

Negative mood states and related factors in a sample of adolescent secondary-school students in Barcelona (Spain)

Emily Q. Ahonen^{a,b} / Manel Nebot^{a,b} / Emmanuel Giménez^a

^aEvaluation and Intervention Methods Service, Agència de Salut Pública de Barcelona, Barcelona, Spain;

^bDepartment of Experimental and Health Sciences, Universitat Pompeu Fabra, Barcelona, Spain.

(Estados de ánimo negativos y los factores relacionados en una muestra de adolescentes de enseñanza secundaria de Barcelona)

Abstract

Introduction: Poor mental health is a common problem in adolescence. Little information is available, however, about the factors influencing negative mood states in otherwise healthy adolescents. We aimed to describe the mood states and related factors in a sample of adolescents in the city of Barcelona (Spain).

Methods: We administered a health survey to a sample of 2,727 students from public, subsidized, and private schools in Barcelona, aged approximately 14, 16, and 18 years old. To analyze the associations among moods and related factors, we used bivariate logistic regression, and fitted multivariate logistic regressions using the statistically significant variables from the bivariate analysis. To examine the possible group effects of the school on individual students, we employed multilevel analysis.

Results: The frequencies of negative mood states increased with age, with girls consistently reporting more frequent negative mood states than boys. The factors associated with negative mood states were problematic alcohol use, perceived mistreatment or abuse, antisocial behavior, intention to use or current use of illegal drugs (not including cannabis), lower perceived academic performance, and feeling isolated.

Conclusions: Mood states are influenced by lifestyle and social factors, about which there is little local information. To plan and implement appropriate public health interventions, more complete information about the possible areas of influence is required. To complement the information obtained from studies such as the present study, longitudinal and qualitative studies would be desirable.

Key words: Mood states. Adolescents. Mental health.

Resumen

Introducción: El deterioro de la salud mental es un problema frecuente en la adolescencia. Sin embargo, se sabe poco de los factores influyentes en los estados de ánimo negativos en adolescentes saludables. Pretendemos describir los estados de ánimo negativos y los factores relacionados en una muestra de adolescentes de la ciudad de Barcelona.

Métodos: Administramos una encuesta de salud a 2.727 estudiantes de escuelas públicas, concertadas y privadas en Barcelona con edades de 14, 16 y 18 años. Usamos análisis de regresión logística bivariada para estudiar las relaciones entre los estados de ánimo negativo y los factores relacionados, para ajustar después un modelo logístico multivariante con los factores significativos del análisis bivariado. Para examinar la posible influencia de los factores grupales de los centros escolares en los individuos, hemos empleado el análisis multinivel.

Resultados: Las frecuencias de los estados de ánimo negativos aumentaban con la edad, y las chicas consistentemente relataban estados de ánimo peores que los chicos. El uso problemático del alcohol, el abuso y el maltrato percibido, las conductas antisociales, la intención de usar o el uso actual de drogas ilegales, el bajo rendimiento escolar percibido y el sentirse marginado se relacionaron también con estados de ánimo negativos.

Conclusiones: Hay factores personales, sociales y de estilos de vida, sobre los que tenemos poca información local, que influyen sobre los estados de ánimo. Para planear e implementar intervenciones de salud pública apropiadas, necesitamos una información más completa sobre las áreas de posible influencia. Para complementar la información obtenida en estudios como éste, sería deseable llevar a cabo estudios longitudinales y cualitativos.

Palabras clave: Estados de ánimo. Adolescentes. Salud mental.

Correspondence: Dr. Manel Nebot.
Evaluation and Intervention Methods Service,
Public Health Agency of Barcelona. Príncipe d'Asturias, 63. 08012 Barcelona. Spain.
E-mail address: mnebot@aspb.es

Recibido: 2 de diciembre de 2005.

Aceptado: 28 de junio de 2006.

The Spanish version of this article is available in the electronic edition of GACETA SANITARIA (www.doyma.es/gs).

Introduction

Worldwide, it is estimated that up to 20% of children and adolescents suffer mental health problems that affect their daily functioning¹. Symptoms of mental health problems affect 4% of adolescents between 12-17 years of age, and the prevalence at 18 years old is 9%¹. Furthermore, it is estimated that 20-25% of older adolescents have experienced at least one episode of major depression in their lives². Yet, it is also estimated that only 10-15% of adolescents who require mental health services receive them¹, in most cases because mental health problems are not recognized as health problems deserving medical attention.

Available mental health indicators tend to summarize rates of clinically-measured mental illness, and sometimes attribute mental health difficulties in adolescents to the physical and hormonal changes that young people experience³. Similarly, literature on the subject most often speaks not of positive mental health, but rather of mental illness. Such a viewpoint disallows a more holistic vision of the mental health of young people in the context of lifestyle habits.

Previous studies have identified demographic, social and lifestyle factors associated with adolescent mental health problems. Among these, age, race or ethnicity, experience with bullying, violent behavior, the use of addictive substances and somatic symptoms emerge in various studies³⁻⁶. Other studies have found associations with sexual practices, diet and physical activity with mental health status^{4,7,8}. In prospective studies, some researchers have proposed causal relationships between such factors as depression⁹⁻¹² and tobacco use.

While these studies generally have associated similar factors with adolescent mental health status, our lack of understanding about causal relationships highlights the complexities of the relationships among social and lifestyle factors and the mood states and mental health of young people. Furthermore, such research is scarce in our context. For these reasons, it is important to explore the influence of the risk factors suggested in other cultural contexts in our cultural context. For this purpose, questions about mood states and related factors were included in the 2004 FRESC survey, a periodic survey of health and lifestyle risk factors administered approximately every three years since 1987 to secondary (high school) students in Barcelona. FRESC survey main goal is to maintain a global and continuous vision of adolescent health in the city.

The objective of this study was to describe the mood states and related demographic, social and lifestyle factors in a sample of adolescents in the city of Barcelona, providing a first step for future studies and the development of appropriate interventions. Factors studied

include age, gender, violent conduct, experience with bullying, perceived mistreatment and abuse, substance use, physical activity, antisocial behaviour, and use of barrier methods in pregnancy and sexually transmitted infections (STI) prevention.

Methods

The study population is high school students from public, private and subsidized (private schools that receive public funding with certain conditions) schools in Barcelona. We obtained a school census from the Municipal Education Institute and stratified for school type, course year, socio-economic level of the school district (using the Family Economic Capacity Index to group schools into socioeconomic categories of low, medium and high)¹³ and school size. Within each stratus, we selected schools by random cluster sampling, using the classroom as the sample unit. We divided classrooms by school course year, which correspond approximately to 14, 16, and 18 years of age in individuals. The sample represents 10% of the total of the classrooms in each school year division.

After obtaining permission from each school and replacing those that decided not to participate ($n = 5$), we administered the survey in each classroom using research team personnel and health professionals between February and April, 2004. Among the five non-participating schools, three schools did not participate because they did not offer the course level in question, one because it was a special education center, and the fifth negated participation without giving a reason. In each case, more students were sampled from classrooms in schools with similar characteristics (size, type of school, age group, SES of the neighbourhood) to maintain sample size. The administration of the survey took place during regular school hours in the presence of the classroom teacher and a member of the research team trained to respond to questions. The survey questions appeared in both Spanish and Catalan to facilitate its use in a bilingual population.

We collected, coded, and introduced data into the database. We excluded cases without information on sex and those outside our age range. We randomly selected one survey from each classroom and checked for accuracy of data entry. We performed descriptive analyses, searching aberrant or inconsistent data.

Study variables

We used a question composed of six items to measure symptoms of negative mood states. Students were asked, «How many times have you felt: very tired doing

normal activities? Difficulty sleeping or staying asleep? Out of place, sad, or depressed? Hopeless facing the future? Nervous or tense? Bored with things? Threatened by another student at school?» Answers were collected on a five-option Likert scale ranging from never to always.

Because the question did not have a time period attached, we believed it important to take into account the fact that almost any individual will at some time experience one or more of the mood states presented. In order to differentiate occasional experience of negative mood states from the experience of possibly problematic negative mood states, we created a dichotomous variable. Answers were divided into two groups, where «never», «almost never», or «sometimes» were one group (0 value), and «frequently» or «always» were given a point. Adding up the points accumulated in the six items, students who accumulated three or more points were considered to have negative mood states. The items used were adapted from the Health Behaviour in School-aged Children (HBSC) survey¹⁴.

The studied risk factors tested included the following previously used constructs from the FRISC-FRESC survey in Barcelona: age, sex (male or female), school type (public, subsidized, or private), problematic alcohol consumption (presence determined by an affirmative answer to at least two of the following questions: weekend drinking; drinking in clubs, bars or parties with friends; having drunk 4 or more alcoholic beverages on the same occasion; one or more drunken episodes in the last 6 months; and having bought alcohol for oneself), regular smoker status (once a week or daily smoking), current use of cannabis (positive answer to having tried cannabis), intention to use other illegal drugs (yes or no to the listed substances), leisure time activities (going to galleries, malls, bars or discos once a week or more), physical activity (exercising once a week or more), and risky sexual practices (not indicating the use of condoms during sexual activity)¹⁵⁻¹⁹. Constructs relating to perceived mistreatment and abuse (indicating mistreatment at home, school, or in the street), antisocial conduct (answer of once or more to skipping school, fighting, breaking or stealing things), experience with bullying (experience of being laughed at or insulted, hit, attacked or threatened, teased or marginalized twice or more in the last 12 months), and violent behavior (a positive answer to either fighting or fighting in school twice or more in the past 12 months or ever having required medical attention after a fight in the same time period) are new additions to the FRESC, and are adapted from the widely used Health Behaviour in School-aged Children, Youth Risk Behavior Surveillance System, and Peer Harassment in School surveys²⁰⁻²⁵. The adaptations and translations were done by members of our research group, using a process of consensus with collaboration from experts in the relevant fields of interest.

We asked for and obtained permission to administer the surveys from the administrators of each participating school. The administrators notify the families of participating students of the survey administration as an element of all the extracurricular activities employed throughout the school year. At the time of survey administration, each student had the option to refuse participation without consequences.

Statistical analysis

We analyzed all data using the statistical packages SPSS for Windows and HLM version 6. To confirm the internal consistency of each item within the mood states indicator, we employed Cronbach's Alpha using a cut off point of 0.6.

To study the relationships between mood states and risk factors, we used a bivariate logistic regression, and fit a multivariate model using the significant variables in the bivariate analysis. We stratified all analyses for age and sex. We used a two-level multilevel analysis, employing the same variables that were significant in the multivariate regression. The first level was the individual and the second level was the school the individual attended. In the multilevel analysis, we considered only the changes in the intercept at the first level that are caused by the group residuals in the second level (schools). Testing the significance of these residuals enables us to see the changes provoked by considering or not considering the group level. Such modelling is equivalent to a simple formulation of GEE (Generalized Estimating Equations).

Results

Data, analyses and discussion refer to the age group of the individual student. The study sample comprised 2,727 students; 1,018 aged 14 years old, 957 aged 16 years old, and 752 aged 18 year old. We achieved response percentages of 90.1% among 14 year old students, 84.4% among 16 year old students, and 76.7% and 62.1% in the two academic categories that correspond to 18 year olds.

After removing an incoherent item from the construct (Have you felt threatened by another student at school?), Cronbach's Alpha for the mood states indicator in boys was 0.625, and for girls it was 0.632. Table 1 summarizes the characteristics of the sample. It is almost evenly distributed by sex, with medium socioeconomic level being the most frequent level of participants, and most respondents coming from subsidized schools.

Table 1. Demographic and social characteristics of the sample. FRESC 2004, Barcelona (Spain)

Variable	Age			Total
	14 years	16 years	18 years	
	n (%)	n (%)	n (%)	
Total	1,018	957	752	2,727
Sex				
Male	510 (50.1)	497 (51.9)	371 (49.3)	1,378
Female	508 (49.9)	460 (48.1)	381 (50.7)	1,349
	%	%	%	
Socioeconomic level ^a				
Low	25.0	22.7	21.3	
Medium	48.8	51.3	44.7	
High	18.9	16.3	12.8	
School type				
Public	29.7	25.7	33.0	
Subsidized	64.4	71.5	42.6	
Private	4.6	2.3	23.9	

^aThe FECL is an aggregate synthetic index of the neighborhood where the student lives, elaborated using indicators such as job, electricity consumption, home rental prices or car horse power, and classified in 3 levels (< 91 low, between 91 and 114 middle and > 114 high).

Table 2. Frequency of negative mood states by item, age and sex. FRESC 2004, Barcelona (Spain)

Age	Component of the dependent variable	Boys (%)	Girls (%)
14	Felt tired?	21.4	16.9
	Had difficulty sleeping?	19.6	26.6
	Felt out of place, sad, depressed?	7.3	19.5
	Felt hopeless about the future?	7.8	9.6
	Felt nervous or tense?	21.2	29.7
	Felt bored with things?	18.4	22.4
	Item sums (3 or more items)	12.9	19.3
16	Felt tired?	19.5	20.7
	Had difficulty sleeping?	19.9	31.3
	Felt out of place, sad, depressed?	6	16
	Felt hopeless about the future?	8.9	15
	Felt nervous or tense?	19.1	35.2
	Felt bored with things?	18.7	18.7
	Item sums (3 or more items)	11.9	22.4
18	Felt tired?	22	29
	Had difficulty sleeping?	25.6	36.2
	Felt out of place, sad, depressed?	8.6	18.4
	Felt hopeless about the future?	12.9	17.6
	Felt nervous or tense?	23.4	42.3
	Felt bored with things?	16.4	18.9
	Item sums (3 or more items)	15.1	24.4
Total	Item sums whole sample (3 or more items)	13.1	21.8

Table 2 summarizes the frequency of reported negative mood states by age and sex. While individual percentages for each item within the scale are reported in the table, students were categorized as having negative mood states if they scored positively on three or more items. Girls more frequently reported problems with mood states and these frequencies increased with age. Eighteen year old boys reported negative mood states more frequently than both categories of younger boys. In all age groups, girls reported nervousness with more frequency than any other negative mood indicator, while boys most frequently reported tiredness or sleepiness.

Bivariate and multivariate analyses of negative mood states and related factors at the ages of 14, 16 and 18 are reported by age in tables 3, 4, and 5, respectively. Although in the case of 14 year old girls and 16 year old boys the second level residuals in the multilevel analysis did not reach statistical significance ($p = 0.359$ and $p = 0.109$, respectively), the corresponding odds ratio (OR) are only slightly changed (see tables 3 and 4). For ease of interpretation, and because in the majority of cases the residuals were significant, all OR shown are reported using the results of the multilevel analysis.

In 14 year olds of both genders, problematic alcohol use was associated with reporting negative mood

states (boys: OR = 2.5; 95% CI, 1.3-4.8; girls: OR = 3.1; 95% CI, 1.7-5.7). In boys, additional associated factors were antisocial conduct (OR = 2.2; 95% CI, 1.2-4.1) and perceived mistreatment at school (OR = 2.5; 95% CI, 1.3-4.7), while in girls perceived mistreatment or abuse at home (OR = 3; 95% CI, 1.5-6.0) and at school (OR = 2.4; 95% CI, 1.3-4.3) increased the likelihood of reporting negative mood states.

Sixteen year olds showed slightly different risk factors. In boys, intention to use or current use of illegal drugs (not including cannabis) (OR = 2.4; 95% CI, 1.3-4.2) and being teased or marginalized (OR = 4.6; 95% CI, 2.3-9.4) were associated with negative mood states. In girls, current or intended future use of illegal drugs (not including cannabis) (OR = 2.4; 95% CI, 1.2-4.8) was also associated with negative mood states, as was perceived abuse or mistreatment at school (OR = 3.5; 95% CI, 1.6-7.3).

In the oldest male students (18 years old), perceived mistreatment and abuse both at home (OR = 4.4; 95% CI, 1.8-10.8) and at school (OR = 2.6; 95% CI, 1.3-5.2) associated with negative mood states. In girls, the factors associated were current or intended future use of illegal drugs (not including cannabis) (OR = 2.1; 95% CI, 1.1-3.4), lower levels of perceived school success (lowest third of class OR = 4.9; 95% CI, 1.8-12.6), and perceived mistreatment at school (OR = 2.8; 95% CI, 1.7-4.7).

Table 3. Bivariate and multivariate analysis of the associations between mood states and demographic variables, substance use, leisure activities, perceived violence and mistreatment, antisocial conduct and physical activity in 14 year-olds by sex. FRESC 2004, Barcelona (Spain)

Variables	Answer categories	Boys		Girls	
		Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
<i>Demographics</i>					
Socioeconomic level	Low				
	Medium	1.2 (0.6-2.3)		1.1 (0.6-1.9)	
	High		1.1 (0.5-2.6)		1.0 (0.5-2.0)
School type	Public				
	Subsidized or Private	1.2 (0.7-2.5)		0.8 (0.5-1.3)	
Self-perceived academic level	Lowest 1/3	2.6 (1.2-5.8)		3.4 (1.6-7.5)	
	Middle 1/3	1.1 (.5-2.3)		1.2 (0.7-2.1)	
	Highest 1/3				
<i>Use of substances</i>					
Regular tobacco use	Yes	2.1 (0.8-5.7)		2.0 (1.0-4.1)	
	No				
Problematic alcohol consumption	Yes	3.3 (1.8-5.9)	2.5 (1.3-4.8)	2.8 (1.6-4.7)	3.1 (1.7-5.7)
	No				
Cannabis use	Yes	2.1 (1.2-3.6)		1.9 (1.2-3.1)	
	No				
Intention or use of other illegal drugs	Yes	2.7 (1.4-5.4)		2.2 (1.2-4.0)	
	No				
<i>Leisure activities</i>					
Afternoon/night activities (once a week)	Yes	1.3 (0.7-2.4)		2.0 (1.1-3.4)	
	No				
Malls	Yes	7 (0.3-1.2)		1.3 (0.8-2.0)	
	No				
Entertainment	Yes	5 (0.2-1.1)		1.1 (0.7-1.7)	
	No				
<i>Bullying</i>					
Teasing/marginalizing	Yes	2.2 (1.3-3.9)		1.4 (0.8-2.3)	
	No				
Hitting	Yes	2.4 (1.1-5.5)		5 (0.0-4.8)	
	No				
<i>Violent behavior</i>					
Physical fights	Yes	1.6 (0.9-2.7)		2.3 (1.1-4.9)	
Physical fights (med. attn)	No	2.6 (1.0-5.5)		2.6 (0.8-8.3)	
<i>Perceived mistreatment/abuse</i>					
At home	Yes	3.1 (1.3-7.1)		4.2 (2.4-7.3)	3.0 (1.5-6.0)
	No				
At school	Yes	2.9 (1.6-4.9)	2.5(1.3-4.7)	2.8 (1.6-4.6)	2.4 (1.3-4.3)
	No				
In the street	Yes	2.4 (1.2-4.8)		2.2 (0.9-5.2)	
	No				
<i>Antisocial conduct</i>	Yes	2.8 (1.6-5.0)	2.2 (1.2-4.1)	2.5 (1.3-4.7)	
	No				
<i>Physical activity</i>	Yes	1.0 (0.4-2.4)		0.7 (0.4-1.2)	
	No				

CI: confidence interval; OR: odds ratio.

Table 4. Bivariate and multivariate analysis of the associations between mood states and demographic variables, substance use, leisure activities, perceived violence and mistreatment, antisocial conduct, physical activity and condom use in 16 year-olds by sex. FRESC 2004, Barcelona (Spain)

Variables	Answer categories	Boys		Girls	
		Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
<i>Demographics</i>					
Socioeconomic level	Low				
	Medium	1.2 (0.6-2.3)		0.5 (0.3-0.8)	
	High	0.7 (0.3-2.0)		0.5 (0.2-1.1)	
School type	Public				
	Subsidized or Private	0.929 (0.5-1.7)		0.9 (0.5-1.5)	
Self-perceived academic level	Lowest 1/3	1.5 (0.6-3.5)		2.0 (1.1-3.6)	
	Middle 1/3	1.0 (0.5-2.0)		2.5 (1.1-6.0)	
	Highest 1/3				
<i>Use of substances</i>					
Regular tobacco use	Yes	0.8 (0.3-1.6)		2.0 (1.2-3.2)	
	No				
Problematic alcohol consumption	Yes	1.1 (0.6-2.0)		2.0 (1.2-3.4)	
	No				
Cannabis use	Yes	1.3 (0.7-2.2)		1.6 (1.0-2.5)	
	No				
Intention or use of other illegal drugs	Yes	2.51 (1.3-4.5)	2.4 (1.3-4.2)	3.2 (2.0-5.2)	2.4 (1.2-4.8)
	No				
<i>Leisure activities</i>					
Afternoon/night activities (once a week)	Yes	0.8 (0.4-1.4)		1.6 (0.9-2.7)	
	No				
Malls	Yes	0.08 (0.4-1.7)		0.4 (0.2-0.8)	
	No				
Entertainment	Yes	0.2 (0.0-1.4)		1.2 (0.5-2.5)	
	No				
<i>Bullying</i>					
Teasing/marginalizing	Yes	4.0 (2.2-7.4)	4.6 (2.3-9.4)	2.3 (1.3-4.1)	
	No				
Hitting	Yes	2.8 (1.0-7.4)		2.6 (0.5-11.9)	
	No				
<i>Violent behavior</i>					
Physical fights	Yes	1.1 (0.6-2.0)		3.3 (1.7-6.2)	
	No				
Physical fights (med. attn)	Yes	1.1 (0.3-3.4)		1.9 (0.5-6.9)	
	No				
<i>Perceived mistreatment/abuse</i>					
At home	Yes	1.3 (0.4-3.6)		3.8 (2.3-6.5)	
	No				
At school	Yes	1.9 (0.9-3.6)		3.9 (2.2-6.9)	3.5 (1.6-7.3)
	No				
In the street	Yes	2.3 (1.1-4.7)		2.0 (0.9-4.3)	
	No				
<i>Antisocial conduct</i>					
Physical activity	Yes	1.7 (0.8-3.5)		4.1 (2.0-8.5)	2.8 (1.0-7.7)
	No				
Condom use	Yes	0.3 (0.1-0.8)		0.4 (0.2-0.9)	
	No				
Condom use	Yes	0.7 (0.3-1.4)		2.4 (1.4-3.9)	1.7 (1.0-2.8)
	No				

CI: confidence interval; OR: odds ratio.

Table 5. Bivariate and multivariate analysis of the associations between mood states and demographic variables, substance use, leisure activities, perceived violence and mistreatment, antisocial conduct, physical activity and condom use in 18 year-olds by sex. FRESC 2004, Barcelona (Spain)

Variables	Answer categories	Boys		Girls	
		Bivariate OR (95% CI)	Multivariate OR (95% CI)	Bivariate OR (95% CI)	Multivariate OR (95% CI)
<i>Demographics</i>					
Socioeconomic level	Low				
	Medium	0.5 (0.2-0.9)		1.2 (0.6-2.4)	
	High	0.3 (0.1-1.0)		1.0 (0.4-2.5)	
School type	Public	1.4 (0.7-2.7)		0.7 (0.4-1.2)	
	Subsidized or Private				
Self-perceived academic level	Lowest 1/3	2.3 (1.0-5.4)		3.9 (1.6-9.4)	4.9 (1.8-12.6)
	Middle 1/3	0.9 (0.4-1.7)		1.3 (0.7-2.4)	1.6 (0.8-3.1)
	Highest 1/3				
<i>Use of substances</i>					
Regular tobacco use	Yes	1.0 (0.5-2.0)		1.5 (0.9-2.5)	
	No				
Problematic alcohol consumption	Yes	1.5 (0.5-4.1)		1.1 (0.5-2.2)	
	No				
Cannabis use	Yes	1.8 (0.9-3.6)		1.3 (0.8-2.2)	
	No				
Intention or use of other illegal drugs	Yes	1.3 (0.6-2.5)			
	No			2.8 (1.7-4.5)	2.1 (1.3-3.4)
<i>Leisure activities</i>					
Afternoon/night activities (once a week)	Yes	0.9 (0.5-1.6)		0.9 (0.6-1.5)	
	No				
Malls	Yes	0.6 (0.3-1.2)		0.6 (0.4-1.1)	
	No				
Entertainment	Yes	0.7 (0.4-1.4)		1.2 (0.7-1.9)	
	No				
<i>Bullying</i>					
Teasing/marginalizing	Yes	2.5 (1.0-6.2)		3.1 (1.4-6.7)	
	No				
Hitting	Yes	0 (-)		0 (-)	
	No				
<i>Violent behavior</i>					
Physical fights	Yes	1.0 (0.5-2.1)		3.0 (1.2-7.3)	
	No				
Physical fights (med. attn)	Yes	2.0 (0.7-5.4)		1.2 (0.2-6.4)	
	No				
<i>Perceived mistreatment/abuse</i>					
At home	Yes	6.6 (2.7-16.1)	4.4 (1.8-10.8)	2.7 (1.5-4.9)	
	No				
At school	Yes	3.4 (1.7-6.8)	2.6 (1.3-5.2)	3.8 (2.0-7.4)	2.8 (1.7-4.7)
	No				
In the street	Yes	1.0 (0.4-2.4)		2.3 (0.9-5.4)	
	No				
<i>Antisocial conduct</i>	Yes	1.5 (0.6-3.5)		3.9 (1.9-8.0)	
	No				
<i>Physical activity</i>	Yes	0.8 (0.4-1.6)		0.6 (0.3-1.0)	
	No				
<i>Condom use</i>	Yes	0.6 (0.3-1.1)		0.9 (0.6-1.5)	
	No				

CI: confidence interval; OR: odds ratio.

Discussion

Our study demonstrates a high frequency of negative mood states among adolescents overall (around 13% of all boys and 21% of all girls). These values are similar to the ranges reported elsewhere^{5,2,11}. In our study, girls reported more frequent negative mood states than boys in all age categories, and the frequency of those mood states increased steadily with age. In boys, though less dramatically, negative mood states also were more frequent in the oldest students. Female gender and older age have been demonstrated previously to relate to higher levels of anxiety and depression in health surveys^{3,4} and longitudinal studies^{5,11}. In both genders, perceived abuse or mistreatment, at school or in the home, was consistently related with more negative mood states.

Our data also showed relationships between both current or intended future use of illegal drugs (excluding cannabis) and problematic alcohol consumption and higher frequencies of negative mood states. Similar relationships were described by Saluja³ in a cross-sectional study, and Hallfors²⁶ and Costello¹¹ in longitudinal studies. In these studies, all measured use of substances related to more depressive moods. Additionally, in cross-sectional studies, Kuntsche²⁷ found that adolescents who participate in risky single occasion drinking reported lower life satisfaction and more depressive moods, and Haarasilta⁵ reported that twice monthly drunkenness in young adult males and once monthly drunkenness in females was related to major depressive episodes. In our sample, negative mood states were associated with use of substances; problematic alcohol consumption in the youngest students (14 years old), and current or intended future use of illegal drugs in the older students (16 and 18 years old).

Several cross-sectional and longitudinal studies, as well as a meta-analysis, have related symptoms of depression and anxiety to bullying^{3,12,28-30}. Often such studies make a distinction between being the aggressor or the victim, while we inquired only about being victimized. In our study, specific aspects in the bullying construct (being teased or marginalized) were associated with negative mood states only in 16 year old boys. In all other age and sex groups, perceived abuse at school, inquired about generally as feeling mistreated in any way, was associated with negative mood states. This may be explained by the structure of the questions. In our bullying construct question and the question about general, perceived abuse, there is some overlap in content that could lead to these results. Perhaps in 16 year old boys, bullying was more frequently experienced as teasing or marginalizing, while in girls and at other ages the bullying experience was more generalized. Given the consistent correlations between bullying in other stu-

dies, it seems worthwhile to re-examine the question constructs for future studies.

In 16 year old girls, the use of barrier contraceptive methods was also related with negative mood states in the bivariate analysis. This association is somewhat unclear, and could be related more to the sexual activity in itself than the use of protective methods. Brooks⁴ found a similar relationship between the use of contraceptives and symptoms of depression or stress, while Shrier³¹ and Kosunen³² describe the opposite relationship. In any case, it should be investigated in future study.

Several limitations of this study must be recognized. First, though our mood states indicator is adapted from widely used adolescent health surveys, it lacks a time period of measurement, and the dichotomization of the variable and the use of a cut off point of three or more items are not established in the literature. However, the literature does mark a difference between expected and normal mood swings in adolescents and what may be more frequent or serious negative mood states indicating a problem. The variable was dichotomized in order to attempt to focus on those individuals who may truly have mood state problems. Though doing so was a decision of the researchers, the resulting frequencies of negative mood states are similar to those described elsewhere¹. Furthermore, because our questions were adapted from general health questionnaires, they are not intended to be a clinical measure of mental health, but rather a holistic measure of the mood states that may indicate problems. For this reason, questions were adapted from global health surveys^{24,25,33,34}.

A second limitation is that in a cross-sectional study, in which mood states and related factors were measured in the same moment in time, it is impossible to establish a cause-effect relationship. However, the low cost and high feasibility of cross-sectional studies make them a good way to obtain descriptive information, and they are frequently employed for this purpose. In addition, the FRESC survey allows a broad and continuous vision of the state of health of adolescents in Barcelona, and from this vision it is possible to create hypotheses for future study, and track trends over time.

A final, related limitation is the necessary assignment of a numerical value to the presence or not of negative mood states. To do so is to divide into black and white terms a human condition that exists in a scale of variations of grey. It is highly likely that at some given time, everyone will experience negative mood states. Furthermore, the lived experience of the same mood state may be distinct for each individual person. By creating a dichotomous variable, we lose some of this richness of experience. Given that this was a first attempt at gaining a general idea of the mood states of adolescents in our context, we believe such a decision provides a starting point for future research and interven-

tions. It is also important to point out that the size and random nature of our sample, as well as the age representation, are important strengths of the study.

One objective of this study was to begin to provide the information necessary to create effective interventions to improve the mood states of adolescents in Barcelona. In order to be well-directed and eventually successful, interventions with these goals require a solid understanding of the issue involved. As Catalán-Reyes and Galindo-Villardón explain³⁵, individuals within a group may present similar characteristics because they form a part of the same group. We suspect that the school in which a student studies could have an influence on mood states and related factors. By taking into account group factors in our multilevel analysis, we have attempted to control for the groupal dimension in the individual measure of mood states, to examine in some way the grey areas discussed previously. Such a vision is necessary, because population interventions should be based on collective characteristics. Furthermore, because adolescents spend most of their waking hours in school, school-based surveys and perhaps interventions are a logical way to approach them. In future studies, researchers should look to employ enriched methods to measure mood states, mental health and related factors in adolescents, perhaps employing qualitative methods and longitudinal studies.

Acknowledgements

The authors would like to thank Luis Rajmil, Joan-Carles Suris i Granell, Joan Benach, Carme Borrell, Amanda Edge-Gugeon and Rachel Rennie Klingelhofer for their helpful comments and suggestions, and Marc Mari-Dell'Olmo and Maica Rodríguez-Sanz for their statistical support.

References

1. World Health Organization European Ministerial Conference on Mental Health: Facing the Challenges, Building Solutions. Mental Health of Children and Adolescents. Helsinki: WHO; 2004 [accessed 3 Nov 2006]. Available at: www.euro.who.int/document/mnh/ebrief14.pdf
2. Shaffer D, Waslick B, eds. The many faces of depression in children and adolescents. Washington: American Psychiatric Publishing; 2002.
3. Saluja G, Iachan R, Scheidt PC, Overpeck MD, Sun W, Giedd JN. Prevalence of and risk factors for depressive symptoms among young adolescents. *Arch Pediatr Adolesc Med.* 2004; 158:760-5.
4. Brooks TL, Harris SK, Thrall JS, Woods ER. Association of adolescent risk behaviors with mental health symptoms in high school students. *J Adolesc Health.* 2002;31:240-6.
5. Haarasilta LM, Marttunen MJ, Kaprio JA, Aro HM. Correlates of depression in a representative nationwide sample of adolescents (15-19 years) and young adults (20-24 years). *Eur J Public Health.* 2004;14:280-5.
6. Rushton JL, Forcier M, Schectman RM. Epidemiology of depressive symptoms in the National Longitudinal Study of Adolescent Health. *J Am Acad Child Adolesc Psychiatry.* 2002; 41:199-205.
7. Hassmen P, Koivulu N, Uutela A. Physical exercise and psychological well-being: a population study in Finland. *Prev Med.* 2000;30:17-25.
8. Camacho TC, Roberts RE, Lazarus MB, Kaplan GA, Cohen RD. Physical activity and depression: evidence from the Alameda County Study. *Am J Epidemiol.* 1991;134:220-31.
9. Brown RA, Lewinsohn PM, Seeley JR, Wagner EF. Cigarette smoking, major depression, and other psychiatric disorders among adolescents. *J Am Acad Child Adolesc Psychiatry.* 1996;35:1602-10.
10. Breslau N, Kilbey MM, Andreski P. Nicotine dependence and major depression: new evidence from a prospective investigation. *Arch Gen Psychiatry.* 1993;50:31-5.
11. Costello EJ, Erkanli A, Federman E, Angold A. Development of psychiatric comorbidity with substance abuse in adolescents: effects of timing and sex. *J Clin Child Psychol.* 1999; 28:298-311.
12. Bond L, Carlin JB, Thomas L, Rubin K, Patton G. Does bullying cause emotional problems? A prospective study of young teenagers. *BMJ.* 2000;23:661-74.
13. Ventura A, Carcel C, Canals RM, García R, Pujol C, Tomas P. Index de capacitat econòmica familiar II. Barcelona: Ajuntament de Barcelona; 1999.
14. Moreno Rodríguez MC, Muñoz Tinoco MV, Pérez Moreno PJ, Sánchez Queija I. Los adolescentes españoles y su salud. Un análisis en chicos y chicas de 11 a 17 años. Summary of the study Health Behaviour in School Aged Children (HBSC-2002). Madrid: Ministerio de Sanidad y Consumo; 2005 [accessed Nov 3, 2006]. Available at: http://www.hbsc.org/countries/downloads_countries/Spain/adolesEsp_2002.pdf
15. Ariza C, Nebot M, Villalbi JR, Díez E, Tomas Z, Valmayor S. Tendencias en el consumo de tabaco, alcohol y cannabis de los escolares de Barcelona (1987-1999). *Gac Sanit.* 2003;17:190-5.
16. Nebot M, Tomas Z, Ariza C, Valmayor S, López MJ, Juárez O. Factors associated with smoking onset: 3-year cohort study of schoolchildren. *Arch Bronconeumol.* 2004; 40:495-501.
17. Villalbi JR, Barniol J, Nebot M, Díez E, Ballestin M. Tendencias en el tabaquismo de los escolares: Barcelona, 1987-1996. *Aten Primaria.* 1999;23:359-62.
18. Juárez O, Díez E, Barniol J, Villamarin F, Nebot M, Villalbi JR. Conductas preventivas de la transmisión sexual de sida, de otras infecciones y del embarazo en estudiantes de secundaria. *Aten Primaria.* 1999;24:194-202.
19. Díez E, Barniol J, Nebot M, Juárez O, Martín M, Villalbi JR. Comportamientos relacionados con la salud en estudiantes de secundaria: relaciones sexuales y consumo de tabaco, alcohol y cannabis. *Gac Sanit.* 1998;12:272-80.
20. Starkuniene S, Zaborskis A. Links between accidents and lifestyle factors among Lithuanian schoolchildren. *Medicina (Kaunas).* 2005;41:73-80.
21. Kuntsche EN. Hostility among adolescents in Switzerland? Multivariate relations between excessive media use and forms of violence. *J Adolesc Health.* 2004;34:230-6.
22. Nansel TR, Overpeck MD, Hayne DC, Ruan WJ, Scheidt PC. Relationships between bullying and violence among U.S. youth. *Arch Pediatr Adolesc Med.* 2003;157:348-53.
23. Nansel TR, Overpeck M, Pilla RS, Ruan WJ, Simons-Morton B, Scheidt P. Bullying behaviors among US youth: prevalence and association with psychosocial adjustment. *JAMA.* 2001;285:2094-100.
24. Alsaker, FD. Bully/victim problems among peers: and how to handle them. Bern: Huber Verlag; 2003.

25. Alsaker FD, Brunner A. Switzerland. In: Smith PK, Morita Y, Junger-Tas J, Olweus D, Catalano R, Slee PT, editors. The nature of school bullying: a cross-national perspective. London: Routledge; 1999. p. 250-63.
26. Hallfors DD, Waller MW, Ford CA, Halpern CT, Brodish PH, Iritani B. Adolescent depression and suicide risk: association with sex and drug behavior. *Am J Prev Med.* 2004;27: 224-31.
27. Kuntsche EN, Gmel G. Emotional well-being and violence among social and solitary risky single occasion drinkers in adolescence. *Addiction.* 2004;99:331-9.
28. Salmon G, James A, Smith DM. Bullying in schools: self reported anxiety, depression, and self esteem in secondary school children. *BMJ.* 1998;317:924-5.
29. Kaltiala-Heino R, Rimpela M, Marttunen M, Rimpela A, Rantanen P. Bullying, depression and suicidal ideation in Finnish adolescents: school survey. *BMJ.* 1999; 319:348-51.
30. Hawker DS, Boulton MJ. Twenty years' research on peer victimisation and psychosocial maladjustment: a meta-analytic review of cross-sectional studies. *J Child Psychol Psychiatry.* 2000;41:441-5.
31. Shrier L, Harris SK, Sternberg M, Beardslee WR. Associations of depression, self-esteem, and substance use with sexual risk among adolescents. *Prev Med.* 2001;33:179-89.
32. Kosunen E, Kaltiala-Heino R, Rimpela M, Laippala P. Risk-taking sexual behavior and self-reported depression in middle adolescence: a school based survey. *Child Care Health Dev.* 2003; 29:337-44.
33. World Health Organization. Health Behavior in School-aged Children: a World Health Organization Cross-Sectional Study; 2001 [accessed 3 Nov 2006]. Available at: www.hbsc.org
34. Youth Risk Behavior Survey. Centers for Disease Control and Prevention; 2005 [accessed 3 Nov 2006]. Available at: www.cdc.gov/HealthyYouth/yrbs/index.htm and www.cdc.gov/HealthyYouth/yrbs/pdfs/2005itemrationale.pdf
35. Catalán-Reyes MJ, Galindo-Villardón MP. Utilización de los modelos multinivel en investigación sanitaria. *Gac Sanit.* 2003; 17 Supl 3:35-52.