

A screening focusing on aftereffects of alcohol consumption in a student population. A National cross-sectional survey

J. HAZART¹, M. BLANQUET^{1,2}, A. DEBOST-LEGRAND^{2,3}, A. PERREVE⁴, S. LEGER^{5,6}, V. MARTOIA⁷, S. MAURICE⁸, G. BROUSSE^{9,10}, L. GERBAUD^{1,2}

¹ Service de Santé Publique, CHU de Clermont-Ferrand, 63058 Clermont-Ferrand CEDEX 1 France; ² Université Clermont Auvergne, CNRS-UMR 6602, Institut Pascal, Axe TGI, Groupe PEPRADE, 63 000 Clermont-Ferrand, France; ³ Pôle Femme Et Enfant, Centre Hospitalier Universitaire de Clermont-Ferrand, Clermont-Ferrand, France; ⁴ Service de Santé Universitaire, 63000 Clermont-Ferrand; ⁵ Université Clermont Auvergne, Université Blaise Pascal, Laboratoire de Mathématiques BP 10448 F-63000, Clermont-Ferrand, France; ⁶ CNRS, UMR 6620, Laboratoire de Mathématiques, F-63171 Aubière, France; ⁷ Centre de santé interuniversitaire, Université Grenoble Alpes, 38400 Saint Martin d'Hères, France; ⁸ ISPED, Université de Bordeaux, 33076 Bordeaux CEDEX; ⁹ Service Psychiatrie et Addictologie de l'Adulte CMP B, CHU de Clermont-Ferrand, Clermont-Ferrand, France, ¹⁰ EA 7280 UFR Médecine, Université Clermont 1, Clermont-Ferrand, France

Keywords

Alcohol drinking • College students • Prevention • Alcohol misuse • Screening tool

Summary

Introduction. Students overestimate alcohol consumption of those around them and underestimate their own, so that quantitative approach may not be the most relevant to assess students' drinking. The main objective was to provide an appropriate tool for screening for students with potential drinking problems.

Methods. A multicentre cross-sectional survey was conducted by internet between February and June, 2013 in France. Thirteen questions explored alcohol consumption, including 8 concerning after-effects of drinking episodes (4 items of the AUDIT) and alcohol behaviour (CAGE test). A multiple correspondence analysis (MCA) was conducted to identify profiles of student's alcohol consumption. Partitioning methods were used to group students by mode of alcohol use. The most relevant items included in the MCA were identified. Three questions were identified as most pertinent among the students with potential drinking problems and

ranked by a decision tree with the Chi-square Automatic Interaction Detector method. Finally, we assessed the generalisation of the model.

Results. A total of 36,427 students participated in the survey: 25,679 were women (70.5% of respondents), sex ratio 0.42 and mean aged 21.2 (sd 3.7 years). Among those who had experimented with alcohol (N = 33,113), three consumption profiles were identified: "simple/non-use" (66.9%), "intermediate consumption" (25.9%) and "problem drinking" (7.2%). For the latter group, the three most relevant items were (Q20) "not able to stop drinking after starting", (Q21) "failed to do what was normally expected", and (Q23) "unable to remember what happened the night before".

Conclusions. These results provide healthcare professionals with a 3-item screening tool for students "problem drinking".

Introduction

Addictive behaviour in students, especially alcohol misuse, is a subject of major concern that has been widely investigated in the literature [1-3]. The negative physical, psychological and sexual consequences associated with alcohol misuse are well known [1-3]. In their study of US college students, Hingson et al. estimated that in a student population of 8,530,318, 10.5% (599,000) were injured in 2001 due to drinking, 12.0% (696,000) were assaulted or hit, and 2.0% (97,000) experienced sexual assault or date rape by another drinking college student [1]. This team later reported that in 1998, 1440 students and in 2005 1825 students from different student populations died from alcohol-related unintentional injuries, for a 3% increase in the rate per 100,000 students per year [2]. Saewyc et al. showed that 16% of both female and male university students had been vic-

tims of emotional or physical violence closely related to alcohol misuse [3].

In France, the university student health services (USHS) are responsible for health promotion, surveillance and prevention for students, including screening for addiction problems.

It is difficult for individuals to quantify alcohol consumption, above a certain quantity that varies from person to person [4, 5]. The general population and most particularly young men misperceive their alcohol intake [5-7], as do students, who tend to overestimate that of those around them and underestimate their own [8-10]. In this context, it may be more relevant to identify misuse by measuring the negative consequences of drinking through specific questionnaire items.

The Alcohol Use Disorders Identification Test (AUDIT) is a self-administered questionnaire of 10 items used to screen for problem drinkers, that is, those whose alco-

hol use during the past year has been harmful or placed them at risk; it has shown good metrological properties in student populations [11, 12]. Its shorter versions, AUDIT-C, AUDIT*2, and AUDIT*3, have also been evaluated among students; like it, they include a quantitative assessment of alcohol consumption and seek to identify which version is most appropriate for screening for excessive drinking in this population [12-15]. They have shown sensitivity ranging from 80% to more than 90% and specificity from 82% to 95% or more and perform at least as effectively as AUDIT [12-14]. To our knowledge, the AUDIT questions that measure excessive consumption of alcohol by its negative effects on memory and behaviour (items 4, 5, 7 and 8) have not been compared with the complete AUDIT questionnaire to measure their screening performance.

Consequently, in order to improve screening of students with drinking problems, the association of directors of French university health centres (Association des Directeurs des Services de Santé Universitaire-ADSSU), the Interministerial mission for combatting drugs and addictive behaviour (Mission Interministérielle de Lutte contre les Drogues et les Conduites Addictives-MILDECA) and the conference of university presidents (Conférence des Présidents d'Université-CPU) set up a project supported by the French Ministry of Higher Education and Scientific Research.

The principal objective of this study was to provide an appropriate tool for screening for potential student drinking problem.

Methods

A multicentre cross-sectional survey was conducted by internet between February 2 and June 30, 2013 in France. An email was sent by participating USHS to students' digital workspaces.

QUESTIONNAIRE

The questionnaire was devised by a working group from the USHS of Bordeaux, Clermont-Ferrand, and Grenoble, associated with the ADSSU. Relevant items were selected from a review of the literature, with special reference to four French and European surveys (<http://www.ovenational.education.fr/>; <http://www.ofdt.fr/>) [16-18]. The questionnaire comprised 76 items that explored sociodemographic and educational characteristics, substance use, physical, psychological, and sexual violence, physical and mental health, social deprivation, and unmet health care needs (Supplemental Table A).

Thirteen questions explored alcohol consumption (Q15-Q23 and Q28-Q31). Four assessed alcohol consumption (as a regular habit), the quantity of alcohol drunk over the past year, in the past 30 days, on a single occasion, and one question measured the number of times the individual had been drunk, according to the OFDT definitions (Q15-Q19) [19]. Eight questions analysed excess alcohol consumption. Four questions came from AUDIT, two that asked about symptoms of dependence (Q20-

Q21) and two about harmful use of alcohol (Q22-Q23). These questions were (Q20) "How often during the past year have you found that you were not able to stop drinking once you had started?", (Q21) "How often during the past year have you failed to do what was normally expected from you because of drinking?", (Q22) "How often during the last year have you had a feeling of guilt or remorse after drinking?", and (Q23) "How often during the last year have you been unable to remember what happened the night before because you had been drinking?" The following responses were available: never; less than once a month; once a month; more than once a month; once a week or more. Four questions came from the Cut-Annoyed-Guilty-Eye-opener (CAGE) test (Q28-Q31), which measures problems associated with alcohol consumption at any point in life. The responses to these questions was yes or no: (Q28) "Have you ever felt you needed to cut down on your drinking?", (Q29) "Have people annoyed you by criticising your drinking?", (Q30) "Have you ever felt guilty about drinking?", and (Q31) "Have you ever felt you needed a drink first thing in the morning (eye-opener) to steady your nerves or to get rid of a hangover?" [20].

The online version of the study questionnaire was developed by the Bordeaux School of Public Health (ISPED). Only complete questionnaires were considered. The database was anonymous, created by ISPED, and approved by the French data protection authority (CNIL).

POPULATION

All French USHS (N = 54) were invited to participate in the study. In all, 33, at universities located across France and enrolling 537,092 French students, distributed the questionnaire. Paris-area universities are underrepresented in this group. Among the USHS that did not participate, 10 conducted a different survey (I-share), and the others did not have access to student lists. All students in participating universities were asked to participate through their university e-mail address. Response was fully voluntary.

STATISTICAL ANALYSIS

To make the sample representative of the study population, the data were weighted for gender and university discipline with the raking ratio technique. The adjustment was based on data furnished by the French ministry of higher education and research (<http://www.enseignement-sup-research.gouv.fr/cid77397/les-effectifs-d-etudiants-dans-le-superieur-en-2012-2013.html>). Except for the two variables used for the weighting, all results presented have been weighted.

Descriptive analysis was performed to assess overall and quantitative variables, by calculating percentages and their 95% confidence intervals (95% CI) and means with their standard deviations (sd), respectively. Bivariate analysis was performed with the Chi-square test for qualitative variables and Student's t-test for quantitative variables.

Among the 13 questions exploring alcohol use, the 10 most informative alcohol-related items were kept: the

number of glasses consumed on a single occasion and the number of episodes of drunkenness during the past year, as well as Q20-Q23 and Q28-Q31. A multiple correspondence analysis (MCA) was conducted to identify profiles of consumption by detecting its underlying patterns. We next identified the three items most relevant to characterising each homogeneous pattern cluster by calculating the Cramer's V. Then, we ranked these three questions identified as most pertinent among the students with potential drinking problems by a decision tree with the Chi-square Automatic Interaction Detection (CHAID) method (a decision tree technique, based on adjusted significance testing) [21-23].

The last step of the statistical analysis assessed the generalizability of our model. The database (33,113 students who had experimented with alcohol) was divided in two parts, a learning group (75% of the sample, 24,689 students) and a validation group (25%, 8424 students) through the measurement of a global error rate, an underestimated error rate and an overestimated error rate. Significance was defined by a threshold of 5% for all statistical tests. Statistical analysis was performed with SAS software (V9.2. SAS Institute Inc., Cary, NC, 2002-2003) and R-3.1.1.

Results

In all, 36,427 students responded to the survey: 25,679 young women (70.5%) and 10,748 young men (29.5%), for a sex ratio of 0.42. Their mean age was 21.2 (sd 3.7) years. The academic divisions enrolling the most respondents were science and technology, agronomics, industry, and teaching (29.0%), arts, letters, languages, and human and social science (24.6%), and health (19.2%) (Tab. I).

Overall, 91.3% of students had experimented with alcohol and 79.0% had used alcohol in the last 30 days; 59.0% reported they had been drunk at least once in the past year (Tab. II). Of students who had experimented with alcohol, 6.9% reported being unable to stop drinking once they had started, 4.9% that they had failed to do what was normally expected from them, 6.0% that they felt guilt or remorse after drinking, and 6.0% that they could not remember what happened the night before at least once in the past month. All harmful alcohol use symptoms were reported more frequently by men (Tab. III).

Among those who had experimented with alcohol (N = 33,113), three consumption profiles were identified: "simple/non-use" (22,164 students, 66.9%), "intermediate consumption" (8,553 students, 25.9%) and "problem drinking" (2,396 students, 7.2%) (Fig. 1). For the "problem drinking" group, the three most relevant items were (Q20) "not able to stop drinking after starting", (Q21) "failed to do what was normally expected", and (Q23) "unable to remember what happened the night before" (Supplemental Table B). In the decision tree, those three relevant items were ranked as follows: (Q23) (Q20), and (Q21).

Tab. I. Socio-demographic and higher education characteristics of overall students included in the survey.

	N ^a	% ^b (n ^c)	m ^d (sd ^e)
Gender (women)*	36427	70.5 (25,679)	
Age	36378		21.2 (3.7)
Academic division*	36427		
Science and Technology, Agronomics, Industry, Teaching		29.0 (10,558)	
Art, Letters and Languages, Human and Social sciences		24.6 (8,967)	
Health		19.2 (6,978)	
University institute of Technology		11.1 (4,029)	
Law, Political sciences		8.2 (2,991)	
Commerce, Economic sciences, Management		5.8 (2,097)	
Sport		2.2 (807)	

a = number of individuals with information about the variable; b = percentage; c = number of individuals with that response category; d = means; e = standard deviation; * = non-weighted data.

From the learning portion of the sample (N = 24,689), the three most relevant questions for identifying students with drinking problems were ranked as follows: (Q23) "unable to remember what happened the night before", (Q20) "not able to stop drinking after starting", and (Q21) "failed to do what was normally expected". Among the students who reported that they could not remember who happened the night before (Q23) "at least once a month", 40.3% belonged to the group with drinking problems (Supplemental Material 2), while among those who reported that they were unable to stop drinking (Q20) more than once a month, 15.0% did, as did 6.7% of those who reported that they were unable to do what was normally expected (Q21) more than once a month. Overall, 84.5% of the students in the "problem drinking" group were correctly identified by using a simple decision tree. Inversely, the response "never" to those three questions correctly identified 70.0% of the students belonging to the "simple/non-use" group (Fig. 2). Thus this model, with three simple questions (unable to remember after drinking, not able to stop drinking, failed to do what was expected due to alcohol intake), has good sensibility and enough specificity for identifying students at risk. This indicates that it might be a good tool for screening.

Discussion

The students with drinking problems can be identified during rapid screening in daily practice, by asking three probing questions, all from AUDIT.

Our results are consistent with those of the 2010 French Health Barometer concerning the annual prevalence of at least one episode of drunkenness (59.0% vs 50.9%,

Tab. II. Descriptive and bivariate analyses of alcohol use among overall students included in the survey.

	Total* N = 36427 % ^a (n ^b)	Males** N = 10748 % ^a (n ^b)	Females** N = 25679 % ^a (n ^b)	p
Alcohol use				
Experimentation	91.3 (33113)	91.9 (9853)	90.9 (23260)	< 0.0001
≥ 1 use in the last 30 days	79.0 (28197)	82.9 (8858)	76.1 (19339)	< 0.0001
≥ 10 use in the last 30 days	8.8 (2615)	14.4 (1470)	4.6 (1145)	< 0.0001
≥ 1 use per day	1.9 (522)	3.3 (332)	0.8 (190)	< 0.0001
≥ 1 drunkenness in the last year	59.0 (20498)	66.6 (7095)	53.2 (13403)	< 0.0001
≥ 3 drunkenness in the last year	33.9 (11076)	43.8 (4595)	26.3 (6481)	< 0.0001
Drinks on a single occasion < 0.0001				
≤ 4 drinks on a single occasion	70.0 (24154)	60.2 (5965)	77.6 (18189)	
5 or 6 drinks on a single occasion	16.5 (5194)	19.0 (1875)	14.6 (3319)	
7 or 9 drinks on a single occasion	7.7 (2252)	10.5 (1006)	5.5 (1246)	
≥ 10 drinks on a single occasion	5.8 (1513)	10.4 (1007)	2.3 (506)	

a = percentage; b = number of individuals with this response category; c = with at least two positive answers; * = data weighted on gender and academic division; ** = data weighted on academic division.

Tab. III. Another descriptive and bivariate analyses of alcohol use characteristics among male and female students who had experimented with alcohol.

	Total* N = 33113 % ^a (n ^b)	Men** N = 9853 % ^a (n ^b)	Women** N = 23260 % ^a (n ^b)	p
Not able to stop drinking once you had started (Yes)				< 0.0001
< 1 time per month	9.3 (2,882)	11.0 (1,073)	8.0 (1,809)	
≥ 1 time per month	6.9 (1,851)	10.2 (931)	4.3 (920)	
Failed to do what was normally expected from you because of drinking (Yes)				< 0.0001
< 1 time per month	14.0 (4,348)	16.4 (1,580)	12.1 (2,768)	
≥ 1 time per month	4.9 (1,326)	7.3 (649)	3.2 (677)	
Had a feeling of guilt or remorse after drinking (Yes)				< 0.0001
< 1 time per month	19.9 (6,402)	21.3 (2,055)	18.9 (4,347)	
≥ 1 time per month	6.0 (1,688)	7.8 (699)	4.6 (989)	
Unable to remember what happened the night before because you had been drinking (Yes)				< 0.0001
< 1 time per month	18.5 (5,752)	22.6 (2,228)	15.3 (3,524)	
≥ 1 time per month	6.0 (1,671)	8.8 (856)	3.8 (815)	
Have you ever felt you should cut down on your drinking? (Yes)	14.7 (4,303)	18.6 (1,721)	11.6 (2,582)	< 0.0001
Have people annoyed you by criticising your drinking? (Yes)	10.7 (3,033)	15.8 (1,505)	6.8 (1,528)	< 0.0001
Have you ever felt you are drinking too much? (Yes)	17.3 (5,139)	22.7 (2,169)	13.2 (2,970)	< 0.0001
Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)? (Yes)	1.2 (309)	1.9 (164)	0.7 (145)	< 0.0001
CAGE-Alcohol positive ^c	12.8 (3,716)	17.3 (1,619)	9.4 (2,097)	< 0.0001

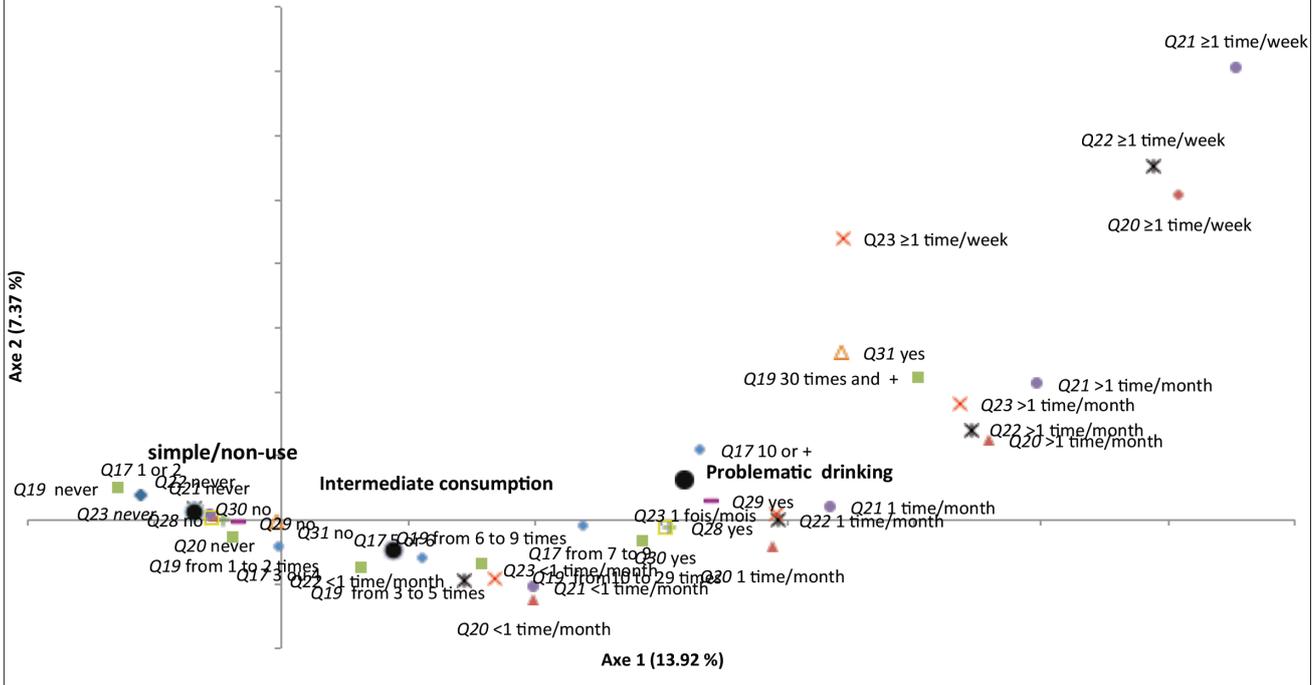
a = percentage; b = number of individuals with that response category; c = with at least two positive answers; * = data weighted on gender and academic division; ** = data weighted on academic division.

respectively) and those of the Eurobarometer concerning binge drinking (responding yes to “I usually consume five servings of alcohol or more on the days I drink”

(27.4% vs 22%) [24]. Similar results were also observed concerning the amount drunk at one time despite a different threshold and time period (30.7% vs 27.4%) [25].

Fig. 1. Projection of variables modalities integrating in the multiple correspondence analysis.

Centre of gravity; Item 17: “How many alcoholic drinks do you drink on a single occasion?”; **Item 19a:** “Have you been drunk in the last year?”; **Item 20:** “How often during the last year have you found that you were not able to stop drinking once you had started?”; **Item 21:** “How often during the last year have you failed to do what was normally expected from you because of drinking?”; **Item 22:** “How often during the last year have you had a feeling of guilt or remorse after drinking?”; **Item 23:** “How often during the last year, have you been unable to remember what happened the night before because you had been drinking?” and **item 28-31:** DETA-CAGE.



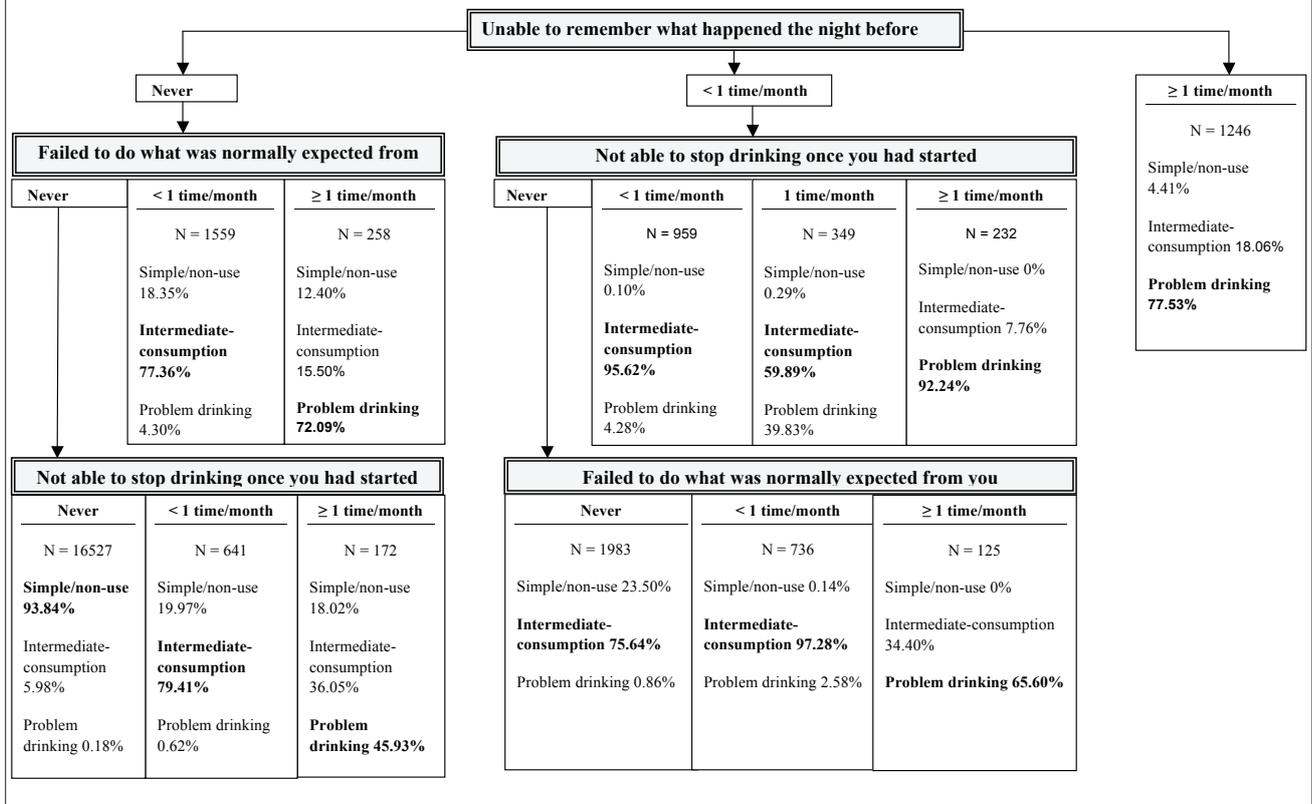
The 30-day prevalence of alcohol consumption among the US university students whose alcohol use was assessed by the ACHA-NCHAI (66.8%) and the Monitoring the Future (MTF) surveys (63.1%) was lower than in our study (79.0%) [26, 27]. Nonetheless, results for the percentage of students who had been drunk at least once were quite similar: The MTF survey reported that 57.9% of American university students had been drunk at least one time in the last 12 months, compared with 59.0% in our survey. Moreover, 32.3% of the American students in the ACHA-NCHAI survey admitted to having forgotten where they were or what they had done under the influence of alcohol, a percentage moderately higher than among French students (24.5%).

One of the issues underlying this study was students’ misperceptions of their own alcohol consumption. Our study appears to show a recall bias associated with excessive alcohol consumption. The approaches based on the quantity of alcohol drunk appeared to be much more less discriminant for identifying groups of students at high risk than the questions about the consequences of their drinking. For students with drinking problems, the questions on negative effects on memory and behaviour are informative and contribute to identifying students at high risk. Students thus appear to underestimate the real quantity of alcohol they drank and overlook guilt feelings, but have better perception and report more accurately the consequences of drinking in terms of amnesia, loss of control, and inability to do what was expected of them [4, 5].

To our knowledge, this is the first nationwide study in France intended to analyse students’ practices related to addiction. The Health Barometer analyses the health of the French but not specifically that of students and the OVE conducts studies of students without specifically focusing on their health status. This multicentre cross-sectional study was conducted among a very large sample of students. It is nonetheless impossible to estimate the students’ participation rates, because the Ministry of Education could not provide student enrolment data by university for the year the study took place. Participation varied according to university. Some students could not be asked to participate because we did not obtain the agreement of their university’s communication department. The results are nonetheless homogeneous between the participating universities.

Healthcare professionals but also public authorities now have available three questionnaire items that can be used to assess alcohol consumption and are relevant both for early, routine identification and for initiating prevention campaigns among students with problem drinking. These questions meet the needs of healthcare professionals who have wanted to be able to conduct rapid screening in their everyday practice [28, 29]. Once this screening and identification has been performed, several methods of management are possible: intervention by a healthcare professional, peers, or even self-management on the internet [30-32]. A strategy of correction of misperceptions has also proved effective [33].

Fig. 2. Results of the decision tree (N = 24 689), for students belongs to the simple/non-use group (66.87%), the intermediate group (25.81%) and the problem drinking group (7.32%).



The continuation of this work also leads us to approach this research field from another angle. Do the three questions we identified only allow us to identify students who are problem drinkers through the negative consequences that excessive drinking can have? Or do they further allow us to identify difficulties in controlling alcohol consumption that thus reveal vulnerability to future dependence on it? If the latter is the case, these three questions must be considered factors of vulnerability, similar to those previously identified: age at the beginning of drinking, alcohol consumption and drunkenness in middle school and high school, and the frequency of negative effects of alcohol consumption [34].

Conclusions

Questions about the inability to remember what happened the night before, inability to stop drinking, and inability to do what one is normally expected to do provide information that can be used to screen students with drinking problems, using a threshold frequency of at least once a month. These three key points may also be factors of vulnerability to alcohol. The development of management strategies incorporating them is essential.

Acknowledgements

We thank the French Ministry of Education and in particular Mr. S. Carton at the Authority for Higher Education and Integration into the Workplace (Direction Générale de l'Enseignement Supérieur et de l'Insertion Professionnelle-DGESIP). We are grateful to the Conference of University Presidents (Conférence des Présidents d'Université-CPU) and extend special thanks to Mme C. Marseault. We thank Dr Pascal Courty and Dr Michel Zorman.

The surveys were funded by the Ministerial Agency against Drug Abuse and Addictive Behaviour (Mission Interministérielle de Lutte contre les Drogues et les Conduites Addictives-MILDECA).

The author declares that there is no conflict of interest.

Authors' contributions

JH, AP, VM, SM and LG developed the protocol of the study. JH and SL performed the statistical analysis. All authors interpreted the results. MB, ADL, GB and LG wrote the article, the other authors read it and made revisions for significant content. All authors had full control of the content of the article.

References

- [1] Hingson R, Heeren T, Winter M, Wechsler H. Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18-24: changes from 1998 to 2001. *Annu Rev Public Health* 2005;26:259-79.
- [2] Hingson RW, Zha W, Weitzman ER. Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18-24, 1998-2005. *J Stud Alcohol Drugs Suppl* 2009;12-20.
- [3] Saewyc EM, Brown D, Plane M, Mundt MP, Zakletskaia L, Wiegel J, Fleming MF. Gender differences in violence exposure among university students attending campus health clinics in the United States and Canada. *J Adolesc Health Off Publ Soc Adolesc Med* 2009;45:587-94.
- [4] Northcote J, Livingston M. Accuracy of self-reported drinking: observational verification of « last occasion » drink estimates of young adults. *Alcohol Alcohol Oxf Oxf* 2011;46:709-13.
- [5] Garnett C, Crane D, West R, Michie S, Brown J, Winstock A. Normative misperceptions about alcohol use in the general population of drinkers: a cross-sectional survey. *Addict Behav* 2015;42:203-6.
- [6] Cunningham JA, Neighbors C, Wild TC, Humphreys K. Normative misperceptions about alcohol use in a general population sample of problem drinkers from a large metropolitan city. *Alcohol Alcohol Oxf Oxf* 2012;47:63-6.
- [7] Wild TC. Personal drinking and sociocultural drinking norms: a representative population study. *J Stud Alcohol* 2002;63:469-75.
- [8] American College Health Association. The ACHA-National College Health Assessment II survey- Spring 2015 Reference Group Executive Summary. American College Health Association; 2015 p. 20.
- [9] Neighbors C, Dillard AJ, Lewis MA, Bergstrom RL, Neil TA. Normative misperceptions and temporal precedence of perceived norms and drinking. *J Stud Alcohol* 2006;67:290-9.
- [10] Kypri K, Langley JD. Perceived social norms and their relation to university student drinking. *J Stud Alcohol* 2003;64:829-34.
- [11] Cortés-Tomás M-T, Giménez-Costa J-A, Motos-Sellés P, Sancerni-Beitia M-D. Different versions of the Alcohol Use Disorders Identification Test (AUDIT) as screening instruments for underage binge drinking. *Drug Alcohol Depend* 2016;158:52-9.
- [12] Blank M-L, Connor J, Gray A, Tustin K. Screening for hazardous alcohol use among university students using individual questions from the alcohol use disorders identification test-consumption. *Drug Alcohol Rev* 2015; Apr 13. doi: 10.1111/dar.12272. [Epub ahead of print].
- [13] Cortés-Tomás M-T, Giménez-Costa J-A, Motos-Sellés P, Sancerni-Beitia M-D. Different versions of the Alcohol Use Disorders Identification Test (AUDIT) as screening instruments for underage binge drinking. *Drug Alcohol Depend* 2016;158:52-9.
- [14] Demartini KS, Carey KB. Optimizing the use of the AUDIT for alcohol screening in college students. *Psychol Assess* 2012;24:954-63.
- [15] Bush K, Kivlahan DR, McDonnell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Ambulatory Care Quality Improvement Project (ACQUIP). Alcohol Use Disorders Identification Test. *Arch Intern Med* 1998;158:1789-95.
- [16] Hibell B, Guttormsson U, Ahlström S, Balakireva O, Bjarnason T, Kokkevi A, Kraus L. The 2011 ESPAD Report. Substance use among students in 36 European Countries. The Swedish Council for Information on Alcohol and Other Drugs (CAN); 2011 p. 394.
- [17] La santé mentale des jeunes en insertion [Internet]. [cité 11 mars 2016]. Disponible sur: <http://docplayer.fr/6496053-La-sante-mentale-des-jeunes-en-insertion.html>.
- [18] Office Français des Drogues et Toxicomanies. Cannabis, alcool, tabac et autres drogues à la fin de l'adolescence: usages et évolutions récentes ESCAPAD 2003. OFDT - Paris. 2004;4.
- [19] Richard J-B, Palle C, Guignard R, Nguyen-Thanh V, Beck F, Arwidson. La consommation d'alcool en France en 2014. *Evolutions*. 2015;6.
- [20] Mayfield D, McLeod G, Hall P. The CAGE questionnaire: validation of a new alcoholism screening instrument. *Am J Psychiatry* 1974;131:1121-3.
- [21] Roux BL, Rouanet H. Geometric data analysis: from correspondence analysis to structured data analysis [Internet]. Springer Netherlands; 2005 [cité 9 févr 2018]. Disponible sur: <http://www.springer.com/gp/book/9781402022357>.
- [22] kass80.pdf [Internet]. [cité 9 févr 2018]. Disponible sur: <http://www4.stat.ncsu.edu/~dickey/Analytics/Datamine/Reference%20Papers/kass80.pdf>.
- [23] Greenacre M, Blasius J. Multiple Correspondence Analysis and Related Methods [Internet]. CRC Press. 2006 [cité 9 févr 2018]. Disponible sur: <https://www.crcpress.com/Multiple-Correspondence-Analysis-and-Related-Methods/Greenacre-Blasius/p/book/9781584886280>.
- [24] European Commission. EU citizens' attitudes towards alcohol [Internet]. 2010 p. 129. Report No.: 331. Disponible sur: http://ec.europa.eu/public_opinion/archives/eb_special_339_320_en.htm.
- [25] Richard J-B, Beck F, Spilka F. Alcohol consumption among young adults (18-25 years) in 2010 in France: specificities and trends since 2005. *Bull Epidémiologique Hebd* 2013;16-17.
- [26] American College Health Association. American College Health Association- National College Health Assessment Spring 2014 Reference Group Executive Summary. 2014 p. 19 pages.
- [27] Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE, Miech RA. Monitoring the Future national survey results on drug use, 1975-2013: Volume II, college students and adults ages 19-55. Ann Arbor: Institute for Social Research, The University of Michigan; 2014.
- [28] Wilson GB, Lock CA, Heather N, Cassidy P, Christie MM, Kaner EFS. Intervention against excessive alcohol consumption in primary health care: a survey of GPs' attitudes and practices in England 10 years on. *Alcohol Alcohol Oxf Oxf* 2011;46:570-7.
- [29] Blanquet M, Peyrol F, Morel F, Morge A, Maradeix B, Gerbaud L, Llorca PM. Prévalence du mésusage de l'alcool et attitudes des médecins libéraux. *Alcoologie et Addictologie* 2015;37:105-13.
- [30] Geisner IM, Varvil-Weld L, Mittmann AJ, Mallett K, Turrissi R. Brief web-based intervention for college students with comorbid risky alcohol use and depressed mood: does it work and for whom? *Addict Behav* 2015;42:36-43.
- [31] Georgie J M, Sean H, Deborah M C, Matthew H, Rona C. Peer-led interventions to prevent tobacco, alcohol and/or drug use among young people aged 11-21 years: a systematic review and meta-analysis. *Addict Abingdon Engl* 2016;111:391-407.
- [32] Robertson-Boersma D, Butt P, Dell CA. Reflections on How a University Binge Drinking Prevention Initiative Supports Alcohol Screening, Brief Intervention, and Referral for Student Alcohol Use. *Yale J Biol Med* 2015;88:339-46.
- [33] Ridout B, Campbell A. Using Facebook to deliver a social norm intervention to reduce problem drinking at university. *Drug Alcohol Rev* 2014;33:667-73.
- [34] Scaglione NM, Mallett KA, Turrissi R, Reavy R, Cleveland MJ, Ackerman S. Who will experience the most alcohol problems in college? The roles of middle and high school drinking tendencies. *Alcohol Clin Exp Res* 2015;39:2039-46.

Supplemental Table A: survey questionnaire

SURVEY: Students' health

We would like you to fill in a questionnaire for a survey on health concerns among students living in France.

The present questionnaire is anonymous and takes around 20 minutes to complete.

Please reply to ALL items

1. Age _____ years old

2. Sex

Male Female

3. Nationality

French Other (state which) _____

4. Residence

Family or relatives Residence hall Apartment rental with roommates

Apartment rental alone Other

5. a) Town of higher education _____

b) Location of University (answered "other" if you are in school) _____

6. a) Type of higher education establishment:

University Grandes écoles Preparatory courses for Grandes Ecoles

Advanced Technician Certificate University Institute of Technology

Specialised school Engineering school Other _____

b) Year of study _____

c) Academic discipline

Agronomics Art Commerce, Economic sciences Law Teaching

Industry Letters and Languages Management Health Human and social sciences

Science and Technology Political Sciences Sport Other

7. Year of the 1st registration in higher education _____

8. a) Year of high school diploma _____

b) Where high school diploma was awarded _____

9. a) How much do you weigh? □□□kg

b) How tall are you? □,□□ meters

10. How many average hours do you sleep on average a night? _____ hours

11. Do you have difficulty falling asleep, staying asleep or achieving restorative sleep?

Never Rarely Sometimes Often Most of the time All the time

IF YOU ANSWERED NEVER OR RARELY, GO TO ITEM 13

12. a) When did those difficulties begin?

Before the start of the academic year After the start of the academic year

b) Did these difficulties and tiredness prevent you from performing your daily activities (school work, job, leisure)?

Never Rarely Sometimes Often Most of the time All the time

The following items are about your feelings during the past 4 weeks. For each question, give the one answer that comes closest to the way you have been feeling.

13. During the past 4 weeks, how much of the time

(For each item you will be asked to fill in a bubble in each line)

	All the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
a) Have you been very nervous?	1	2	3	4	5	6

b) Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
c) Have you felt calm and peaceful?	1	2	3	4	5	6
d) Have you felt downhearted and depressed	1	2	3	4	5	6
e) Have you been happy	1	2	3	4	5	6

The following items are about alcohol consumption. Choose the most appropriate answer.

14. Have you ever drunk alcohol (wine, beer, cider, liquor, cocktails)?

- Yes No

IF NO, GO TO ITEM 32

IF YES:

15. How often have you drunk alcohol in the last year?

- Never ≤ 1 time a month 2 to 3 times a month
 1 to 2 times a week ≥ 3 times a week Every days

16. How often have you drunk alcohol in the last 30 days?

- Never 1 to 2 times 3 to 5 times (about 1 time a week)
 6 to 9 times (1 to 2 times a week) 10 to 19 times (3 to 5 time a week)
 20 to 29 times (almost every day) ≥ 30 times (≥ 1 time per day)

17. How many alcoholic drinks do you drink on a single occasion?

- 1 or 2 3 or 4 5 or 6 7 to 9 ≥ 10



7cl of aperitif
At 18°



10cl
champagne
at 12°



of 2.5cl
whiskey
at 45°



of 2.5cl of pastis
at 45°



25 cl
beer
at 5°



of 10 cl
of wine
at 12°

Be careful, the quantity of alcohol depends on volume drunk: 1 glass of whisky of 10cl is equivalent to 4 units of alcohol, 1 glass of 15cl of liqueur is equivalent to 2 units of alcohol. 1 glass of cocktail with fruit liqueur or spirits and fruit juice is equivalent to 2 units of alcohol.

18. Overall, you drink:

- < 10 drinks of alcohol a year 1 to 4 drinks a month
 5 to 10 drinks a month > 10 drinks a year

19. a) Have you been drunk in the last year?

- Never 1 to 2 times 3 to 5 times 6 to 9 times 10 to 29 times ≥ 30 times

b) On a 1 to 10 points scale, at what point were you drunk the last time?

1: Felt happy 10: So drunk that I couldn't walk

- 1 2 3 4 5 6 7 8 9 10

20. How often during the last year have you found that you were not able to stop drinking once you had started?

- Never < 1 time a month 1 time a month > 1 time a month ≥ 1 time a week

21. How often during the last year have you failed to do what was normally expected from you because of drinking?

- Never < 1 time a month 1 time a month > 1 time a month ≥ 1 time a week

22. How often during the last year have you had a feeling of guilt or remorse after drinking?

- Never < 1 time a month 1 time a month > 1 time a month ≥ 1 time a week

23. How often during the last year have you been unable to remember what happened the night before because you had been drinking?

- Never < 1 time a month 1 time a month > 1 time a month ≥ 1 time a week

24. Have you been injured as a result of your drinking?

- Never Rarely Sometimes Often Very often

25. Has someone else been injured as a result of your drinking?

- Never Rarely Sometimes Often Very often

26. Have you been raped or experienced sexual assault as a result of your drinking?

- Never Rarely Sometimes Often Very often

27. Have you witnessed any violent incidents (fight, sexual assaults...) as a result of your drinking?

- Never Rarely Sometimes Often Very often

Concerning your alcohol consumption:

28. Have you ever felt you should cut down on your drinking?

- Yes No

29. Have people annoyed you by criticising your drinking?

- Yes No

30. Have you ever felt bad or guilty about your drinking?

- Yes No

31. Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)?

- Yes No

The following items are about marijuana consumption. Choose the most appropriate answer.

32. Have you ever used marijuana?

- Yes No

IF NO, GO TO ITEM 42

IF YES:

33. How old were you the first time? _____ years old

34. Have you used marijuana in the last year?

- No ≤ 1 time a month 2 to 4 times a month 2 to 3 times a week
 ≥ 4 times a week

35. How often have you used marijuana during the last 30 days?

- 0 1 to 2 times 3 to 9 times ≥ 10 times Every day

Concerning your marijuana consumption:

36. Have you ever felt you should cut down on your use of marijuana?

- Yes No

37. Have people annoyed you by criticising your use of marijuana?

- Yes No

38. Have you ever felt bad or guilty about your use of marijuana?

- Yes No

39. Have you ever used marijuana first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)?

- Yes No

40. Have you smoked cannabis when you were alone?

- Never Rarely Sometimes Often Very often Permanently

41. Have you smoked cannabis before midday?

- Never Rarely Sometimes Often Very often Permanently

The following items are about tobacco use. Choose the most appropriate answer.

42. Do you smoke currently?

- I don't smoke and I have never tried
 I have tried but did not become a smoker
 I was a smoker but I stopped
 I smoke occasionally (< 1 cigarette a day)
 I smoke everyday (at least 1 cigarette a day)

IF YOU DON'T SMOKE CURRENTLY, GO TO ITEM 52

If you smoke, occasionally or daily:

43. How old were you the first time? _____ years old

44. How many cigarettes have you smoked during the last 30 days?

- <1 1 to 5 6 to 10 11 to 20 21 to 30 ≥ 31

45. How many times did you stop smoking for at least 7 days? □□ times

46. How soon after waking do you smoke your first cigarette?

- Within 5 minutes 6 - 30 minutes 31 - 60 minutes > 60 minutes
 I don't smoke in the morning

47. Do you find it difficult to refrain from smoking in places where it is forbidden?

- Yes No

48. Which cigarette would you hate to give up?

- The first in the morning Those after lunch The last of the day An other

49. Do you smoke more frequently in the morning?

- Yes No

50. Do you smoke even when you are sick in bed?

- Yes No

51. Do you use a water pipe?

- No, never
 Yes, < 1 time a week
 Yes, 1 to 3 times a week
 Yes, > 3 times a week

Have you used the followings substances at least one time in your life and in the last 30 days?

	a) I have used it at least 1 time in my life	b) I have used it in the last 30 days
52. Medication for nerves or sleep disturbance	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
53. Amphetamines	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
54. Cocaine	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
55. Ecstasy / MDMA	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
56. Poppers/glue/solvents	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

57. Mushrooms / LSD	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
----------------------------	--	--

58. Are you currently in paid employment?
 No Paid job in summer only Occasional paid job
 Paid job < 15 hours a week Paid job ≥ 15 hours a week

IF YOU HAVE NO JOB, GO TO ITEM 61

IF YOU HAVE A JOB:

59. Does this job have a relation with your studies? Yes No

60. Did you ask for your study schedule to be altered so as to continue with your job?

Yes No

61. Do you do sports?

No sport Not regularly or < 1 hour a week Regularly from 1 to 2 hours a week
 Regularly from 3 to 4 hours a week Regularly ≥ 5 hours a week

62. What medical insurance do you have?

a) Main insurance

Student insurance Parents' insurance Insurance as a salaried worker
 Other Don't know

b) Private health insurance

Student private health insurance Parents' private health insurance
 Complementary universal health insurance Other None Don't know

Have you seen a doctor in the last 12 months?

63. Attending physician	a) <input type="checkbox"/> Yes <input type="checkbox"/> No	b) If yes: <input type="checkbox"/> Campus health centre <input type="checkbox"/> Office <input type="checkbox"/> Other
64. Gynecologist	a) <input type="checkbox"/> Yes <input type="checkbox"/> No	b) If yes: <input type="checkbox"/> Campus health centre <input type="checkbox"/> Office <input type="checkbox"/> Other
		c) Do you use regular means of contraception? <input type="checkbox"/> Yes <input type="checkbox"/> No d) Have you ever taken emergency oral contraception? <input type="checkbox"/> Yes <input type="checkbox"/> No
65. Psychologist / Psychiatrist	a) <input type="checkbox"/> Yes <input type="checkbox"/> No	b) If yes: <input type="checkbox"/> Campus health centre <input type="checkbox"/> Office <input type="checkbox"/> Other
66. Dentist	a) <input type="checkbox"/> Yes <input type="checkbox"/> No	b) If yes: <input type="checkbox"/> Campus health centre <input type="checkbox"/> Office <input type="checkbox"/> Other
67. Other medical specialist	a) <input type="checkbox"/> Yes <input type="checkbox"/> No	b) If yes: <input type="checkbox"/> Campus health centre <input type="checkbox"/> Office <input type="checkbox"/> Other

68. Did you choose an attending physician to be your family physician?

Yes No Don't know

Did you forgo seeing healthcare professionals in the last 12 months? (Several answers possible)

<p>69. Attending physician</p>	<p>a) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>b) If yes: <input type="checkbox"/> Cost problem <input type="checkbox"/> I didn't have any time <input type="checkbox"/> I couldn't get an appointment when I needed one <input type="checkbox"/> I couldn't get an appointment where I lived <input type="checkbox"/> Other</p>
<p>70. Dentist</p>	<p>a) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>b) If yes: <input type="checkbox"/> Cost problem <input type="checkbox"/> I didn't have any time <input type="checkbox"/> I couldn't get an appointment when I needed one <input type="checkbox"/> I couldn't get an appointment where I lived <input type="checkbox"/> Other</p>
<p>71. Ophthalmologist</p>	<p>a) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>b) If yes: <input type="checkbox"/> Cost problem <input type="checkbox"/> I didn't have any time <input type="checkbox"/> I couldn't get an appointment when I needed one <input type="checkbox"/> I couldn't get an appointment where I lived <input type="checkbox"/> Other</p>
<p>72. Optician</p>	<p>a) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>b) If yes: <input type="checkbox"/> Cost problem <input type="checkbox"/> I didn't have any time <input type="checkbox"/> I couldn't get an appointment where I lived <input type="checkbox"/> Other</p>
<p>73. To buy medication</p>	<p>a) <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>b) If yes: <input type="checkbox"/> Cost problem <input type="checkbox"/> I didn't have any time <input type="checkbox"/> Other</p>

74. Have you ever been a victim of violence?

a) Psychological?

Yes No

Add comments below.

b) Physical?

Yes No
Add comments below.

c) Sexual?
 Yes No
Add comments below.

75. Have you ever behaved violently?

a) Against someone?
 Never Rarely Sometimes Often Very often

b) Against yourself?
 Never Rarely Sometimes Often Very often

c) Committing acts of vandalism?
 Never Rarely Sometimes Often Very often
Add comments below.

76. Answer all the following items:

- a) Do you sometimes meet with a social worker (welfare worker, educator)?
 Yes No
- b) Do you have complementary health insurance (mutual insurance)?
 Yes No
- c) Do you live with a partner?
 Yes No
- d) Are you a homeowner or will you be one in the near future?
 Yes No
- e) Are there periods in the month when you have real financial difficulties in facing you needs (food, rent, electricity)?
 Yes No
- f) Have you participated in any sports activities in the last 12 months?
 Yes No
- g) Have you gone to any shows (cinema, theatre) in the last 12 months?
 Yes No
- h) Have you gone on vacation during the past 12 months?
 Yes No
- i) Have you seen any family members in the past six months (other than your parents or children)?
 Yes No
- j) If you had financial, family or health difficulties, is there anyone you could stay with for a few days?
 Yes No
- k) If you had financial, family or health difficulties, is there anyone you could give you material aid such as lending you money?
 Yes No

Thank you for taking the time to answer this questionnaire.

Write any comments you may have in the space below.

Consult the results of the statistical analysis on our website: <http://www.addictprev.fr/>

Comments:

Supplemental Table B: results of the three most discriminant items for the three groups, simple use/non-use, intermediate consumption and problem drinking, identified by the multiple correspondence analysis

Items	Group 1 Simple use/non-use	Group 2 Intermediate consumption	Group 3 Problem drinking
Number of drink on a single occasion	0.542	0.401	0.413
Annual frequency of drunkenness	0.689	0.548	0.556
Not able to stop drinking after starting	0.541	0.430	0.679
Failed to do what was normally expected	0.572	0.465	0.627
Guilt feelings	0.613	0.526	0.553
Unable to remember what happened the night before	0.652	0.551	0.645
Have you ever felt you should cut down on your drinking?	0.400	0.239	0.321
Have people annoyed you by criticising your drinking?	0.332	0.156	0.338
Have you ever felt bad or guilty about your drinking?	0.465	0.291	0.354
Have you ever had a drink first thing in the morning to steady your nerves or to get rid of a hangover (eye opener)?	0.087	0.008	0.144

■ Received on May 22, 2017. Accepted on February 9, 2018.

■ Correspondence: Dr Marie Blanquet, Service de Santé Publique, CHU de Clermont-Ferrand, 7, place Henri Dunant, 63058 Clermont-Ferrand CEDEX 1 France, Clermont Université, Université d'Auvergne, EA 4681, PEPRADE (Périnatalité, grossesse, Environnement, PRAtiques médicales et DEveloppement), Clermont-Ferrand, France. - E-mail: mblanquet@chu-clermontferrand.fr