

ORIGINAL ARTICLE

## Socialization Instances Linked to Cannabis Experimentation Among French Teenagers

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France presents one of the highest prevalence of teenagers aged 15-year-olds who report they already have experienced cannabis in Europe. Data from the French 2010 *Health Behavior in School-aged Children* (HSBC) survey and environmental parameters typifying schools 'neighborhoods were used to study cannabis experimentation. We conducted a two-level logistic regression (clusters being schools) on 4,175 French 8th–10th graders from 156 schools. Several individual parameters were linked to cannabis experimentation. Living in a non-intact family, feeling insufficiently monitored, having poor communication with mother and being from a family with a high socio-economic status (SES) were all associated with increased risk of cannabis experimentation. At environmental level, only being in a priority education area was linked to this behavior, without explaining differences among schools.

**Keywords** France, Epidemiology, teenagers, cannabis experimentation, environment, socio-economic status, self-administered survey

### INTRODUCTION

Cannabis is nearly always the first illicit drug used by teenagers in France (Spilka, Le Nezet, & Tovar, 2012): during the last decades, its consumption has increased (Choquet, Morin, Hassler, & Ledoux, 2004) while the age at initiation has decreased (Melchior, Chastang, Goldberg, & Fombonne, 2008). Although both these trends have stabilized (Spilka et al., 2012), the current level of cannabis consumption by French teenagers remains an area of concern. Among the 43 nations participating in the *Health Behavior in School-aged Children* (HBSC) study in 2010, France had the sixth highest proportion of 15-year-olds

reporting they ever used cannabis (30% boys, 24% girls), just after the United States (30% boys, 26% girls) and Spain (30% boys, 25% girls) (Currie et al., 2012). The European ESPAD study confirms this trend (Hibell et al., 2011). In 2010, 41.5% of French 17-year-olds reported they ever used cannabis, 22.4% used it at least once a month, and 6.5% used it regularly (Spilka, Le Nezet, & Tovar, 2012). In 2010, among youth in 6th–9th grades, 10% reported they experience with cannabis. Experimentation was marginal in 6th grade (1.5%), but rapidly progressed to 23.9% of adolescents in 9th grade (Spilka et al., 2012).

This situation is worrying because the earlier youth experiment with cannabis, the lower any subsequent chances of cessation (Dewit, Hance, Offord, & Osborne, 2000); and they increase their risk for initiation for other illicit drug use (Agrawal et al., 2006). Early experimentation was associated with later risky behaviors such as delinquent behavior, and lower condom use (Brooks, Balka, & Whiteman, 1999; Durant, Smith, Kreiter, & Krowchuk, 1999). Cannabis consumption also was linked to low academic performance (Cox, Zhang, Johnson, & Bender, 2007) and increased risk of leaving school without qualification (Fergusson, Horwood, & Beautrais, 2003). Cannabis initiation before 14 with subsequent daily use was associated with school dropout at 17 (Legl-eye et al., 2009).

Family, peer, school, and larger social environmental parameters are linked to risk of cannabis use. Family provides children their first social norms and behavior standards. Teenagers living with both parents had a lower risk of ever having used cannabis, compared to teenagers from other family configurations (mono-parental family, step-family, . . .) (Miller, 1997). Parental knowledge about how children spend their Saturday evenings and teenagers' satisfaction with their paternal relationship were associated

to a lower risk of current cannabis use among French youth (Ledoux, Miller, Choquet, & Plant, 2002). Family socio-economic status (SES) is also essential to understand cannabis use; the more teenagers are advantaged, the more they are likely for overall cannabis consumption (Legleye, Beck, Khlat, Peretti-Watel, & Chau, 2012). During adolescence, teenagers increasingly turn from their parents to their peers; having friends who smoke cannabis increased the risk of cannabis consumption (Miller & Plant, 2003). Likewise, adolescents perceiving that their peers consume cannabis were more at risk for initiation and personal cannabis use (D'Amico & McCarthy, 2006). School is also important: students with perception of their school connectedness as low report more frequent cannabis use (Resnick et al., 1997). Finally, teenagers living in disadvantaged neighborhood had more opportunities to be exposed to substances than adolescents living in other areas (Crum, Lillie-Blanton, & Anthony, 1996). Indeed, young people in a community with numerous risks factors (low neighborhood attachment, community disorganization, norms favorable to drug use, . . .) have an increased risk of current substance use, including cannabis (Hemphill et al., 2011). The higher the rate of unemployment in the neighborhood, the more teenagers were at risk for cannabis initiation (Tucker, Pollard, de la Haye, Kennedy, & Green, 2013).\*\*

Considering the high prevalence of cannabis experimentation among French teenagers, and the immediate consequences of such, it seems of foremost importance to understand parameters linked to cannabis experimentation at these ages. HBSC study allows investigating this question among youth who are younger than those examined in other French studies on the subject (ESPAD (Hibell et al., 2011), ESCAPAD (Spilka et al., 2012)), and offers a large range of variables that allows taking into account numerous parameters that may be linked to youth's behaviors.

Our objective is therefore to determine the contributions of family, peers, school, and the larger socio-economic environment to cannabis experimentation among French young adolescents (i.e., ages 13–17).

## METHODS

### HBSC Survey

French data from the 2010 HBSC study were used. HBSC survey offers the opportunity to explore life of teenagers, their well-being and behaviors, by asking adolescents directly about their feelings and perceptions. The repeat cross-sectional survey has been conducted in France since 1994. Each cycle received approval from the French data collection authority (CNIL). Every four years, a nationally representative sample of students in 5th–10th grade is selected randomly by the French Ministry of Education, using a two-staged cluster sampling procedure. Primary sampling units were schools; then within each school, two classes were selected randomly. The selection of schools is stratified to take into account urbanicity, type of school (private or public), and whether schools were located in

a priority education area. Teenagers filled out the anonymous paper and pencil questionnaire in the classroom, after they and their parents gave their informed consents. Among 608 selected classes, 568 agreed to participate (93.4%) representing 14,023 teenagers. Overall, 1,084 parents refused to give consent for their children, 163 students refused to participate, and 1,022 students were absent the day of the survey. As a result, 11,754 students completed the questionnaire. After excluding questionnaires which were insufficiently completed ( $n = 28$ ) and those regarded as aberrant ( $n = 88$ ), 11,638 (83%) completed questionnaires remained for the analyzable data set.

### Data Collection

#### *Outcome: Cannabis Experimentation*

Four questions were asked about cannabis consumption: “Have you already consumed cannabis: during your life? / during last 12 months? / during last 30 days?”, (responses: “Never / 1 or 2 times / 3 to 5 / 6 to 9 / 10 to 19 / 20 to 39 / 40 or more”), and “How old were you the first time you smoked cannabis?”, (responses: “Never / 11 or less / 12 / 13 / 14 / 15 / 16 or more”). If adolescents answered they smoked cannabis at least once, they were recoded positively.

#### *Individual Parameters*

They were provided though the HBSC questionnaire.

#### *Family*

Using teenagers' reports about the composition of their principal household, family structure was coded into four categories: two parents, mono-parental, stepfamily, other.

Two measures captured family socio-economic level. First, the SES of the family was determinate using information given by teenagers about their parents' jobs. Using categories determined by the French National Institute for Statistics and Economics Studies, we distinguished four groups: high (craftsman, trades peoples, contractors, managers, and professionals), intermediate (farmers, intermediate occupations, and employees), low (workers) and unclassified (retired people, without occupation and those who were not classified because of insufficient or irrelevant information). The higher SES obtained for either parent became the family SES. Second, the family affluence scale (FAS), (Currie et al., 2008), measuring the material family wealth based on four items (Family car ownership, bedroom occupancy, family holidays, and computer ownership), was used to calculate a composite FAS measure in three categories: low/intermediate/high.

Parents/teenager relationships were studied using quality of communication with mother and father (Good/bad/have not, do not see this parent), and the monitoring parental score. This latter measured family knowledge perceived by adolescents using following items: “Does your mother/father know: who are your friends?/how you spend your money?/where you are after school?/where you go in the evening?/how you spend your free time?.” A score was calculated separately for each parent using a polychoric component analysis. The

highest value obtained by either parent of a given child became the parental monitoring score. The higher it was, the more informed parents were about their children. This score was used as tertiles, the highest being the reference.

### Peers

We studied if teenagers frequently go out after school or in the evening, both defined as frequent if at least four days a week (yes, no).

### School

School perception was represented by whether a student (1) had been left back in school to repeat at least one grade (yes/ no), and (2) reported school performance under the mean according to teachers<sup>1</sup> (yes/no). The overall affective appeal toward school was determined using a binary variable “Not liking school at all” (yes/ no). Whether teenagers find school demanding was assessed with two items: “Do you find school work: difficult/tiring?” recoded in three categories (low/intermediate/high). Perceived classmate support was measured using three questions: “The students in my class enjoy being together/Most of the students in my class are kind and helpful/Other students accept me as I am” categorized as “none/moderate/high.”

### Environmental Parameters

First, proportions of grade repetition in each school participating in the HBSC survey in 2010 were provided by the French Ministry of Education, along with whether a school belonged to a priority education area (in French ZEP for “Zone d’Education Prioritaire”). This kind of area is socio-economically disadvantaged and benefits of special programs and measures to prevent risky behaviors and overall promote education.

Second, we accessed ecological data about the communities where participating schools were located by using the smallest available geographical units (IRIS) from the last exhaustive French census (1999). We assumed that because French teenagers nearly always live in the same area where they go to school and, in the rare exceptions, still spend the majority of their daily time at school, they were exposed to school area environments. Ecological variables used were proportions of mono-parental families, of unemployment and of people over age 15 not schooled without a diploma. All these variables were used as quartiles of the observed distribution, the lowest (less advantaged areas) being the reference, or in linear form when possible. The French Ecological Deprivation Index (EDI) was also used and reflected level of deprivation: the higher the EDI, the more the area is deprived. Using national quintiles, we provided the effect of being in a school located in a deprived IRIS compared to the overall French situation (Pornet et al., 2012).

### Sampling Strategy and Population

While the overall HBSC yielded 11,638 completed questionnaires, we subsetted the respondents to focus on students in 8th–10th grade, because only teenagers in these grades are asked all questions about cannabis. The subset consisted of 4,987 teenagers between 13 and 17 years of age, to have homogeneous age. Were excluded adolescents with missing data for the outcome ( $n = 15$ ) or for the family structure ( $n = 43$ ), who had inconsistencies when they answered questions about family ( $n = 424$ ), and who were in schools for which geocoding was not possible ( $n = 285$ ). Teenagers from schools with less than 5 students were excluded (one school with three children) to guarantee a correct size of clusters. We excluded 15 teenagers whose family structure was “other” (living neither with mother or father) and 27 others who responded “they do not have/see their mother” for quality of communication with this parent because they constitute too small categories to be interpreted. Overall, 4,175 adolescents (84%) in 156 schools were studied (Figure 1).

### Analysis Strategy

Teenagers who experienced cannabis were compared with abstainers according to different behaviors by gender. We used the Cantrill scale which allows teenagers to rate their well-being (from zero to ten), with a report of greater than or equal to six regarded as good. We also compared family and environmental parameters between two groups, those experienced with cannabis and abstainers. All comparisons used Chi<sup>2</sup> tests and SVY command to take into account cluster effects.

To check whether significant variability exists among studied schools for cannabis experimentation, we ran an empty two-level logistic regression model. Parameters significantly associated with the outcome ( $p < .2$ ) were introduced in three separate stepwise models to determinate which of them characterized the best respectively: family, peers, and school ( $p < .2$ ). Significant variables were gathered and a stepwise procedure was conducted ( $p < .05$ ). Finally, the model was adjusted on significant environmental variables at a threshold of 5% ( $p < .05$ ). At each step, the median odds ratio (MOR) was calculated to test if differences between schools remained after taking into account individual characteristics (Merlo et al., 2006).

We used two different analysis strategies to deal with missing data. Overall, each studied variables had few missing data (from .4% to 2.3%). However, we used a large range of parameters, so dropping individuals with missing data would have resulted in exclusion of too many teenagers. For the first method, missing data were recoded as such and kept in the database. For the second method, missing data were imputed using the ICE command. In accord with the literature, we made 5 imputations (Rubin, 1987; Van Buuren, Boshuizen, & Knook, 1999). Analyses were adjusted on gender and on age (as a continuous variable) and were conducted under Stata 12, StataCorp. 2009.

<sup>1</sup>We asked teenagers: “In your opinion, what does your class teacher(s) think about your school performance compared to your classmates?”

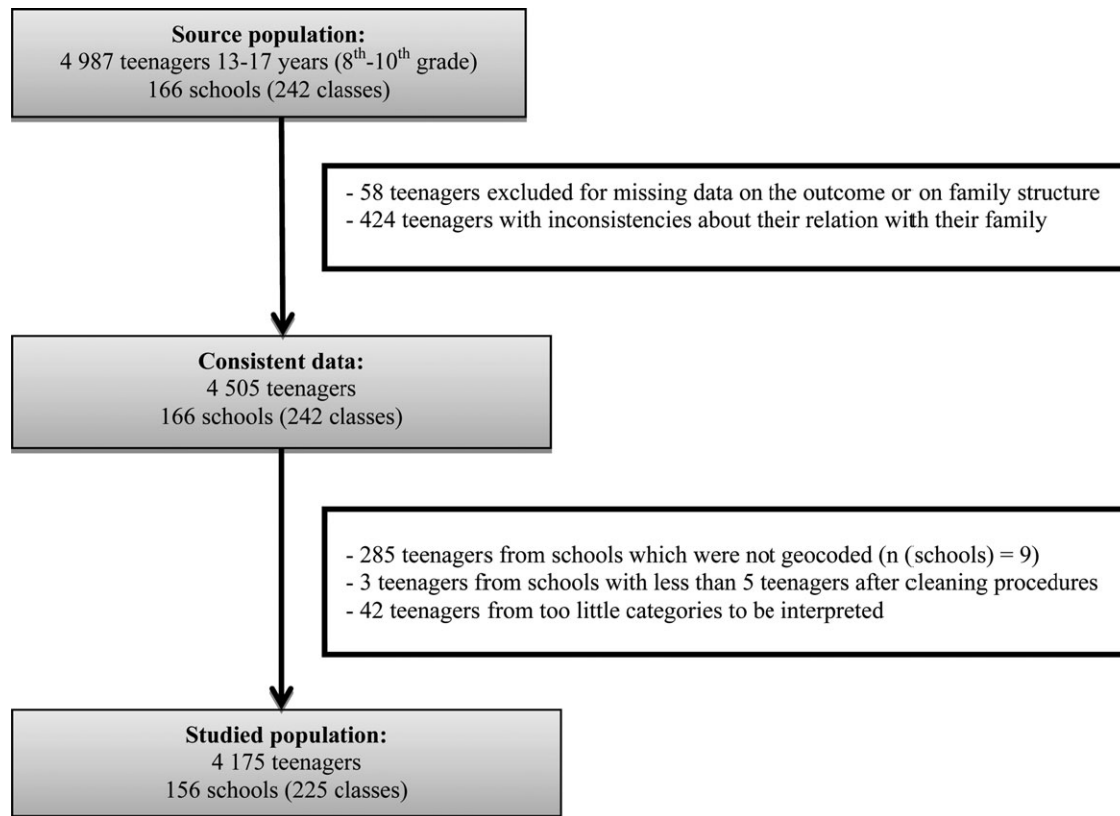


FIGURE 1. Flow chart.

## RESULTS

Overall, 4,175 teenagers were studied, including 2,045 girls (49.0%) and 2,130 boys (51.0%). The median age was 15.0 (IQR = [14.3–15.8]) years, ranging from 13.0 to 16.9.

Many teenagers lived with both parents (77.8%) and had a good communication with their mother (64.9%), but less with their father (39.2%), (Table 1). Adolescents generally experienced a high family affluence, as measured by the FAS (63.3%). They went out more often after school (33.9%) than in the evening (8.9%). Furthermore, teenagers mainly perceived the demandingness of school and the support of classmates as moderate (respectively, 60.5% and 57.3%).

Table 2 shows that 922 (22.1%, CI 95% = [19.8%–24.5%]) teenagers experimented with cannabis, boys being significantly more likely to do so than girls (24.2%, CI 95% = [21.4%–27.2%] vs. 20.1%, CI 95% = [17.7%–22.8%],  $p = .005$ ). Teenagers who experimented with cannabis were more likely to have experienced tobacco (96.6% vs. 32.7%,  $p < .001$ ), drunkenness (74.7% vs. 19.3%,  $p < .001$ ), and being depressed at least once a week (20.4% vs. 14.5%,  $p < .001$ ). They also less often reported high scores of Cantril than their non-experienced counterparts (80.1% vs. 86.7%,  $p < .001$ ). Teenagers who experienced cannabis were slightly older than those who did not try cannabis (15.4 ( $\pm$ .8) vs. 14.9 ( $\pm$ .9) years,  $p < .001$ ).

Table 3 compares family parameters between teenagers who experienced cannabis and those who did not.

Teenagers who experienced cannabis were less likely to live with both parents (69.4% vs. 80.2%,  $p < .001$ ), had less often good communication with their mother (57.1% vs. 67.0%,  $p < .001$ ) or father (32.6% vs. 41.1%,  $p < .001$ ), and were more often monitored by their parents to a low level (51.2% vs. 27.9%,  $p < .001$ ). Teenagers who already experienced cannabis slightly more often came from families having a high SES than their abstinent counterparts (34.8% vs. 30.8%,  $p = .0197$ ).

Comparisons of environmental characteristics indicate that teenagers who have never experienced cannabis were more likely to be in a priority education area (9.9% vs. 4.5%,  $p < .001$ ) and, from areas where rates of people of 15 years or older not schooled without a diploma were high (26.2% vs. 20.2%,  $p = .049$ ), (Table 4). Teenagers who experienced cannabis were more likely to come from schools with high rates of students with grade repetition than abstainers (33.0% vs. 22.7%,  $p = .003$ ).

Results from the two-level logistic regression using recoded missing data are in Table 5. Categories corresponding to missing data are not presented. A significant cluster effect was detected in the empty model (column 1, Table 5). Variables characterizing the best fit for family, peers and school were identified in column 2 to 4 (Table 5). Among the three studied individual contexts, family explained the greatest part of variance among schools, as showed by its MOR, which is the smallest (1.42). Being in an intact family, from low SES, feeling sufficiently monitored, and having a good quality of communication with mother were all linked to a decreased risk of cannabis

TABLE 1. Description of individual characteristics ( $n = 4,175$ )

Parameters		%	Parameters		%
Family structure	Both parents	77.8	School performance under the mean according to teachers	No	84.9
	Mono-parental	11.1		Yes	14.6
	Stepfamily	11.1		Missing data	.5
Good communication with mother	No	33.2	Not liking school at all	No	88.2
	Yes	64.9		Yes	11.4
	Missing data	1.9		Missing data	.4
Good communication with father	No	53.6	Classmate support	Low	10.9
	Yes	39.2		Moderate	57.3
	Haven't/Don't see	5.7		High	30.6
	Missing data	1.5		Missing data	1.2
FAS	Low	5.8	Perceived school demands	Low	17.5
	Intermediate	28.7		Moderate	60.5
	High	63.3		High	21.2
	Missing data	2.2		Missing data	.8
Highest SES <sup>a</sup> between both parents	Low	6.1	Grade repetition	No	78.1
	Intermediate	53.0		Yes	21.9
	High	31.7			
	Unclassifiable	9.2			
Times out after school $\geq 4$ times a week	No	64.7			
	Yes	33.9			
	Missing data	1.4			
Evenings out $\geq 4$ times a week	No	89.9			
	Yes	8.9			
	Missing data	1.2			

<sup>a</sup>SES: Socio-Economical Status.

experimentation. Peers and school slightly explained the same part of inter-cluster variation (MOR, respectively, being 1.51 and 1.56). Frequently going out after school or in the evening increased the risk of cannabis experimentation. Not liking school at all, reporting one's teachers view one's performance as below average, and perceiving school as highly demanding were linked to increased risk for cannabis experimentation.

In the complete individual model (column 5, Table 5), all significant variables which were previously significant remained. Girls were less likely to experiment with cannabis than boys, even if it was not significant in the final model, while each year of age multiplied this risk by 1.8. The MOR of this model was 1.49, showing that after taking into account all relevant individual parameters, and recognizing that these parameters partially explained differences between clusters, inter-schools variations in terms of cannabis experimentation remained significant. We introduced environmental variables significantly linked to the outcome at threshold 5% and a stepwise procedure was run to select the most relevant variables.

The sixth column of Table 5 presents the final model. Only being enrolled in a school in a priority education area remained significant and was associated with decreased risk for cannabis experimentation. The final model MOR slightly diminished compared to that of the complete indi-

vidual model, before adjusting on environmental parameters (respectively, 1.42 and 1.49), indicating that differences for cannabis experimentation among schools were less important after considering environmental parameters. However, the inter-cluster variance remained significant even when taking into account all relevant studied parameters.

Note that sensitivity analysis using multiple imputations gave the same results as the analysis with missing data recoded as such (data not shown).

## DISCUSSION

### Findings

In France, cannabis consumers represent a non-negligible proportion of teenagers in 8th-10th grade (22.1%) and were more likely than abstainers to have risky behaviors (tobacco, alcohol). These differences may be partially explained by noting that teenagers who tried cannabis were slightly older than those who did not. Cannabis experimentation was principally linked to individual parameters, rather than environmental ones. Indeed, teenagers living with their both parents, from a low SES family, feeling well monitored and who have a good quality of communication with their mother, were less at risk for cannabis experimentation. Rarely going out after school or in the

TABLE 2. Comparison of teenagers who experienced cannabis versus those who did not, in terms of well-being and risk behaviors

	Boys			Girls			All		
	Cannabis experimentation			Cannabis experimentation			Cannabis experimentation		
	Yes	No	<i>p</i>	Yes	No	<i>p</i>	Yes	No	<i>p</i>
<i>N</i> (%)	494 (24.2)	1 551 (75.8)	–	428 (20.1)	1 702 (79.9)	–	922 (22.1)	3 253 (77.9)	–
Median age [IQR] <sup>a</sup>	15.6 [14.8; 16.1]	14.8 [14.1; 15.6]	<.001	15.5 [14.8; 16.0]	14.8 [14.2; 15.7]	<.001	15.6 [14.8; 16.0]	14.8 [14.2; 15.7]	<.001
Exp. Tobacco, %	94.9	29.1	<.001	98.6	36.0	<.001	96.6	32.7	<.001
Exp. drunkenness, %	74.5	21.2	<.001	75.0	17.6	<.001	74.7	19.3	<.001
Feeling depressed > 1 time/week, %	13.6	9.0	.005	28.3	19.5	<.001	20.4	14.5	<.001
Cantril ≥ 6, %	85.0	90.2	.001	74.4	83.5	<.001	80.1	86.7	<.001

<sup>a</sup>Age comparisons were run using the rank test.

TABLE 3. Comparison of family characteristics between teenagers who experienced cannabis and those who did not ( $n = 4,175$ )

		Experienced $n = 922$	Not experienced $n = 3,253$	$p$
Family structure	Both parents	69.4	80.2	<.001
	Mono-parental	14.9	10.1	
	Stepfamily	15.7	9.7	
Good communication with mother	No	40.7	31.1	<.001
	Yes	57.1	67.0	
	Missing data	2.2	1.9	
Good communication with father	No	58.0	52.3	<.001
	Yes	32.6	41.1	
	Haven't/Don't see	7.4	5.2	
	Missing data	2.0	1.4	
FAS	Low	5.6	5.8	.994
	Intermediate	28.4	28.8	
	High	63.7	63.2	
	Missing data	2.3	2.2	
Highest SES between both parents <sup>a</sup>	Low	4.5	6.6	.0197
	Intermediate	50.6	53.7	
	High	34.8	30.8	
	Unclassifiable	10.1	8.9	
Parental monitoring	Low	51.2	27.9	<.001
	Intermediate	27.5	34.3	
	High	19.6	36.5	
	Missing data	1.7	1.3	

<sup>a</sup>SES: Socio-Economical Status.

TABLE 4. Comparison of environmental characteristics between teenagers who experienced cannabis and those who did not ( $n = 4,175$ )

		Experienced $n = 922$	Not experienced $n = 3,253$	$p$
Ecological Deprivation Index (EDI), % <sup>a</sup>	1st quintile ((-5.3)-(-1.4))	17.7	14.7	.805
	2nd quintile ((-1.3)-(-.7))	12.9	13.4	
	3rd quintile ((-.6)-(.0))	10.7	11.5	
	4th quintile ((.0)-(.9))	26.7	27.5	
	5th quintile ((1.0)-(20.5))	32.0	32.9	
Unemployment, %	1st quartile (4.5%-8.4%)	29.3	24.7	.477
	2nd quartile (8.5%-12.2%)	23.4	25.3	
	3rd quartile (12.3%-15.4%)	23.8	25.1	
	4th quartile (15.5%-35.9%)	23.5	24.9	
Proportion of single parent household, %	1st quartile (2.9%-9.4%)	26.1	25.1	.482
	2nd quartile (9.5%-12.5%)	21.7	26.1	
	3rd quartile (12.6%-18.0%)	25.8	24.8	
	4th quartile (18.4%-38.0%)	26.4	24.0	
Proportion of people of 15 years or older not schooled without a diploma, %	1st quartile (1.8%-11.3%)	30.7	23.7	.049
	2nd quartile (11.4%-16.0%)	25.0	25.3	
	3rd quartile (16.1%-21.3%)	24.1	24.8	
	4th quartile (21.4%-43.8%)	20.2	26.2	
Proportion of pupils with grade repetition in the school, %	1st quartile (4.6%-16.1%)	19.9	26.5	.003
	2nd quartile (16.2%-20.8%)	24.2	25.4	
	3rd quartile (21.3%-28.0%)	22.9	25.4	
	4th quartile (28.1%-71.3%)	33.0	22.7	
Priority education area	Yes	4.5	9.9	<.001
	No	95.5	90.1	

<sup>a</sup>National quintiles were used for EDI.

TABLE 5. Multivariable models revealing parameters linked to cannabis experimentation among 4,175 French teenagers in 8th–10th grade

	Empty model	Family OR (95% CI)	Peers OR (95% CI)	School OR (95% CI)	Individual complete model OR (95% CI)	Final model OR (95% CI)
Age (years)		1.9 [1.7–2.1]	1.8 [1.6–2.0]	1.8 [1.6–2.0]	1.8 [1.6–2.0]	1.8 [1.6–2.0]
Gender (Ref = Boys)		.8 [.7–.9]	.9 [.7–1.0]	.8 [.7–1.0]	.9 [.7–1.0]	.9 [.7–1.0]
<b>FAMILY</b>						
Family structure (ref = 2 parents)						
Mono-parental		1.4 [1.1–1.8]			1.3 [1.1–1.7]	1.4 [1.1–1.7]
Stepfamily		1.8 [1.4–2.3]			1.7 [1.4–2.2]	1.7 [1.3–2.2]
Parental monitoring (ref = High)						
Moderate		1.4 [1.1–1.7]			1.4 [1.1–1.7]	1.4 [1.1–1.7]
Low		2.8 [2.3–3.4]			2.4 [1.9–3.0]	2.4 [1.9–2.9]
Quality of communication with mother (ref = Bad)						
Good		.8 [.6–.9]			.8 [.7–.9]	.8 [.7–.9]
Highest SES between both parents (ref = low)						
Intermediate		1.6 [1.1–2.3]			1.7 [1.2–2.5]	1.6 [1.1–2.4]
High		1.9 [1.3–2.8]			2.3 [1.5–3.4]	2.1 [1.4–3.2]
Unclassifiable		1.7 [1.1–2.6]			1.6 [1.0–2.5]	1.6 [1.0–2.6]
<b>PEERS</b>						
Time out after school $\geq 4$ times a week (ref = No)			2.5 [2.1–2.9]		2.2 [1.9–2.7]	2.2 [1.9–2.7]
Evening out $\geq 4$ times a week (ref = No)			1.8 [1.4–2.4]		1.7 [1.3–2.2]	1.7 [1.3–2.2]
<b>SCHOOL</b>						
Not liking school at all (ref = No)				1.9 [1.5–2.4]	1.8 [1.4–2.2]	1.8 [1.4–2.3]
School performance under the mean according to teachers (ref = No)				1.5 [1.2–1.9]	1.3 [1.0–1.6]	1.3 [1.0–1.6]
Perceived school demands (ref = Low)						
Moderate				1.4 [1.1–1.7]	1.2 [1.0–1.6]	1.2 [1.0–1.6]
High				1.8 [1.3–2.3]	1.5 [1.1–2.0]	1.5 [1.1–2.0]
<b>ENVIRONMENT</b>						
Priority education area						.4 [.3–.6]
Inter-cluster variance (SE)	.437 (.09)	.133 (.05)	.189 (.05)	.216 (.06)	.173 (.06)	.135 (.05)
<i>p</i> (inter-cluster)	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
MOR	1.88	1.42	1.51	1.56	1.49	1.42

evening were both associated to a decreased risk for such initiation. Conversely, not liking school at all, reporting teachers view one's school performance as below average, and perceiving school as highly demanding were linked to an increased risk for cannabis experimentation. Only one environmental parameter was linked to this behavior: teenagers in priority education areas were less at risk for such experimentation.

### Interpretation of the Findings

Family is very important for children. Parental emotional support was linked to a decreased risk of current cannabis use among teenagers living with both parents (Choquet, Hassler, Morin, Falissard, & Chau, 2008), showing that influences of parents–children relationships could vary according to family structure. Like previous research (Rai et al., 2003), we showed that teenagers feeling less mon-

itored by their parents were more at risk for cannabis initiation. Indeed, teenagers with high parental knowledge about their Saturday evening activities were found to be the less at risk of having smoked cannabis (Ledoux et al., 2002), while maternal and paternal knowledge were both associated to lesser current cannabis use (Jimenez-Iglesias, Moreno, Granado-Alcon, & Lopez, 2012). Our findings about family SES were consistent with former research in France revealing that teenagers from higher SES were more at risk for overall cannabis use (Legleye et al., 2012) and cannabis experimentation (Legleye, Janssen, Beck, Chau, & Khlal, 2011) than those from lower SES.

Peer risks influence more teenagers' lifetime cannabis use than parental risks: links between peer risks and lifetime cannabis use were higher among older grades (Cleveland, Feinberg, Bontempo, & Greenberg, 2008),



indicating that teenagers were increasingly influenced by peers. The same pattern was observed for 30-days cannabis use (Cleveland et al., 2008). We found that going out in the evening or after school were associated to an increased risk of cannabis experimentation, as they both offered occasions without parental oversight, propitious to such initiation. Indeed, negotiated unsupervised time was already linked to increased likelihood of risky behaviors, including cannabis use (Borawski, Ievers-Landis, Lovegreen, & Trapl, 2003). Going out thus can be associated with family, in the sense that parents can control what their children do and when they get back home.

Results about school were consistent with former research, which showed that leaving school without qualification was linked to prior cannabis use (Fergusson et al., 2003), and early initiation of cannabis use with subsequent use (Legleye et al., 2009), while school connectedness was associated with less frequent cannabis use (Resnick et al., 1997). We found that teenagers who indicated they did not like school at all were nearly twice as at risk for cannabis experimentation. Furthermore, high perceiving school as demanding and believing teachers regard one's school performance as below average were linked to an increased risk for such initiation. Contrary to previous research (Godeau, Navarro, & Arnaud, 2012), individual grade repetition was not significantly linked to cannabis experimentation in our results. This finding was consistent with another French study, which found no significant association between cannabis experimentation and having repeated a school year, after taking into account all covariates (Legleye et al., 2011). Our results may be due to the adjustment of models on age, teenagers with grade repetition being significantly older than those who did not. Age can thus be considered as a confounding factor for grade repetition, given that probability of cannabis experimentation is multiplied by 1.8 each year in the final model.

Only one environmental parameter remained significant: being in schools belonging to a priority education area. Teenagers in such areas had already been shown to have a decreased risk for cannabis experimentation in France (Godeau et al., 2012). Such finding is in line with prior research (Ennett, Flewelling, Lindrooth, & Norton, 1997); lifetime alcohol and cigarette use among early teenagers (5th and 6th grades) were higher in schools located in areas with greater social advantages (neighborhood attachment, safety, ...) as perceived by residents and archival data. However, this needs to be contrasted with other studies, which showed that community risk parameters, such as community disorganization, significantly increase the risk of current cannabis use among teenagers (Hemphill et al., 2011). Even after adjusting our complete individual model on being in priority education area, the inter-cluster variance remained significant, indicating that differences between schools were only partly explained by this variable. Thus, contrary to the United-States, where living in a disadvantaged area was associated with risky behaviors, such links seemed to be weaker in France. This can be due to differing levels of

disadvantages between those countries. Indeed, France has always prioritized politics of social welfare provision (Kowarick, 2005), including the children repartition among schools to promote social diversity. Thus, we can hypothesize that social inequalities have a lesser impact in our country than in the United-States.

### ***Strengths and Limitations***

This paper has some limitations. First, the cross-sectional nature of data does not allow drawing conclusions about causality; only associations between cannabis experimentation and other variables can be noted. Second, it would be interesting to adjust analyses on parameters not available in the HBSC study, but recognized in the literature for their influences, such as physical abuse, affiliation with deviant peers, peers' consumption (including cannabis) and parental dependence on cannabis and other substances, as well as their approval for such use (D'Amico & McCarthy, 2006; Hemphill et al., 2011; Melchior, Choquet, Le Strat, Hassler, & Gorwood, 2011; Miller & Plant, 2003). However, it is not easy to ask such questions in a classroom.

The main strength of this paper stems from the use of the HBSC study, because it is based on a representative sample of teenagers in the age group of interest. Second, anonymous, self-reported questionnaires seem to be a good way to collect data about use of illegal substances of teenagers. Finally, the wide range of data available in this study permitted assessing influences of many parameters on cannabis experimentation, including environmental ones.

### **CONCLUSION**

According to our findings, cannabis experimentation in France was more linked to individual parameters than environmental ones. Despite environments and scholar systems vary across countries, we found in our sample the same individual parameters linked to cannabis experimentation as elsewhere, family explaining the greatest part of variation in term of cannabis experimentation between schools. Teenagers in schools belonging to a priority education area, which corresponds to areas with greater social disadvantages, had a lesser risk for cannabis experimentation. Further studies including environmental parameters, especially school environment, are thus essential to better target at-risk population and improve prevention programs.

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## Declaration of Interest

There is no conflict of interest between authors and financiers. The authors alone are responsible for the content and writing of the article.

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## GLOSSARY

**Cannabis experimentation:** Teenagers who declared they have consumed cannabis at least once in their life were considered as having experienced cannabis, thus “cannabis experimentation” is the fact to have experimented it at least once in life.

**HBSC:** The Health Behavior in School-aged Children (HBSC) survey explores health, health behaviors, well-being and their determinants and social contexts, cross-nationally. It is based on a self-reported questionnaire, completed in classroom. This survey is conducted every four years on a new representative sample of student, from 5th to 10th grade in France.

**IRIS:** These are the smallest geographical units from the French census, providing data such as the rate of unemployment, the proportion of mono-parental families, . . .

**Multilevel modelization:** This kind of modelization allows taking into account the fact that individuals grouped in clusters present some similarities. Thus, data are not totally independent. In our case, teenagers are grouped in schools.

**Socialization instances:** During adolescence, teenagers are mainly exposed to three instances which provide them some values that can affect their behaviors, the way they think. The first one is the family, as young people are not yet independent. The second one is the school, where they spend their days. The third one is their peers, with whom they share friendship.

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