

Observational Study

Prevalence of substance use among moroccan adolescents and association with academic achievement

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Abstract

AIM: To investigate rates of drug and alcohol use and their association with academic performance in Moroccan youth.

METHODS: An adapted version of the European School Project on Alcohol and Other Drugs survey was administered to 2139 10th-12th graders in 36 Moroccan public high schools. Two multiple logistic regressions were completed, one for male and one for female subjects. Grade average was used as a two-part outcome variable, and drug use was used as a four-level categorical independent variable. Parents' education levels and socioeconomic status were included as covariates.

RESULTS: Of the subjects, 181 girls (16%) and 390 boys (40%) reported ever having used alcohol, hashish, or psychotropic drugs. Girls who had used any of those substances in the past 30 d demonstrated an adjusted odds ratio (AOR) of 2.62 (95%CI: 1.31-5.22) of having average or below-average grades, and those with any lifetime use showed an AOR of 1.72 (95%CI: 1.07-2.77). Among the boys, use in the past 30 d was associated with an AOR of 2.08 (95%CI: 1.33-3.24) of average or below average grades, and use in the last 12 mo with an AOR of 1.74 (95%CI: 1.00-3.05). Any lifetime use among male and previous 12 mo use among female subjects were not significantly associated with academic achievement.

CONCLUSION: Among Moroccan adolescents, drug use is substantially different between boys and girls. In both genders, lower academic achievement was associated with alcohol, hashish, or psychotropic drug use in the last 30 d.

Key words: Morocco; Academic performance; Drug and alcohol use; Adolescence

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Core tip: Adolescent drug and alcohol use in Morocco is insufficiently documented. This study investigates its prevalence, its association with academic achievement, and different use patterns between genders in the country. We obtained these data using an adapted form of the European School Project on Alcohol and Other Drugs survey administered to 2139 high school students at urban public schools. Of those subjects, 181 girls (16%) and 390 boys (40%) reported use of alcohol, hashish, or psychotropic drugs at some point in their lifetime. Lower grades in both genders were associated with use of any substance in the last 30 d.

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INTRODUCTION

Drug and alcohol use is associated with a high level of worldwide morbidity and mortality. In 2010, an analysis of the World Health Organization's Global Burden of Disease survey showed that, after high blood pressure, the 2 top risk factors for global disease burden were tobacco smoking and alcohol consumption^[1]. The health burden of drugs and alcohol is particularly severe in low- and middle-income countries, where alcohol and drug use disorders account for 19.5 million and 6.5 million disability-adjusted life years (DALYs), levels several times higher than those in the developed world^[2]. This is particularly true for adolescents, among whom drug and alcohol use is the top risk factor for DALYs worldwide^[3].

Despite this, epidemiological data for adolescent drug and alcohol use in the developing world is sparse^[4], especially among Arab countries. Studies from the Middle East seldom focus on adolescents^[5,6] and rarely examine both boys and girls^[7].

This is the case in Morocco, a North African Arabic country with a population of over 30 million^[8]. Although illegal and forbidden by Islam, alcohol and drugs are available in the country, and it is currently considered one of the largest exporters of cannabis in the world^[9]. One of the few epidemiologic studies conducted in Morocco demonstrated that the population-based lifetime prevalence of alcohol and drug dependence is comparable to that in other countries^[10]. The World Health Organization estimates the 12-mo prevalence of alcohol dependence to be somewhat lower than that of

other countries, at 0.78% in men and 0% in women^[8]. However, neither of these studies report data specific to adolescent drug and alcohol use.

In addition to its significant contribution to adolescent mortality and morbidity, drug and alcohol use has also associated with lower academic performance; however, these studies have primarily been conducted in developed countries. For example, low academic performance has been shown to correlate with tobacco and marijuana use in adolescents^[11]. Maggs *et al.*^[12] reports that low academic performance is a predictor of cocaine and alcohol use among adolescent students. Again, the majority of the academic performance and substance use correlational studies have been performed in developed countries, with few in countries with emerging economies^[13,14].

Male and female adolescents have distinct drug use characteristics and risk factors that contribute to their development of substance use disorders. Adolescent boys typically are at a greater risk of dangerous drinking behaviors than girls^[15]. Gender differences in adolescent drug use characteristics also have important implications for designing effective treatment strategies^[16].

In light of these factors, the present study was designed to investigate three items of interest: the prevalence of drug and alcohol use among high school students in Morocco, the gender differences in that prevalence, and the association of substance use and academic performance. This study uses a validated survey instrument that was translated and culturally adapted for use in Moroccan high schools.

MATERIALS AND METHODS

Participants

Participants ($n = 2139$) were part of the Mediterranean School Survey Project on Alcohol and Other Drugs (MedSPAD), which is supported by the Pompidou Group at the Council of Europe^[17,18]. The purpose of the MedSPAD project is to improve knowledge about drug use in the non-European Countries of the Mediterranean region.

Data were collected in 36 public urban high schools in two Moroccan cities: 20 high schools in Rabat and 16 in Salé. In February 2006, the surveys were distributed in the last 3 grades (10th, 11th, and 12th grades) in the 36 high schools. Seventy-three classes, including 24 in the 10th grade, 22 in the 11th grade, and 27 in the 12th grade, completed the survey.

Authorization for this study was obtained from the Moroccan Ministry of Education and all students gave verbal consent to participate. The survey was anonymous and voluntary; students were informed that they did not have to answer any questions, if they did not want to; however, there were no refusals. Only researchers, including a senior psychiatrist and seven resident psychiatrists, were in the classroom while the students completed the survey.

Measure

The survey was developed by the European School Project on Alcohol and Other Drugs (ESPAD), which is a validated questionnaire on student substance use and related risk and protective factors in Europe^[19]. The questionnaire was translated into Arabic and adapted to the Moroccan social and cultural context. In 2003, a pilot survey of 400 students was completed in Rabat High schools^[17]. The 2006 questionnaire consisted of 57 items (53 multiple choice questions and 4 open ended questions). The questionnaire took less than 30 min, on average, to complete. Questionnaire items included demographic information, relationship with parents, parent education, family socioeconomic level, onset age of drug use, lifetime drug use, past year drug use, past month drug use, risk perceptions of drug use, and attitudes about drug use.

Statistical analysis

Data were edited and analyzed in SPSS, version 20.⁴³ Pearson χ^2 analyses and independent *t* tests were completed to examine the association between variables of interest including *ad hoc* independent variables, covariates, and the outcome variable: grade average in the last trimester. These analyses were completed separately by males and females. The outcome variable grade average in the last trimester was created by dichotomizing the original variable. The original categories for grade average in the last trimester was less than 5, 5-9, 10-12, 13-14, and more than 15. There were very few students in the last two categories (3.4% total) while half of the students had a grade average of 10-12. Moroccan grades 16 and above are roughly equivalent to a United States grade of A+, 15.9-14.1 to an A, 14.0-12.1 to a B+, 12.0-11.1 to a B, 11.0-10.1 to a C, and the remaining grades are below average. Therefore, academic performance was recoded into two groups; the first group of students with grades of 12 and below were collapsed into the average and below average student group and the second group of students with grades 13 and above were collapsed into the above average student group (reference group).

Based on our *ad hoc* hypothesis that substance use would be associated with lower academic performance, two multiple logistic regressions were completed with the dichotomous outcome variable, grade, and an independent variable, drug use. The independent variable measuring drug use was a four level categorical variable: 3 = used alcohol, hashish, or psychotropic drugs in the past 30 d; 2 = used alcohol, hashish, or psychotropic drugs in the past 12 mo; 1 = ever used alcohol, hashish, psychotropic, or other drugs in lifetime; and 0 = never used any drug, except possibly tobacco (reference group). Each multiple logistic regression included 3 covariates; father's education level, mother's education level, and socioeconomic status in comparison to other families in country. Separate multiple logistic regression models were completed by gender. Alpha

levels of 0.05 and two-sided tests were used to determine significance.

RESULTS

Demographic information for the study participants is recorded in Tables 1 and 2. A little over half of the sample (53.2%) was female and a small percent (0.5%) did not report their sex. On average, participants were 17.5 (SD = 1.5) years old. Most of the participants (72.1%) described their socioeconomic status as the same as other families, 21.9% as above other families, and 6.0% as below other families in Morocco. Twenty-eight percent of the sample reported ever using alcohol, hashish, psychotropic drugs, or other drugs, 13.5% reported using alcohol, hashish, and psychotropic drugs in the past 12 mo, and 9.1% reported using alcohol, hashish, and psychotropic drugs in the past 30 d. Of those who ever used alcohol, hashish, or psychotropic drugs, they were 15.5 years old on average (SD = 2.4) when they first tried these substances. As seen in Table 1, all the variables, except using alcohol, hashish or psychotropic drugs in the past 12 mo, are significantly related to or trend towards significance in predicting girls' grade average in the last trimester. Girls who had above average grades were younger when they first used alcohol, hashish, or psychotropic drugs compared with girls who had average and below average grades [xbar age 14.7 (2.5) vs xbar age 15.7 (2.6), $t_{142} = -2.30$, $P = 0.023$].

As seen in Table 2, all the variables are significantly related to boys' grade average in the last trimester. Boys who had above average grades were on average a year younger than boys who had average and below average grades when they first used alcohol, hashish, or psychotropic drugs [xbar age 15.0 (2.4) vs xbar age 16.0 (2.0), $t_{310} = -3.66$, $P = 0.0005$].

Differences in use patterns between boys and girls are recorded in Table 3. Significantly, 40.5% of boys report ever having used, compared to 16.3% of girls. Twelve-month and 30-d use also varied highly between the genders (20.9% and 14.6% among boys and 6.9% and 4.1% among girls, respectively).

Table 4 reveals the results of the multiple logistic regression predicting girls' grade average in the last trimester, after adjusting for mother's and father's education and comparison socioeconomic status. When compared to girls who never used, girls who ever used alcohol, hashish, psychotropic, or other drugs were 1.72 times more likely to have average and below average grades, while girls who used alcohol, hashish, or psychotropic drugs in the past 30 d were 2.62 times more likely to have average and below average grades.

Table 5 reveals the results of the multiple logistic regression predicting boys' grade average in the last trimester, after adjusting for mother and father's education and comparison socioeconomic status. Compared with boys who never used, boys who used

Table 1 Bivariate analyses comparing grade average in the last trimester for girls only

Variable	Grades 13 and above (above average grades) <i>n</i> = 568 % (<i>n</i>) or mean (SD)	Grades 12 and below (average and below average grades) <i>n</i> = 541 % (<i>n</i>) or mean (SD)	Statistic	<i>P</i> value
Age	17.0 (1.4)	17.6 (1.4)	$t_{1107} = -7.71$	0.0005
Days absent in the last 30 d				
Not absent	65.8% (374)	53.2% (285)		
1 d	16.0% (91)	20.1% (108)	$\chi^2_5 = 24.24$	0.0005
2 d	8.5% (48)	9.5% (51)		
3-4 d	3.9% (22)	9.0% (48)		
5-6 d	2.6% (15)	3.2% (17)		
7 or more days	3.2% (18)	5.0% (27)		
		<i>n</i> = 536		
Father's education level				
Not educated	11.4% (58)	22.4% (109)	$\chi^2_4 = 56.59$	0.0005
Elementary school	19.9% (101)	23.2% (113)		
Middle school	10.5% (53)	14.8% (72)		
High school	19.7% (100)	20.9% (102)		
College and beyond	38.5% (195)	18.7% (91)		
	<i>n</i> = 507	<i>n</i> = 487		
Mother's education level				
Not educated	30.9% (167)	49.1% (255)	$\chi^2_4 = 61.97$	0.0005
Elementary school	15.2% (82)	18.7% (97)		
Middle school	9.4% (51)	9.2% (48)		
High school	22.0% (119)	12.9% (67)		
College and beyond	22.6% (122)	10.0% (52)		
	<i>n</i> = 541	<i>n</i> = 519		
Socioeconomic status compared with other families in country				
Above other families	25.7% (146)	20.1% (108)	$\chi^2_2 = 12.57$	0.002
Same as other families	71.0% (403)	72.5% (390)		
Below other families	3.3% (19)	7.4% (40)		
		<i>n</i> = 538		
Ever used alcohol, hashish, psychotropic, or other drugs	13.9 (79)	18.9 (102)	$\chi^2 = 4.96$	0.026
Age first used alcohol, hashish, or psychotropic drugs	14.7 (2.5)	15.7 (2.6)	$t_{142} = -2.30$	0.023
	<i>n</i> = 65	<i>n</i> = 79		
Used alcohol, hashish, or psychotropic drugs in the last 12 mo	6.0 (34)	7.9 (43)	$\chi^2 = 1.65$	0.199
Used alcohol, hashish, or psychotropic drugs in the past 30 d	3.0 (17)	5.2 (28)	$\chi^2 = 3.39$	0.066

alcohol, hashish, or psychotropic drugs in the past 12 mo were 1.74 times more likely to have average and below average grades, and boys who used alcohol, hashish, or psychotropic drugs in the past 30 d were 2.08 times more likely to have average and below average grades.

DISCUSSION

This study is one of the first to examine the use of drugs and alcohol by Moroccan adolescents, with the major findings being that among high school students 28% reported experimentation with alcohol, hashish, or psychotropic drugs, with 13.5% and 9.1% having used in the last 12 mo and 30 d, respectively. Lifetime substance use prevalence was much higher among boys (40.5%) than girls (16.3%). Girls with any lifetime use of drugs or alcohol and use in the last 30 d were about 1.7 and 2.6 times as likely, respectively, to have of having average lower grades compared to non-users. Boys' grades showed significant association with use in the past 30 d (2.1 times more likely to have lower grades than non-users) and in the past 12 mo (1.7 times more likely). Use in the last 12 mo in girls and

any previous use in boys showed similar associations but were not statistically significant.

Data regarding substance use among high school students in Morocco from this study is comparable to that in other countries in the region. A study of high school students in Shiraz, Iran reported the prevalence of lifetime drug and alcohol use to be 30.23%^[20]. In 2005, 30-d prevalence of alcohol use in Lebanon was reported to be 20%^[4].

This study shows an association between use and one negative outcome: lower grades. The strongest association was seen with most recent use; neither use in the last 12 mo for boys nor lifetime use for girls was statistically significant. Research has shown drug and alcohol use to have multiple adverse effects on teens^[11,12]. However, the cross-sectional nature of this study does not allow for a causal interpretation, and further research should be done to assess the effects of drug and alcohol use on Moroccan adolescents.

The gender difference in substance use prevalence is striking. Though Morocco is considered a more secular and Westernized country than others in the region, the difference in use among adolescent boys and girls is similar to that of countries with more religiously

Table 2 Bivariate analyses comparing grade average in the last trimester for boys only

Variable	Grades 13 and above (above average grades) <i>n</i> = 377 % (<i>n</i>) or mean (SD)	Grades 12 and below (average and below average grades) <i>n</i> = 587 % (<i>n</i>) or mean (SD)	Statistic	<i>P</i> value
Age	17.2 (1.6) <i>n</i> = 371	18.0 (1.6) <i>n</i> = 580	$t_{949} = -7.74$	0.0005
Days absent in the last 30 d				
Not absent	56.1% (211)	39.4% (230)		
1 d	13.8% (52)	17.6% (103)	$\chi^2_5 = 31.15$	0.0005
2 d	12.5% (47)	12.7% (74)		
3-4 d	7.4% (28)	11.3% (66)		
5-6 d	2.9% (11)	5.7% (33)		
7 or more days	7.2% (27) <i>n</i> = 376	13.4% (78) <i>n</i> = 584		
Father's education level				
Not educated	19.5% (66)	27.5% (142)	$\chi^2_4 = 28.09$	0.0005
Elementary school	16.3% (55)	18.2% (94)		
Middle school	6.2% (21)	11.8% (61)		
High school	21.6% (73)	20.7% (107)		
College and beyond	36.4% (123) <i>n</i> = 338	21.9% (113) <i>n</i> = 517		
Mother's education level				
Not educated	36.3% (127)	46.0% (251)	$\chi^2_4 = 22.22$	0.0005
Elementary school	14.3% (50)	15.0% (82)		
Middle school	7.7% (27)	9.0% (49)		
High school	16.9% (59)	17.0% (93)		
College and beyond	24.9% (87) <i>n</i> = 350	13.0% (71) <i>n</i> = 546		
Socioeconomic status compared with other families in country				
Above other families	26.1% (98)	17.2% (101)	$\chi^2_2 = 12.40$	0.002
Same as other families	68.5% (257)	74.8% (439)		
Below other families	5.3% (20) <i>n</i> = 375	8.0% (47)		
Ever used alcohol, hashish, psychotropic, or other drugs	33.7 (127)	44.8 (263)	$\chi^2 = 11.78$	0.001
Age first used alcohol, hashish, or psychotropic drugs	15.0 (2.4) <i>n</i> = 98	16.0 (2.0) <i>n</i> = 214	$t_{310} = -3.66$	0.0005
Used alcohol, hashish, or psychotropic drugs in the last 12 mo	17.0 (64)	23.3 (137)	$\chi^2 = 5.63$	0.018
Used alcohol, hashish, or psychotropic drugs in the past 30 d	10.9 (41)	17.0 (100)	$\chi^2 = 6.98$	0.008

Table 3 Reported substance use by gender

Use pattern	Girls <i>n</i> = 1109 <i>n</i> (%)	Boys <i>n</i> = 964 <i>n</i> (%)
Ever used alcohol, hashish, psychotropic, or other drugs	181 (16.3)	390 (40.5)
Used alcohol, hashish, or psychotropic drugs in the last 12 mo	77 (6.9)	201 (20.9)
Used alcohol, hashish, or psychotropic drugs in the past 30 d	45 (4.1)	141 (14.6)

Table 4 Multiple logistic regression predicting girls' grade average in the last trimester, after adjusting for mother and father's education and comparison socioeconomic status (*n* = 970)

Combined drug use	B (SE)	AOR	95%CI for AOR	<i>P</i> value
Used alcohol, hashish, or psychotropic drugs in the past 30 d	0.96 (0.35)	2.62	1.31, 5.22	0.006
Used alcohol, hashish, or psychotropic drugs in the past 12 mo	0.27 (0.38)	1.3	0.63, 2.72	0.479
Ever used alcohol, hashish, psychotropic, or other drugs	0.54 (0.24)	1.72	1.07, 2.77	0.026
Never used	-	-	-	-

AOR: Adjusted odds ratio.

conservative societies. A rapid study assessment of adolescent alcohol and drug use in Lebanon did not

Table 5 Multiple logistic regression predicting boys' grade average in the last trimester, after adjusting for mother and father's education and comparison socioeconomic status (*n* = 831)

Combined drug use	B (SE)	AOR	95%CI for AOR	P value
Used alcohol, hashish, or psychotropic drugs in the past 30 d	0.73 (0.23)	2.08	1.33, 3.24	0.001
Used alcohol, hashish, or psychotropic drugs in the past 12 mo	0.55 (0.29)	1.74	1.00, 3.05	0.052
Ever used alcohol, hashish, psychotropic, or other drugs	0.19 (0.20)	1.21	0.82, 1.79	0.335
Never used	-	-	-	-

AOR: Adjusted odds ratio.

find gender difference in use of most substances to be significant. The reported lifetime prevalence of alcohol use among boys was reported at 69.1%; among girls it was 62.9%^[21]. However, a study from Iran shows a gender gap similar to that in this Moroccan study: 15% prevalence of lifetime alcohol use among boys, 3.5% among girls^[20]. Gender roles are broadly delineated in Morocco, and different socialization patterns between the genders may explain some of this difference in substance use. However, more research is required to further define the issue. This may have important ramifications for adolescent treatment and prevention programs. It has been reported that different gender use patterns are associated with different risk factors^[22,23]. If different risk factors for drug and alcohol use exist among adolescent boys and girls in Morocco, gender-specific prevention and treatment strategies may prove more efficacious than a single approach^[15]. Further research is indicated to identify those risk factors.

We found earlier age of onset of substance use to be associated with higher grades, a somewhat counterintuitive result. Previous research has shown an association between the onset of alcohol use before age 13 and lower high school grade average^[24], as well as a relationship between early drug use and future truancy^[25]. The finding in this study could relate to sampling bias, as lower-performing students who began using at an earlier age may have been truant when the survey was administered. Alternatively, there may be an unidentified factor that protected the high-achieving students who first used substances at an early age from developing a use disorder. As this study was cross-sectional and did not assess for substance-use disorders, additional research would help to ascertain the relationship in this finding.

The nature of this study leaves it with some limitations. Because the survey was administered at school, the data may have some response bias as truant students were not included in the study. As with all self-reported drug and alcohol use, the survey response reliability is difficult to ensure. In addition, the cross-sectional nature of the study makes it difficult to establish a causal relationship between substance use and academic performance. There was some delay in publication due to limited resources to analyze the data; however, this study remains the first and most recent report of adolescent substance use in Morocco.

Though adolescent drug and alcohol use has been

studied in other North African and Middle Eastern countries, little research has been done on the subject in Morocco. This study is one of the first to provide a glimpse of the fairly high prevalence of adolescent substance use in the country, and it provides important implications for future treatment and prevention strategies.

COMMENTS

Background

Adolescent drug and alcohol use is associated with significant morbidity and mortality worldwide, including decreased academic performance. Epidemiological studies in Middle Eastern and Mediterranean countries show large variation in use patterns, both within the region and between genders. However, adolescent substance use has not been well-documented in Morocco.

Research frontiers

Current research involves interventions to prevent and limit the harm from adolescent drug and alcohol use.

Innovations and breakthroughs

This study is, to the authors' knowledge, the first to report data regarding adolescent drug and alcohol use in Morocco.

Applications

By showing drug and alcohol use to be highly prevalent among urban Moroccan adolescents, particularly males, this study provides an argument for treatment and intervention strategies to help with substance use disorders.

Terminology

Hashish: A cannabis extract in which its psychoactive chemicals are concentrated; Psychotropic drugs: A drug that can alter the mind, mood, and behavior.

Peer-review

This is a very important topic among adolescents.

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