Association between negative mood states, psychoactive substances consumption and bullying in school-aged adolescents

Asociación entre el estado de ánimo negativo, el consumo de sustancias psicoactivas y el *bullying* en adolescentes escolarizados

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Abstract

Objective: mental health problems during adolescence lead to increased morbidity and mortality. We intend to test the hypothesis that bullying and addictive substance use is related to negative mood states.
Methods: We carried out a cross-sectional study among high school students in Burela (Northern Spain) (n=238). "Negative mood state" was defined as experiencing the following: feeling tired, sad, out of place, bored, hopeless, nervous or lacking sleep. Independent variables were binge drinking, having smoked tobacco or cannabis, and the corresponding perceived risk of using them. The variable bullying was also measured. Poisson regression models with robust variance were estimated, and Prevalence Ratios were obtained.
Results: 10.5% [CI 95% (7.2-15.2)] of the students reported suffering negative mood states. Students declaring low perceived risk of cannabis use [PR = 2.6 (1.2-5.5)], having tried this addictive substance at some point [PR = 3.1 (1.1-8.9)] and having suffered bullying [PR = 4.8 (2.4-9.6)] increased the risk of experiencing negative mood states.
Conclusion: It would be advisable to design and implement interventions aimed at improving mental health during adolescence which account for the use of addictive substances and being a victim of bullying.
Key Words: negative mood states, substance use, adolescents, bullying.

Resumen

Antecedentes: los problemas de salud mental durante la adolescencia suponen un aumento de la morbimortalidad y la discapacidad. Se pretende testar la hipótesis de que el *bullying* y el consumo de sustancias psicoactivas están asociados al estado de ánimo negativo.
Métodos: estudio transversal entre estudiantes de Educación Secundaria Obligatoria (ESO) (n=238) de los institutos de Burela (Lugo). El "estado de ánimo negativo" se definió a partir de los siguientes ítems: sentirse cansado/a, triste, desplazado/a, aburrido/a, desesperanzado/a, nervioso/a o insomne. Como variables independientes se consideraron: el *binge drinking*, el haber fumado alguna vez tabaco o cannabis, así como sus correspondientes percepciones de peligrosidad. Además, se midió la variable *bullying*. Se estimaron modelos de regresión de Poisson con varianza robusta y se obtuvieron Razones de Prevalencia (RP).
Resultados: el 10,5% [IC95% (7,2-15,2)] de la población encuestada presentaba estado de ánimo negativo. La nula o baja percepción de peligrosidad para el cannabis [RP=2,6 (1,2-5,5)], haber probado alguna vez esta sustancia adictiva [RP=3,1 (1,1-8,9)] y haber sufrido *bullying* [RP=4,8 (2,4-9,6)] se asociaban al estado de ánimo negativo.
Conclusiones: sería recomendable crear intervenciones para la mejora de la salud mental durante la adolescencia que tengan en cuenta el consumo de sustancias adictivas y el hecho de haber sufrido *bullying*.
Palabras clave: estado de ánimo negativo, consumo de sustancias, adolescentes, *bullying*.

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During adolescence, emotional processes taking place over longer periods of time such as despair, sadness, loneliness or nervousness comprise negative mood states, which can predict major affective disorders (Monteagudo et al., 2013) with repercussions both on the health of the individual and on their social and family environment. In the last Spanish Survey of National Health, one in ten people aged 15 and over stated that they had been diagnosed with a mental health problem (Instituto Nacional de Estadística, 2018). A significant number of adolescents have thus reported different emotional and behavioral symptoms. Specifically, 22.6% of a sample of Spanish students reported feeling nervous, and 10.8% felt sad or discouraged, with differences in terms of sex and age (Ortuño-Sierra, Fonseca-Pedrero, Paíno & Aritio-Solana, 2014).

Negative mood and poor mental health during adolescence have been associated with bullying (Mello et al., 2017; Moore et al., 2017; Singham et al., 2017), defined as abuse or victimization occurring in school contexts among students. Spanish school pupils who have suffered bullying have lower scores on the *Strengths and Difficulties Questionnaire* (SDQ) mental health scale (Garcia-Continente, Pérez-Giménez, Espelt & Nebot Adell, 2013; Mangot-Sala et al., 2018). In recent years, a stable trend has been observed in Spain, with 4.3% of students aged 13 to 16 reporting being bullied (Sánchez-Queija, García-Moya & Moreno, 2017).

Adolescence is a period during which numerous risky behaviors such as the use of addictive substances begin. In Spain, 38.5% of adolescents have smoked tobacco, 31.3% have used cannabis and 76.9% have drunk alcohol at least once in their lives (Plan Nacional Sobre Drogas, 2016). A variety of studies have reported links between the use of psychoactive substances and poor mental health, with greater evidence in the case of cannabis (Fonseca-Pedrero, Ortuño-Sierra, Paino & Muñiz, 2016; Mangot-Sala et al., 2018), the use of which could also increase the risk of attempted suicide in this population (Carvalho et al., 2018). Bullying and substance use may thus be associated with mood states during adolescence (Gaete et al., 2017; Garcia-Continente et al., 2013; Monteagudo et al., 2013; Moore et al., 2017). Some studies have found a relationship between bullying and substance use with problems of anxiety, low self-esteem, depressive tendencies or suicidal ideation in the adolescent population (Moore et al., 2017), as well as with negative mood states (Ahonen, Nebot & Giménez, 2007).

As far as we know, no studies have analyzed the possible interrelation between substance use, bullying and negative mood in small populations. For this reason, it would be interesting to examine this relationship in a multicultural population of less than 10,000 inhabitants in which more than fifty nationalities coexist and where immigrant and indigenous populations are found to use similar substances (Díaz Geada, Busto Miramontes & Caamaño Isorna, 2018).

The aim of this study is then to analyze the associations between psychoactive substance use, bullying and negative mood state in high school students.

Methods

Study design and population

This is a cross-sectional study in which all students of the 2nd, 3rd and 4th years of compulsory secondary education (ESO) in the two high schools (IES) of Burela: IES O Perdouro and Monte Castelo (n=262).

Data collection

Data collection was implemented using the FRESC questionnaire (Risk Factors in High School Students), designed by the Barcelona Public Health Agency (ASPB) to show emerging risk behaviors among secondary-school students. Two models of the questionnaire were used: one for 2nd and 3rd year pupils (13-15 years of age) and another for the 4th grade (15-16 years). To access the study population, school management was contacted and the pertinent parental authorization was obtained. Data collection took place in the classrooms during school hours, in the presence of a teacher and a member of the research team in December 2015. The questionnaire was anonymous and self-completed so that data confidentiality was guaranteed at all times.

Variables

- Dependent variables

Negative mood states: negative mood state was measured with the following items: feeling too tired to do things; having problems falling asleep; waking up too early; feeling out of place; feeling sad or depressed; feeling hopeless about the future; feeling tense and nervous, and feeling bored. Answers were ordered on a five-point Likert scale from 0 = never, to 4 = always. The variable was then dichotomized, with "never", "almost never" and "sometimes" taking the value 0; and "frequently" and "always" represented by 1. Participants who answered "frequently" or "always" on at least three of the items were classified as having a negative mood state (Ahonen et al., 2007).

- Independent variables

In terms of main independent variables, those relating to substance use, their perceived risk and bullying were analyzed.

Regarding substance use, we took into account:
a) *Alcohol - binge drinking* was defined as having drunk four or more alcoholic beverages on the same occasion.
b) *Smoking* - having smoked cigarettes at some point.
c) *Cannabis* - having used cannabis at some point.

Low risk perception has been positively associated with drug use (Ojeda, Patterson & Strathdee, 2008; Tortajada Navarro et al., 2008), so we estimated the proportion of adolescents believing alcohol, tobacco and cannabis to be very risky.

Regarding the bullying variable, three items were considered to contribute: Have you been laughed at or insulted at school or on your way there? Have you been hit, attacked or threatened at school or on your way there? Do you sometimes get excluded by your classmates? Five possible answers were given for the three questions: never, once, twice, three times, more than three times. Subjects were considered as suffering or having suffered bullying when answering at least one of these questions "three times" or "more than three times", or answering "once" or more to all three items in the last twelve months (Garcia-Continente et al., 2013).

Other variables selected as potential confounding variables were:

a) *Self-reported educational level.* This variable was measured through the question "In relation to your classmates, how would you rate your educational level?"

b) *Place of origin.* The nationality of the father and the mother determined whether the respondent was indigenous or immigrant. Students whose parents were both born outside Spain were considered immigrants.

c) *Family Affluence Scale (FAS).* Respondents were asked whether their family had a car or a van, whether they had their own room, how many computers they had and the number of times they had been on vacation with their family in the previous year. The answers to the questions were added and classified into: low FAS (considered as having disadvantaged socioeconomic status) for a score of 0-3 points; average FAS (average socioeconomic status) if the score was 4-5 points; and high FAS (socioeconomically advantaged) with 6-7 points.

Age and sex were also taken as independent variables.

Statistical analysis

A descriptive statistical analysis was performed for the overall sample and itemized according to the presence/absence of negative mood state. The prevalences of negative moods were calculated for each of the independent variables.

For the analysis of the association between the independent variables and negative mood, univariate and multivariate Poisson regression models with robust variance were estimated, and prevalence ratios (PR) were obtaining with their respective confidence intervals at 95% (CI 95%) (Espelt, Mari-Dell'Olmo, Penelo & Bosque-Prous, 2017). The percentage of missing data ranged from 0.42% for the negative mood variable to 2.5% for the cannabis use variable. Analyses were performed using the STATA 15.0 statistical package.

Results

Our final sample comprised 238 students, representing a 91% survey of the 2nd, 3rd and 4th years of Burela's two high schools (n=238).

Table 1 shows the characteristics of the sample by mood state. Girls made up 46.8% of the sample, immigrants 20.7%, students aged 15 years or over 47.3%, average or low educational level 74.3%, and those reported having high FAS 39.6%. Finally, 10.5% [CI 95% (7.2-15.2)] of the surveyed population had negative mood states.

The prevalence of negative mood varied according to the different independent variables (Table 2), affecting 13.5% of girls [CI 95% (8.3-21.3)], and 7.9% of boys [CI 95% (4.2-14.2)]. Furthermore, it was slightly higher among those who used addictive substances. Among students who had experienced binge drinking, the prevalence of negative mood was 12.2% [CI 95% (5.1-26.4)] as against 10.2% [CI 95% (6.6-15.3)] among those who had not. For the adolescent population that had smoked cigarettes at some time, the prevalence of negative mood states reached 20% [CI 95% (8.4-40.6)] compared to 9.7% [CI 95% (4.9-18.4)] in those who had not smoked. Finally, among pupils who had used cannabis at some point, the prevalence of negative mood rose to 30% [CI 95% (9.3-64.2)] compared to 9.5% [CI 95% (6.2 -14.2)] in those who had never done so. As regards bullying, the prevalence of negative mood states was also higher among those who had suffered it, 34.5% [CI 95% (19.3-53.3)], compared to those who had not, 7.2% [CI 95% (4.3-11.6)].

Table 2 shows the prevalence ratios (PR) of negative mood by independent variable, with the corresponding 95% CI. Thus, the risk of experiencing negative mood state was higher among students who perceived cannabis as being not or moderately risky [$PR_{unadjusted}$ = 2.6; CI 95% (1.2-5.5); $PR_{adjusted}$ = 2.3; CI 95% (1.1-4.9)], among those who had used this substance at some point [$PR_{unadjusted}$ = 3.1; CI 95% (1.1-8.9)], and among those who had been bullied [$PR_{unadjusted}$ = 4.8; CI 95% (2.4-9.6); $PR_{adjusted}$ = 4.4; CI 95% (2.2-9.0)].

As for the other variables of substance use analyzed, no statistically significant association was observed either in the bivariate or in the multivariate analysis; even when point estimates suggested associations in the same direction as those found for cannabis.

Discussion

Negative mood state is associated with cannabis use, low perceived risk of the use of this substance and having been the victim of bullying. Our results suggest that 10.5% [(CI

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Table 1. *Sociodemographic characteristics by mood states in students aged 13 to 16 (Burela, 2015).*

	Negative mood states		Non-negative mood states		Total		
	n	%	n	%	n	%	p-valor
Sex							
Female	15	60	96	45,3	111	46,8	0,136
Male	10	40	116	54,7	126	53,2	
Nationality							
Spanish	20	80	168	79,2	188	79,3	0,930
Immigrant	5	20	44	20,8	49	20,7	
Age							
‹15 years	10	40	115	54,2	125	52,7	0,177
›=15 years	15	60	97	45,8	112	47,3	
Self-reported educational level							
Low-average	21	84	155	73,1	176	74,3	0,239
High	4	16	57	26,9	61	25,7	
FAS							
Low	4	16	42	20,3	46	19,8	0,843
Medium	10	40	84	40,6	94	40,5	
High	11	44	81	39,1	92	39,6	
Alcohol							
Yes	5	20	36	17,0	41	17,3	0,706
No	20	80	176	83,0	196	82,7	
Tabaco							
Yes	5	20,8	20	9,6	25	10,8	0,093
No	19	79,2	188	90,4	207	89,2	
Cannabis							
Yes	3	12,5	7	3,4	10	4,3	0,038
No	21	87,5	200	96,6	221	95,7	
Alcohol perceived risk							
Moderately or not risky	18	72	168	79,3	186	78,5	0,404
Very risky	7	28	44	20,7	51	21,5	
Smoking perceived risk							
Moderately or not risky	16	66,7	133	64,3	154	65,3	0,878
Very risky	8	33,3	74	35,7	82	34,7	
Cannabis perceived risk							
Moderately or not risky	8	32	28	13,4	36	15,4	0,015
Very risky	17	68	181	86,6	198	84,6	
Bullying							
Yes	10	40	19	9,0	29	12,2	0,000
No	15	60	193	91,0	208	87,8	

95% 7.2-15.2)] of Burela high school students suffer from negative mood states.

Before discussing results, there are some limitations of the study which should be noted. First, the study is of a transversal design, which prevents causal relationships from being established. In addition, alcohol, tobacco and cannabis use of adolescents was self-reported. Nevertheless, there is evidence that the use of self-report questionnaires is a viable method to measure variables of substance use, for example alcohol consumption in adolescents (Engs & Hanson, 1990). Furthermore, anonymity and the individual format of the questionnaire may reduce the bias of social desirability inherent in the surveys. For the variables bullying and negative mood, although

Table 2. *Prevalence and prevalence ratios for negative mood states in students aged 13 to 16 (Burela, 2015).*

	N	Prevalence (%)	IC95%	RPno ajusted	IC95%	RPajusted	IC95%
Prevalence of negative mood states							
Sex							
Female	111	13,5	(8,3-21,3)	1			
Male	126	7,9	(4,2-14,2)	0,6	(0,3-1,2)		
Nationality							
Spanish	188	10,6	(6,9-15,9)	1,0	(0,4-2,6)		
Immigrant	49	10,2	(4,2-22,5)	1			
Age							
‹15 years	115	8,0	(4,3-14,3)	0,6	(0,3-1,3)		
›=15 years	97	13,4	(8,2-21,1)	1			
Self-reported educational level							
Low-average	155	11,9	(7,8-17,7)	1,8	(0,6-5,1)		
High	57	6,5	(2,4-16,4)	1			
FAS							
Low	46	8,7	(3,2-21,3)	1			
Medium	94	10,6	(5,8-18,8)				
High	92	11,9	(6,7-20,4)	1,16	(0,7-1,9)		
Alcohol							
Yes	41	12,2	(5,1-26,4)	1,2	(0,5-3,0)		
No	196	10,2	(6,6-15,3)	1			
Smoking							
Yes	25	20	(8,4-40,6)	2,2	(0,9-5,3)		
No	207	9,1	(5,9-13,9)	1			
Cannabis							
Yes	10	30	(9,3-64,2)	3,1	(1,1-8,9)		
No	221	9,5	(6,2-14,2)	1			
Alcohol perceived risk							
Moderately or not risky	186	9,7	(6,2-14,9)	0,9	(0,4-2,0)		
Very risky	51	13,7	(6,6-26,3)	1			
Smoking perceived risk							
Moderately or not risky	154	10,4	(6,4-16,3)	1,1	(0,5-2,3)		
Very risky	82	9,7	(4,9-18,4)	1			
Cannabis perceived risk							
Moderately or not risky	36	22,2	(11,4-38,9)	2,6	(1,2-5,5)	2,3	(1,1-4,9)
Very risky	198	8,6	(5,4-13,4)	1		1	
Bullying							
Yes	29	34,5	(19,3-53,3)	4,8	(2,4-9,6)	4,4	(2,2-9,0)
No	208	7,2	(4,3-11,6)	1		1	

we employed questions previously used in other research (Ahonen et al., 2007; Garcia Continente, Pérez Giménez & Nebot Adell, 2010; Garcia-Continente et al., 2013; Mangot-Sala et al., 2018), the psychometric properties of these questions are not known, so we cannot rule out any classification bias. The small sample size prevented disaggregation by sex, although it should be noted that the survey covered 91% of the school population of Burela's 2nd, 3rd and 4th years high school students. It is important to point out that small populations have been very little studied and that Burela has migratory characteristics that make it a focus of particular interest (Oca, 2013; Pérez, Garcia-Continente & Grup col·laborador enquesta FRESC 2012, 2013).

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In our study, 10.5% of students reported suffering negative mood state, a figure in line with the ranges found in our context. Prevalences of 16% have been found, for example, among Catalan students of 14 and 16 years of age (Ahonen et al., 2007) or 19% in 3rd and 4th year high school students (Monteagudo et al., 2013).

In our study, negative mood states were linked in a statistically significant way only to cannabis use and the perceived risk of using it. However, other studies have found statistically significant relationships with smoking or binge drinking (Julià Cano, Escapa Solanas, Marí-Klose & Marí-Klose, 2012; Martínez-Hernáez, Marí-Klose, Julià, Escapa & Marí-Klose, 2012). This may be a result of the sample size of our study as well as of the different methods used in the literature for substance use measurement (Degenhardt et al., 2013; Mangot-Sala et al., 2018; Monteagudo et al., 2013; van Gastel et al., 2013). It should be noted that the causal relationship between negative mood state and substance use is unclear since it can occur in both directions (Merikangas et al., 1998).

The perception of low or no risk involved in the use of an addictive substance is associated with its use (Ojeda et al., 2008; Tortajada Navarro et al., 2008). Our results support this relationship in the case of cannabis, with a low or a lack of perceived risk of using it also linked to negative mood. This should not be underestimated, since it converts the perception of risk into a double risk factor for the health of adolescents: cannabis use together with the negative mood state. This association between the influence on mental health and the use of cannabis in adolescents has also been reported in a study carried out with high school pupils in Barcelona (Mangot-Sala et al., 2018).

Negative mood state is associated with bullying. These results are consistent with other research (Bond, Carlin, Thomas, Rubin & Patton, 2001; Gaete et al., 2017; Garcia-Continente et al., 2013; Mangot-Sala et al., 2018; Mello et al., 2017; Monteagudo et al., 2013; Singham et al., 2017). In addition, there are systematic reviews, meta-analyses (Carta, Fiandra, Rampazzo, Contu & Preti, 2015; Moore et al., 2017) and some longitudinal studies (Bond et al., 2001) which show that being the victim of bullying increases anxiety and depressive symptomatology, or self-destructive behaviors and the risk of suicide in this population. The causality between bullying and negative mood state is again unclear since substance use could function as an intermediate variable between being bullied and negative mood (Livingston et al., 2018), with this particular study, which monitored the daily effect of being a victim of bullying in a sample of North American students, confirming that the use of such substances was a tool to mitigate the negative mood caused by bullying (Livingston et al., 2018).

Conclusions

An association was found in the adolescent population of Burela between negative mood state, cannabis use and being bullied. Our results show the need to implement measures in schools and the social environment of adolescents in order to improve their knowledge of such realities and permit early detection of such risky behaviors. It would thus be advisable to create interventions for the improvement of mental health during adolescence which take into account the use of addictive substances and being a victim of bullying.

Acknowledgments

Conflict of interests

The authors of this article declare no conflict of interest. Albert Espelt is associate editor of the journal Adicciones, but this did not play any role in the process of publication.

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