Eur J Pediatr
DOI 10.1007/s00431-006-0203-3

ORIGINAL PAPER

Do male and female adolescents differ in the effect of individual and family characteristics on their use of psychotropic drugs?

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Received: 24 March 2006 / Accepted: 23 May 2006

Abstract This study assesses the effects of individual and family characteristics on psychotropic drug use among male and female adolescents. The sample included 2,396 subjects attending two middle schools and two high schools. Respondents completed self-administered questionnaires covering gender, age, body mass index, smoking, alcohol use, illicit drug use, tiredness during the daytime, self-reported personality traits, family conditions, and psychotropic drug use. The data were analyzed using logistic models. The prevalence of frequent psychotropic drug use (for headache, tiredness, nervousness, anxiety, insomnia) was 43.0% overall; twice as high among girls than boys. Among the girls, frequent psychotropic drug use was associated with frequent tiredness during the daytime (adjusted odds ratio OR 2.03, 95% CI 1.61–2.57), smoking (2.02, 1.50–2.71), alcohol use (1.34, 1.04–1.74), higher body mass index (>18 kg/m^2, 1.54, 1.16–2.04), poor family atmosphere (1.33, 1.03–1.72), and being worried (1.93, 1.53–2.43) or easily becoming irritable (1.28, 1.01–1.62). In boys the factors with significant ORs were frequent tiredness during the daytime (2.21, 1.67–2.93), alcohol use (1.52, 1.15–2.01), and being worried (1.70, 1.28–2.26) or easily becoming irritable (1.42, 1.06–1.89); univariate analysis revealed a significant relationship with smoking and family atmosphere. An association was also observed for illicit drugs in both sexes and for age≥17 years in girls. Individual and family characteristics have marked influence on psychotropic drug use among both male and female adolescents. Preventive measures should be taken to make adolescents and their parents more aware of the risks and to improve their living conditions.

Keywords Psychotropic drug use · Adolescents · Sex · Tiredness · Family atmosphere · Smoking habit · Alcohol use · Personality · Body weight

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Introduction

In Europe and the USA, general practitioners routinely prescribe psychotropic drugs [21, 31]. Several studies have reported increased prescription rates to adolescents [6, 12]. The use of such medication represents a major public health problem. Its potential consequences include morbidity, injuries, mortality, deleterious effects on quality of life, and the cost of remedial treatments [5, 9, 12, 23, 27]. Medication may also have undesirable side-effects, lead to the development of dependency, and delay adequate management of an underlying problem. Unsupervised relief of symptoms may result in the patient neglecting to follow appropriate health-

related advice or failing to modify dangerous habits. It should be noted that excessive drug use as a child may persist into adulthood.

It would be useful to know whether living conditions and individual characteristics influence psychotropic drug use. Several studies have shown that physical symptoms in adolescents are associated with age, physical development, gender, ethnic group, self-esteem, depression, anxiety, certain behaviors, and family and parental characteristics [33]. Rates of psychotropic drug use are well known to be higher among females [11, 13, 37]. Compared with men, women are more likely to take psychotropic drugs under medical supervision [19], to be given them following a medical consultation, to receive longer courses, and to renew the treatment [20]. Sex differences may in part be attributable to a higher incidence of depressive symptoms among females, and their greater willingness to seek medical help [3]. Psychotropic drug use may also be associated with smoking and alcohol consumption [13], both of which are more common in depressed people [25, 38]. Tiredness is common in all age groups, but particularly affects adolescents [1]. It can deteriorate individual's health and quality of life and thus can favor psychotropic drug use.

A poor body image may predispose people to depressive disorders [4] and result in adolescents becoming overweight [25]. It would therefore be interesting to examine the relationship between body mass index and long-term use of psychotropic drugs. Psychological disposition, motivation, and mental representation may also have an influence [36]. Subjects with certain personality traits are likely to be at increased risk, and women are more culturally predisposed than men to seek medical help for emotional problems. Family atmosphere also contributes to psychotropic drug use. Indeed, family plays a role in physical symptoms, depression, and tobacco, alcohol and illicit drug use [2, 7, 17, 33].

However, despite abundant literature, few studies have investigated the concurrent effects of individual and family characteristics on regular psychotropic drug use in boys and girls. A better understanding of this issue would be expected to help target preventative measures appropriately, and may have relevance to clinical practice and health promotion. The aim of the present study was to assess the relationships of age, smoking, alcohol use, illicit drug use, tiredness, body mass index, personality, and family environment, with regular psychotropic drug use in male and female adolescents from an average French town.

Materials and methods

Study sample

The study population comprised all 3,294 adolescents attending two middle schools and two high schools in the urban area of Nancy in the Meurthe-et-Moselle administrative area of north-eastern France during one school year.

Design

The investigation was approved by relevant personnel at the schools involved: the Nancy-Metz regional education authority, the Meurthe-et-Moselle school inspectorate, and the Commission Nationale de l'Informatique et des Libertés. Parents gave written consent. The study protocol was as follows:

1. A letter requesting participation was sent to parents or guardians.
2. Three weeks later, subjects completed a standardized self-administered anonymous questionnaire (during school time and under the supervision of their sports or physical training teachers). It recorded gender, birth date, height and weight (measured by the teacher), smoking habits, alcohol consumption (Frequent / Sometimes / Never or rare), illicit drug use (Frequent / Sometimes / Never or rare), frequent tiredness during the daytime, family conditions, self-reported personality traits, and psychotropic drug use. Family conditions considered were: living mainly with mother, father, or guardian; frequent absence of father and mother from home for more than 24 hours; perception of the family atmosphere (Good/Rather boring/Do not know). With regard to personality, subjects were asked whether they considered themselves: serious, organized, worried, easily irritated, or solitary (Yes/No) [7, 8]. With regard to psychotropic drugs, subjects were asked whether they frequently used medication (prescribed and non-prescribed) during the previous 12 months for headache, tiredness, nervousness or anxiety, or insomnia (Yes/No) [5, 9, 10].

Respondents were allowed to ask the teacher if they did not understand a question, but teachers had been instructed not to say anything that might influence the response (they rarely did so). Questionnaires took 20–45 minutes to complete and were returned to the teachers in sealed envelopes ready for transfer to Unit 420 of Inserm, where the data were analyzed.

Statistical analyses

The outcome variable was frequent psychotropic drug use (all types combined). Age was categorized into four groups: 12 or under, 13–14, 15–16, and 17 or over. The other factors considered were dichotomized: body mass index (BMI) >18 kg/m^2 [32], current smoker, alcohol consumption (sometimes or frequent), living with both father and mother,

frequent absence of father and mother from home for more than 24 hours, poor family atmosphere, frequent tiredness during the daytime, and self-reported personality traits (serious, organized, worried, easily irritated, solitary). The relationships between various risk factors and psychotropic drug use were analyzed with the $\chi 2$ independence or Fisher exact tests. Adjusted odds ratios (ORs) with 95% confidence intervals (CI) were then calculated using the logistic model with stepwise forward procedure. In this model, only factors significantly related to the outcome variable ($p<0.05$) were considered. All analyses were made for each sex separately. The comparison between the two sexes was made using the Mantel-Haenszel test and odds ratio adjusted for age (±2 years) and 95% CI. The data were analyzed using SAS software (SAS Institute, Cary, NC).

Results

Of the 3,294 pupils contacted, 2,396 (72.7%) participated in the study (13.0% declined, and 14.3% did not participate because they were absent or exempt from sports and physical training on the day of the survey). Table 1 shows the characteristics of the subjects. Boys accounted for 42.1%. It should be noted that 20.5% were current smokers; 37.6% sometimes or often drank alcohol; and 7.2% sometimes or often took illicit drug(s). About one quarter of respondents reported that their family atmosphere was poor, and 44.1% stated that they were often tired during the daytime. Over the previous 12 months, 43.0% had taken one or more psychotropic drugs (prescribed or not; 35.5% for headache, 13.7% for tiredness, 11.3% for nervousness or anxiety, and 5.3% for insomnia).

Table 1 Characteristics of subjects (2,396 pupils): %

Boys	42.1
Age (yr)	
<12	15.6
13–14	16.8
15–16	36.6
>17	31.0
Body mass index (kg/m^2)	
<18	21.5
18–21	61.9
≥22	16.6
Current smoker	20.5
Alcohol consumption (sometimes or frequent)	37.6
Illicit drug use (sometimes or frequent)	7.2
Lives with both father and mother	94.7
Father or mother often away	12.7
Poor family atmosphere	28.7
Frequent tiredness during the daytime	44.1
Self-reported personality	
Worried	48.1
Easily irritated	38.3
Not organized	39.0
Solitary	27.7
Not serious	23.9
Frequent psychotropic drug use during the previous 12 months	43.0

[a]Prescribed and non-prescribed drugs combined

A higher proportion of girls than boys had taken psychotropic drugs. Odds ratios (OR) adjusted for age (±2 years) were: 2.51 (95% CI 2.07–3.04, $p<0.001$) for headache; 1.25 (0.92–1.69, NS) for tiredness; 2.03 (1.41–2.92, $p<0.001$) for nervousness or anxiety; 2.48 (1.30–4.42, $p<0.01$) for insomnia; and 2.38 (2.01–2.86, $p<0.001$) for all categories combined.

Table 2 shows that smoking, alcohol consumption, illicit drug use, poor family atmosphere, and frequent tiredness during the daytime were associated with psychotropic drug use in both boys and girls. Age of 17 years or more and higher BMI had an effect only among girls. Regarding self-reported personality traits, psychotropic drug use was more prevalent in subjects of both sexes who described themselves as being worried, easily irritated or solitary, in girls who said they were not organized, and in boys who declared they were not serious.

Table 3 shows adjusted ORs for various factors. The following four were similar in both sexes: frequent tiredness during the daytime had the most marked effect with ORs of about 2, and alcohol consumption, being worried, and being easily irritated had ORs of between 1.28 and 1.93. Although smoking and family atmosphere were separately linked with psychotropic drug use, significant ORs were found in girls only. A BMI of 18 kg/m^2 or more was also associated with a higher risk in girls (OR 1.54) but not in boys.

Discussion

The present study reveals that 43.0% of adolescents surveyed reported frequent psychotropic drug use for headache, tiredness, nervousness, anxiety, or insomnia. It shows that frequent psychotropic drug use was associated with a number of individual and family factors. Smoking, alcohol consumption, illicit drug use, poor family atmosphere, frequent tiredness during the daytime, and certain self-reported personality traits had significant effects in both sexes. It also shows that the prevalence of psychotropic drug use among girls was double that in boys, and particularly high in girls aged ≥17 and those with a BMI≥18 kg/m^2.

The adolescents studied were all the pupils at two middle schools and two high schools in the urban area of Nancy (330,000 inhabitants). They represented 15% of all school students in the area. The participation rate was satisfactory at 72.7%. Any selection bias would be small, as the yearly

Table 2 Relationships between individual and family characteristics and frequent psychotropic drug use

	Boys (1,004 subjects)			Girls (1,378 subjects)		
	Number of subjects	%	*p*-value	Number of subjects	%	*p*-value
Age (yr)			NS			<0.001
<12	196	26.0		178	38.2	
13–14	178	30.3		224	42.4	
15–16	319	30.4		550	53.4	
≥17	311	34.4		426	60.8	
Body mass index (kg/m^2)			NS			<0.001
<18	216	31.0		298	40.3	
18–21	595	31.3		877	53.9	
>22	193	29.0		203	60.6	
Current smoker			<0.01			<0.001
Yes	159	40.9		329	70.8	
No	845	28.9		1049	46.0	
Alcohol use (sometimes or frequent)			<0.001			<0.001
Yes	420	38.1		474	64.1	
No	584	25.5		904	45.6	
Illicit drug use (sometimes or frequent)			<0.05			<0.01
Yes	75	41.3		97	67.0	
No	929	29.9		1281	50.8	
Lives with both father and mother			NS			NS
Yes	951	30.8		1305	48.3	
No	53	30.2		73	43.8	
Father or mother often away			NS			NS
Yes	135	28.9		166	59.0	
No	869	31.1		1212	51.0	
Poor family atmosphere			<0.001			<0.001
Yes	277	40.0		406	61.6	
No	727	27.6		972	47.9	
Frequent tiredness during the daytime			<0.001			<0.001
Yes	706	28.5		657	64.2	
No	298	36.2		721	40.8	
Self-reported personality						
Worried			<0.001			<0.001
Yes	370	40.3		776	61.0	
No	634	25.2		602	40.4	
Easily irritated			<0.001			<0.001
Yes	338	38.2		574	59.4	
No	666	27.0		804	46.6	
Not organized			NS			<0.01
Yes	440	33.0		490	56.9	
No	564	29.0		888	49.2	
Solitary			<0.05			<0.05
Yes	283	36.4		377	57.3	
No	721	28.6		1001	50.0	
Not serious			<0.05			NS
Yes	611	22.9		269	56.5	
No	393	43.0		1109	50.9	

incidence rate of school injuries was similar among participants and non-participants [32]. The quality of the completed questionnaires was very good (non-responses for various items <4%). As previously mentioned, all factors studied were validated and had been used elsewhere [7–10]. The items used to assess personality were chosen for their simplicity and because they have been associated with increased risk of accidents and with tobacco, alcohol and illicit drug use [7, 8]. They were accepted by respondents and appeared to be understood. The study as a whole was well accepted by the teachers, the pupils, the schools involved, and the parents.

Table 3 Relationships between individual and family characteristics and frequent psychotropic drug use: adjusted OR[a] and 95% CI

	Boys (1,004 subjects)		Girls (1,378 subjects)	
Body mass index 18 kg/m^2 or over	–		1.54**	1.16–2.04
Current smoker	–		2.02***	1.50–2.71
Alcohol consumption (sometimes or frequent)	1.52**	1.15–2.01	1.34*	1.04–1.74
Frequent tiredness during the daytime	2.21***	1.67–2.93	2.03***	1.61–2.57
Poor family atmosphere	–		1.33*	1.03–1.72
Self-reported personality				
Worried	1.70***	1.28–2.26	1.93***	1.53–2.43
Easily irritated	1.42*	1.06–1.89	1.28*	1.01–1.62

*P<0.05, **P<0.01, ***P<0.001

[a]Using logistic model by including the factors significantly related (P<0.05) to the outcome variable (Table 2)

For simplicity, only odds ratios for which P<0.05 are presented

The present study reports that frequent psychotropic drug use was common in the adolescents surveyed (43.0%). Rhee et al. [35] also reported that headache and fatigue were common among adolescents. Furu et al. [15] found that 41% of boys and 64% of girls used drugs during the four weeks preceding the survey. With regard to living conditions, in our study 44.1% of respondents were often tired during the daytime, and tiredness was the main risk factor for frequent psychotropic drug use (adjusted OR approximately 2 for both boys and girls). A high prevalence of fatigue was also observed in other studies [35]. Sleep problems and chronic fatigue favor depression [4, 34]. In addition, they may lead to difficulty working, which is also associated with depression [4]. These findings underline the importance of investigating the causes of frequent tiredness in adolescents.

The relationships between tobacco, alcohol, and illicit drug use and psychotropic drug intake were as expected. Indeed, all three may alter health status and living conditions. Smoking and alcohol problems are more common in depressed people [25, 30, 38]. Smoking affects physical functions and is associated with loss of cognitive flexibility, degenerative forms of cognitive impairment [18, 28], and sleep disorders [16]. Thus, smoking may alter the capacity of pupils to work. In the present study, the difference in the frequency of psychotropic drug use between users and non-users of tobacco, alcohol, or illicit drugs was greater among girls than among boys.

An important finding here was that a poor family atmosphere was associated with frequent use of psychotropic medication. Depression and substance use are markedly associated with difficulties in the family, and particularly with a negative perception of the home atmosphere, and a lack of strength of family ties, sense of family happiness, structure of authority in the family, and family support [2, 7, 11, 17]. These observations highlight the importance of family relations during adolescence. In fact, this issue concerns all age groups; indeed, an association between familial instability and illicit or unprescribed drug use was observed in a nationwide sample of the general population [24].

The present work highlights the fact that certain self-reported personality traits are associated with frequent psychotropic drug use. Adolescents who described themselves as worried, serious, easily irritated, not organized, or solitary were at higher risk. The personality traits most associated with risk were being worried and, to a lesser degree, being easily irritated. It is possible that adolescents who are afraid of the future or who live in poor conditions would have negative personality traits and altered well-being, and consequently use more psychotropic drugs.

This investigation confirms a two-fold higher prevalence of regular psychotropic drug use in girls compared with boys. Furu et al. observed the same pattern among 15–16 year-olds in Norway [31]. A sex-ratio of about two was reported among adults (≥18 years) in the Lorraine area of north-eastern France (a region of 2.3 million inhabitants that includes Nancy) [11] and among adults in six European countries (for the use of an antidepressant, anxiolytic, antipsychotic or mood stabilizing agents during the previous 12 months) [13]. The evidence indicates that preventative measures should target young people in order to reduce drug use in adulthood. Here, the difference between girls and boys was greater in the subjects aged 17 years or more (60.8% vs. 34.4%) than in those aged 12 years or less (38.2% vs. 26.0%). Furthermore, a higher risk was observed in girls with a BMI of 18 kg/m^2 or more. This was consistent with the finding by Bennett et al. that depressed girls had more body image dissatisfaction [4]. Psychosomatic disorders are commonly reported among subjects with advanced pubertal status [34]. Therefore, prevention should focus particularly on girls.

Although this study was conducted in a large enough sample, the results should be interpreted with caution due to the presence of a possible selection bias and the use of an auto-questionnaire. However, self-administered questionnaire is reliable and valid [22]. A study analyzing non-response bias in a mailed health survey showed that respondents and non-respondents were of similar sex and age distributions, and the proportion of people having a

health care expenditure was very slightly higher in respondents (75% vs. 69%) [14].

Our findings may have relevance to clinical practice and health promotion. They reveal that living conditions and individual characteristics play marked roles in regular psychotropic drug use. The adolescents and their parents, the staff at the schools and the practitioners concerned, should be informed about the problem. The adolescents should be helped to improve their living conditions, paying particular attention to tobacco, alcohol, and illicit drug use, tiredness, satisfaction with body image, and family atmosphere. Pupils with certain personality traits warrant more attention and more help to address their problems and to limit psychotropic drug use. When young people are prescribed psychotropic drugs, they should be informed about how to optimize the benefit/risk ratio. Physicians may find the results of interest, particularly if they are women—as female doctors tend be more receptive to what their patients say and to prescribe psychotropic drugs more often than their male counterparts, whatever the indication [26]. The epidemiological data in the literature suggest that the risk of inappropriate use of psychotropic drugs is high and that adolescents with mental disorders (and their parents) must be guaranteed appropriate care [6].

Acknowledgements The authors would like to thank A. d'Houtaud, E. Aptel, B. Mergel, E. Berton, P. Pierre, R. Franiatte, Y. Charron, F. Willer, J.P. Thirion, M.L. Thirion, N. Jurin, C. Mathis, F. Claudin, E. Predine, L. Benamghar, J.P. Michaely, D. Saouag, M. Weiss, M. Depesme, B. Phélut, J. Ciccone, N. Lorentz, and teachers of the schools for their help.

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