteristics and development²⁵. Evaluating nomophobia in the adolescent stage is therefore fundamental to understanding its possible implications in the development of personality and socialization.

Studies that specifically investigate the association between nomophobia and psychoactive substance consumption are scarce. The association of nomophobia with the consumption of alcohol²⁶ and tobacco²⁷ in Turkish university students was investigated, but no significant associations were observed. No studies so far have explored the association between nomophobia and cannabis use. Given the substantial evidence indicating a connection between excessive mobile phone usage and health-risk behaviors, we posit that there exists an association

between nomophobia and an increase in substance use among adolescents. This correlation likely contributes to the accumulation of health risk factors within this population. Investigating the determinants and consequences of nomophobia should consider the different contexts of the problem, in order to comprehensively assess it and thus improve the design of public health strategies¹⁴. In this line, the present study was thought to assess the association between nomophobia and alcohol, cannabis, and tobacco use in an adolescent Spanish population, while focusing on gender differences.

Methods

Study design and settings

A cross-sectional study was carried out among all the students of compulsory secondary education, baccalaureate, or professional training between 14 and 18 years of age in the City Council of Lugo (Galicia-Spain). An exhaustive sampling of all centers, classrooms, and groups was carried out to achieve the total target population (n=3,100). The study was approved by the Bioethics Committee of the University of Santiago de Compostela (USC).

Data collection

The direction and orientation team of each center was contacted to present the study and request collaboration. The centers were contacted by post letter at first and later by phone. An appointment was made to present the study and deliver the questionnaires. During the meeting, the teaching staff was instructed on how to act while the students are completing the questionnaire to minimize possible biases. In order to increase participation, the students completed the questionnaire in the classroom during routine tutorial hours.

Study instrument

To build up a comprehensive instrument, questions from the following validated questionnaires were compiled and added to a base questionnaire that included questions on sociodemographic variables, alcohol consumption, and cannabis and tobacco use. In order to increase the comparability of the results, questions were selected from the Galician version of the Survey on Drug Use in Secondary School Students 2016²⁸. In addition, to assess cannabis use, the Spanish-validated version of the Cannabis Abuse Screening Test (CAST) questionnaire²⁹ was applied. The problematic mobile phone use was determined using a version of the Nomophobia Questionnaire (NMP-Q)¹⁶ that has been previously validated in the adolescent population in Spain.

Exposure ascertainment

The total score of the NMP-Q can range between 20 and 140 points, where a higher score implies higher levels of nomophobia. The cut off points have been chosen according to the Spanish validated version of the questionnaire, interpreted as follows: 20 - 38 points "occasional user", 38 - 86 points "frequent user", > 86 points "risk user" and > 115 points "problematic user"¹⁶. Scores above 86 points were considered as "having nomophobia".

Outcome ascertainment

Binge Drinking (BD) was measured by asking: "In the last 30 days, on how many days did you drink five or more glasses, beers, or cups of alcoholic beverages on the same occasion? (By occasion we mean drinking the drinks in a row or at an interval of approximately two hours)." Participants could answer by selecting any of the following options: No day, 1 day, 2 days, 3 days, 4-5 days, 6-9 days, 10-19 days, or 20 or more days. Those who answered "No day" were considered not to practice BD, while all the other responses were deemed BD. This pattern of

consumption has substantially increased its prevalence in recent years in our environment and constitutes a priority problem for public health. The sensitivity and specificity of this question with this cut-off value are respectively 0.72 and 0.73, and the area under the curve is 0.767 (95% CI: 0.718–0.816)²⁸.

Tobacco smoking was ascertained through the following question: “In the last 30 days, how often did you smoke cigarettes?” The possible responses were: never, less than one day a week, someday a week, and daily. Participants who reported “never” having smoked tobacco were used as a reference, while the other options were considered having smoked tobacco.

Cannabis use was determined by asking “How many days did you use hash or marijuana (weed, cannabis, chocolate, joint, cost, hash oil) in the last 30 days?”. The following options of answers were given: never, not at all, 1 day, 2 days, 3 days, 4-5 days, 6-9 days, 10-19 days, and 20 or more days. The answers “never, or not at all” were grouped as a reference category, while the remaining options were deemed cannabis use in the past month. Participants who scored at least four points were considered to have problematic substance use.

Data analysis

Adjusted odds Ratios and their 95% confidence intervals (CI) were estimated using Generalized Linear Mixed Models (GLMM) for dichotomous dependent variables. The models were controlled for sex, age, and the weekly available money pocket. The latter variable, understood as a proxy variable of socioeconomic status, was measured by asking "How many euros did you have per week for your personal expenses?" and the following options were provided: 0-20 euros; 20 to 50 euros; and >50 euros. The option 0-20 euros was used as a reference. Maximum models were generated that included all the theoretical independent variables according to the

literature, as well as those with a p-value <0.2 in the bivariate analysis. The independent variables with higher p-values were successively eliminated from the original model, provided that the coefficients of the main exposure variables did not change by more than 10% and that Schwartz's Bayesian Information Criterion (BIC) was improved.

Results

A total of 2,133 adolescents with a mean age of 15.93 years participated in the study. 47.1% of participants were females and 52.9% were males. The median available money pocket was 20 euros (Interquartile range: 10 – 40), with no significant differences by gender. The sociodemographic characteristics of the study population are described in table 1.

More males reported daily tobacco smoking than females (males: 10.3%; 95%CI: 7.9 – 12.9, versus females: 7.1%; 95%CI: 5 – 9.3). Likewise, more males reported cannabis use in the past month than females (males: 10.5%; 95%CI: 8.7 – 12.4, versus females: 7.7%; 95%CI: 6.2 – 9.2). A total of 30.9% of the participants reported BD, with no differences between the two genders (Table 1).

Almost one-fifth of the adolescents reported a problematic level of nomophobia (4.8%; 95%CI: 2.7 – 6.9), with a higher prevalence among females (5.7%; 95%CI: 2.8 – 8.8) than males (3.7%; 95%CI: 0.8 – 6.8), although, the average hours of daily mobile use was slightly higher for males (4.9 h) than females (4.5 h) (Table 2).

Nomophobia was associated with more than double the odds of last-month tobacco smoking among men (OR=2.16; 95%CI 1.55-3.03) (Table 3). It was also associated with 86% higher odds of BD among females (OR=1.86; 95%CI 1.61-3.52) (Table 3). The odds of BD in males with nomophobia was greater than that in females (OR=2.29; 95%CI: 1.68-3.13) (Table 3). Nomophobia was associated with 74% increased odds of cannabis use among males (OR=

1.74; 95%CI: 1.07 – 2.81), yet no significant association was observed among females (OR= 1.35 95%CI: 0.85-2.17) (Table 3).

Discussion

More than one-quarter of our study population had nomophobia, and around one-fifth had severe nomophobia defined by the problematic use of the mobile phone. Our findings showed that nomophobia was associated with practicing BD in both genders and with higher levels of tobacco and cannabis use in males.

Our findings are comparable to that obtained by González-Cabrera et al.¹⁶ who showed a similar prevalence of severe nomophobia among high school students from other autonomous communities in Spain; Navarra, Asturias, and Salamanca. These data suggest that nomophobia is more prevalent among young adults than among adolescents. A study carried out among young adults in Italy reported that severe nomophobia exceeded 7%³¹. A meta-analysis also showed that 22% of Spanish Nursing students had nomophobia¹⁸. These variations in prevalence estimates could be related to the difference in the studied age groups. Other studies were undertaken in Spain such as that of Aguilera-Manrique et al.³² and Gutiérrez-Puertas et al.³³, but it was not possible to compare the findings due to methodological differences. Although the NMP-Q was used in all these studies, we used the total score of the questionnaire as a reference, while Aguilera-Manrique et al.³² and Gutiérrez-Puertas et al.³³ calculated the means for each factor of the nomophobia construct. Although the NMP-Q is a widely used instrument that guarantees the cross-cultural investigation of nomophobia and whose psychometric properties have been studied, the inconsistencies in its use yield complicate the comparison of findings from different studies¹⁵. Our study seems to suggest in general terms a possible relationship between nomophobia and substance use, especially alcohol. But it is imperative that more studies be conducted to explore this relationship.

In our study, girls reported nomophobia more than boys. These results agree with those of several studies undertaken in Spain, yet they studied other age groups^{16,22,32-34}. However, we differ from the findings of Kaviani et al.³⁵ who studied nomophobia in a large cohort of Australian students of nearly three thousand participants, and Argumosa-Villar et al.²⁴ who investigated nomophobia in a sample of 242 Spanish students between ages of 16 and 25. Kaviani et al.³⁵ and Argumosa-Villar et al.²⁴ did not find statistically significant differences in the levels of nomophobia between men and women. On the other hand, Darvishi et al.³⁶, found 10% more nomophobia among male college students in Iran. Although it is difficult to contrast gender differences in studies on nomophobia, due to the different measurements of the construct, most of the research seems to indicate a greater vulnerability in girls^{3,12,15}. It is worth mentioning to highlight that these studies were carried out in contexts as diverse as Australia, Iran, or Spain, and in people older than those who participated in our study. All these facts point to the need to investigate the influence of different psychosocial factors and gender roles according to culture on nomophobia¹⁵.

A possible explanation for these gender differences could be that females use social media more than males^{37,38}. Another factor is that females are usually more afraid than boys of not being able to communicate and contact others immediately²². In this context, qualitative studies suggested that girls could use their mobile phones as a "protective element" at night since it allows them constant communication with their friends or family in possible risk situations³⁹. Although ironically, the use of mobile phones in this context could become a method of control and surveillance of girls. Its use has served to externalize via social networks, both an attractive image and social integration, as well as to show violent acts or intensive alcohol consumption. These circumstances contribute to a "technological vulnerability" that exacerbates the risk of

situations linked to the consumption of psychoactive substances during nightlife³⁹. Accordingly, the need to clarify the influence of gender roles on nomophobia is noted^{22,39,40}.

Our data indicated that nomophobia is associated with BD in adolescent males and females, but with tobacco and cannabis use only in men. Regarding alcohol consumption, our results do not agree with those of the study by Fidanci et al.²⁶ who studied university students from Turkey and did not find an association between having nomophobia and consuming alcohol. Another study on Turkish university students investigated the association between nomophobia and smoking, and unlike our study, no association was observed²⁷. Nevertheless, the use of social networks via smartphones could promote substance use from the increased influence of peers on these risky behaviors⁴¹. In this sense, our findings coincide with that of studies carried out among adolescents in Italy and which found an association between the use of mobile phones and social networks and alcohol and tobacco consumption, which supports the results of our study^{6,41}. We are not aware of studies that directly investigated the association between nomophobia and cannabis use.

Socioeconomic factors could influence the association of nomophobia with substance use. A poorer academic performance was observed in students with nomophobia and substance use while being a woman and having good family relationships decreases the chances of developing nomophobia and using substances⁷. Our study highlights the need to continue investigating the impact of nomophobia on substance use, in order to develop health programs that can comprehensively prevent drug and non-drug addiction.

Our study has its strengths and limitations. Among its strengths, is that it was carried out in an adolescent population. In general, the literature has focused on the university population^{8,11,36,40,42,43} while nomophobia seems to start at younger ages^{15,44,45}. Nomophobia, as a public health problem, is expected to worsen given the increasing early access to technology

and the greater vulnerability of adolescents at the level of neural, psychological, and social development. In this sense, assuming that nomophobia is a prevalent phenomenon at all ages^{23,24}, it is necessary to pay special attention to the adolescence stage, a key stage to monitor risk behaviors that debut in it. Another strength of our study is the recruitment of high school students. Compulsory secondary education optimizes the representativeness of the sample and allows us to administratively approach individuals at the age of experimentation whose personality has not been fully developed and in which the mobile can constitute a symbol of social status among the peer group⁴⁶. This research is not exempt from some limitations that should be taken into account in future publications: 1) The different measurements of nomophobia in the literature may have conditioned the external validity of our results, although in our case we used the validated NMPQ questionnaire, whose psychometric properties have been widely assessed and which facilitates cross-cultural investigation of nomophobia^{12,15}; 2) The cross-sectional nature of this study prevents establishing causal relationships; 3) The answers of the people participating in this study were self-reported, although there is evidence that the use of questionnaires of this type is an adequate method to measure the consumption of different psychoactive substances⁴⁷. In addition, the fact that it is an individual and anonymous questionnaire could reduce the risk that participants would respond seeking social approval, a bias typical of the use of surveys; 4) Much of the diversity of the spectrum of gender differences could be missed by studying them in a binary way; 5) The variables under investigation have been assessed using the ESTUDES survey to enhance comparability, although not all of them have been measured with validated tools. However, for BD and nomophobia, we employed validated questionnaires to enhance the reliability of these data.

In conclusion, one in four high school students presented nomophobia. This phenomenon was associated with the practice of health risky behaviors such as the intensive consumption of

alcohol and tobacco and cannabis use. Longitudinal studies that investigate the causal relationships between nomophobia and these risky behaviors are required. The current social context contributes to greater use of mobile phones and therefore to a possible increase in problems related to their inappropriate use. Nomophobia is a booming problem, and its association with risky behaviors such as alcohol consumption in young people, challenge families, the educational community, and authorities. Regulatory measures governing the use of cell phones in educational settings in Spain are presently under consideration. Monitoring the effects of these proposals on device usage patterns and their potential implications for the future health of young individuals will be imperative. Early identification of vulnerable people will allow the development of more realistic and effective solutions for this new public health problem.

Conflict of interest

None to declare.

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Tables

Table 1.

Description of the study population stratified by gender.

	Total		Males		Females		p-value
	N	Mean/Median/% [95%CI]	N	Mean/Median/% [95%CI]	N	Mean/Median/% [95%CI]	
Age							
14 years	327	15.1 [13 - 17.4]	145	14.3 [11.1 - 17.5]	181	16.2 [13.1 - 19.2]	0.99
15 years	499	23.1 [20.9 - 25.3]	237	23.3 [20.2 - 26.6]	258	23 [20 - 26.1]	
16 years	554	25.6 [23.5 - 27.9]	249	24.5 [21.3 - 27.7]	296	26.4 [23.4 - 29.5]	
17 years	562	26 [23.8 - 28.3]	274	26.9 [23.8 - 30.2]	283	25.3 [22.2 - 28.4]	
18 years	218	10.1 [7.9 - 12.3]	112	11 [7.9 - 14.3]	102	9.1 [6.1 - 12.2]	
Country of birth							
Spain	1,986	92.3 [91.2 - 93.4]	947	93.6 [92.2 - 95]	1023	91.5 [90 - 93.1]	0.34
Others	166	7.7 [6.6 - 8.8]	65	6.4 [5 - 7.9]	95	8.5 [7 - 10.1]	
Weekly available money pocket (euros)							
Average [95% CI]		90.7 [43.4 - 138]		106.6 [32.2 - 180.9]		45.5 [25.4 - 65.7]	0.12
Median [IQR]		20 [10 - 40]		20 [10 - 40]		20 [10 - 35]	
Binge drinking in the last 30 days	661	30.9 [29 - 33]	313	31.1 [28.2 - 34.1]	340	30.7 [28 - 33.5]	0.24
Tobacco smoking in the last 30 days							
Never	1,702	79.1 [77.5 - 80.8]	779	77.1 [74.8 - 79.7]	907	81.1 [78.9 - 83.2]	0.025
Some day a week	151	7.0 [5.4 - 8.7]	67	6.6 [4.3 - 9.2]	81	7.2 [5.1 - 9.4]	
Less than a day a week	111	5.2 [3.5 - 6.8]	60	5.9 [3.6 - 8.5]	51	4.6 [2.4 - 6.7]	
Daily	187	8.7 [7.1 - 10.3]	104	10.3 [7.9 - 12.9]	80	7.1 [5 - 9.3]	
Cannabis use in the last 30 days	193	9 [7.9 - 10.2]	106	10.5 [8.7 - 12.4]	85	7.7 [6.2 - 9.2]	0.027

CI: confidence interval; IQR: interquartile range

Table 2.*Mobile use by the general population and classified by gender.*

	Total		Males		Females		p-value
	N	Mean/Median/% [95% CI]	N	Mean/Median/% [95% CI]	N	Mean/Median/% [95% CI]	
Mobile use (hours)							
Average [95% CI]		4.7 [4.5 - 4.8]		4.9 [4.6 - 5.1]		4.5 [4.3 - 4.7]	0.043
Median [IQR]		4 [2 - 5]		4 [2 - 5]		4 [2.5 - 5]	
Nomophobia							
Ocasional use	224	10.6 [8.6 - 12.8]	112	11.2 [8.3 - 14.3]	112	10.2 [7.3 - 13.3]	
Frequent use	1,298	61.7 [59.6 - 63.8]	643	64.6 [61.6 - 67.6]	645	58.8 [55.9 - 61.8]	0.005
Risky use	483	22.9 [20.9 - 25.1]	204	20.5 [17.6 - 23.5]	277	25.3 [22.3 - 28.3]	
Problematic use	100	4.8 [2.7 - 6.9]	37	3.7 [0.8 - 6.8]	63	5.7 [2.8 - 8.8]	

CI: confidence interval; IQR: interquartile range

Table 3.

Association between nomophobia and psychoactive substance use stratified by gender.

	Odds Ratio (95% CI)*					
	Tobacco smoking in the last 30 days		Binge drinking in the last 30 days		Cannabis use in the last 30 days	
	Females	Males	Females	Males	Females	Males
Nomophobia						
No	1	1	1	1	1	1
Yes	1.38 [0.97-1.95]	2.16 [1.55-3.03]	1.86 [1.61-3.52]	2.29 [1.68-3.13]	1.35 [0.85-2.17]	1.74 [1.07-2.81]

**Adjusted by age and available money pocket.*

CI: confidence interval; IQR: interquartile range