DETECTION OF PROBLEM CANNABIS USE: THE CANNABIS ABUSE SCREENING TEST (CAST)

Stanislas Spilka, Eric Janssen (OFDT) and Stéphane Legleye (INED)

Note n°2013-02

Saint-Denis, 03/09/2013

As the most widely-used illegal substance in France, more than one third of French 17-year-olds had used cannabis in the last year in 2011, and 7 out of 100 of them used it regularly (at least 10 times in the last month). To better understand the health and social problems likely to accompany this cannabis use, the French Monitoring Centre for Drugs and Drug Addiction (OFDT) developed a scale for identifying problem cannabis use. This scale is called the *Cannabis Abuse Screening Test*, or CAST. The OFDT's May 2013 publication of *Drugs, addictions and key data* provided an opportunity to conduct an initial survey of the proportion of 17-year-olds with a high risk for problem drug use in France. This memorandum refers to the implementation of this scale and the calculation of our estimate.

Introduction

An estimated 3.8 million people used cannabis [1] in the last year, and 1.2 million of them did so more than 10 times per month (regular use), making cannabis the most frequently used illegal substance in metropolitan France among adults and adolescents. The level of cannabis use in France is among the highest in Europe [2]. The effects of frequent or regular cannabis use in France are now well-documented (see [3-6]). Therefore, identifying potential problem users is of great importance, whether through general population surveys, in which quantifying such users helps determine the extent of the problem, or through consultation situations with medical and paramedical personnel, which helps improve treatment recommendations. Although effective diagnostic scales derived from the DSM (Diagnostic and Statistical Manual of Mental Disorders [7]) and the ICD (International Classification of Diseases [8]) exist, they are generally quite complex for unqualified users and are difficult to integrate into quantitative surveys or to use as a referral tool during consultations. They are often very long and can be time-consuming to complete. This is why many short identification tests were created, such as the ALAC (ALcohol Advisory Council), the ADOSPA (ADOlescents et Substances PsychoActives), and the CRAFFT (Car Relax, Alone, Forget, Family, Friends, Trouble) [9].

The *Cannabis Abuse Screening Test* (CAST) is a tool used to identify cannabis abusers. It has been under development at the OFDT's general population survey unit since 2002. Designed using the key abuse and harmful use identification criteria of the DSM-IV (Fourth edition) and the ICD 10 (Tenth version), CAST aims to describe and estimate problem use from data collected using epidemiological surveys of the general population. Today, it is one of the most frequently used tests among young people, especially as part of the ESPAD survey (European School Survey Project on Alcohol and other Drugs) (see *infra*). The CAST is also one of the identification scales most frequently used by professionals working at counselling clinics for young users (CJC). These clinics were created in 2004 to meet the prevention, support and follow-up needs of cannabis users, and young users in particular [10].

France offered to introduce the CAST scale as an optional module of the ESPAD survey. Subsequently, those countries wishing to conduct it were able to integrate it on an optional basis into the 2007 and 2011 versions of the survey. During the latest survey, 13 out of 36 European countries used CAST. This made it possible to estimate country by country, the proportion of 16-year-olds adolescents presenting problematic uses [11].

For the adult population, the test was integrated for the first time into the Health Barometer survey conducted by the INPES (National Institute for Prevention and Health Education) in 2010 [12].

Description of the test

The CAST is a 6-item scale that describes the behavior of use or problems experienced within the scope of cannabis use. Conducted for the first time in 2002 as part of the ESCAPAD survey (French Survey on Health and Use on Call-up and Preparation for Defence Day, see methodology box), the CAST test has since been modified. Its current version was first considered the definitive version in 2006. The modifications concern mainly the reference time period: initially, the questions referred to the entire life of the person being questioned [13], while now, the test questions refer to the last 12 months. This final version of the test is comprised of 6 questions about use in the morning or solitary use, i.e., use that is supposedly outside of a festive context, possible memory problems, being encouraged to limit or stop use, failed attempts to stop use and problems such as fights or accidents related to cannabis use.

CAST

In the last 12 months, have you smoked cannabis ?
☐No

☐Yes					
In the last 12 months… *Mark one box for each line.*	Never	Rarely	From time to time	Fairly often	Very often
1. Have you smoked cannabis before midday?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
2. Have you smoked cannabis when you were alone?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
3. Have you had memory problems when you smoked cannabis?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
4. Have friends or members of your family told you that you ought to reduce your cannabis use?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
5. Have you tried to reduce or stop your cannabis use without succeeding?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4
6. Have you had problems because of your use of cannabis (argument, fight, accident, bad result at school, etc)? Which ones?	☐ 0	☐ 1	☐ 2	☐ 3	☐ 4

To calculate a score, the responses are coded on a scale of 0 to 4. The total score obtained (which can range from 0 to 24) indicates whether or not the questioned users are at risk. A score of less than 3 indicates no addiction risk. A score of 3 or less than 7 indicates low addiction risk, and a score of 7 or above indicates high addiction risk. The score is calculated for those respondents who completed the test in its entirety and who had used cannabis in the year preceding the test (N=7,668 in 2011, or 28% of the sample questioned).

N.B. The CAST results presented in the 2011 European ESPAD survey report were established using thresholds that referred to initial validations and employed a slightly different score calculation method [11].

Description of the validation protocol

The validation process concerned first the general population. This involved using a reference test such as the M-CIDI to establish the best way to use CAST for diagnostic purposes.

This initial validation relied on a quantitative survey conducted in late 2008 on an adolescent population based on the ESCAPAD survey model. This initial validation was funded in part by the

European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). This enabled the characteristics of the CAST to be tested with respect to DSM IV criteria. The participants were invited to respond to both a reference test and the CAST test. The reference test used as DSM-IV abuse and addiction criteria was the Munich Composite International Diagnostic Interview (M-CIDI) [14-15]. The results were published in 2011 [16]

In 2012, also based on 2008 survey data, a second validation method was implemented within the scope of a partnership with the *Institut für Therapieforschung* (IFT) of Munich. The CAST data were analysed using a so-called latent class statistical technique. One of the criticisms of the DSM-IV criteria was that the theoretical structure of the abuse and addiction diagnoses was not confirmed by the survey data. The theory suggested that abuse and addiction were two distinct items, while the empirical data suggest a unidimensional continuum of disorders. Moreover, the recommended thresholds (at least 1 of 4 criteria for abuse, at least 3 of 7 criteria for addiction) were deemed debatable, especially for adolescents. Finally, abuse was subject to intense reservations, especially for the item pertaining to use-related legal problems. These misgivings were taken into consideration when the DSM-IV was revised. The new DSM (DSM-V) published in May 2013 only contains one dimension and does not recognise abuse as a diagnosis. Despite this, the DSM-IV diagnostic criteria, as a whole, remain relevant. The latent class analysis aims to identify those categories of users that best reflect the range of problems related to use in the population (without consideration for the theoretical diagnostics of the DSM-IV). This identification of the categories of "at-risk" users is used to define an empirical reference for calibrating the CAST on the model of what is proposed in the absence of a reference test [17]. This classification is facilitated by the unidimensional structure of the targeted disorders. Finally, 3 classes were established: non-symptomatic use, *moderate risk* use and *high risk* problem use or addiction.

The latter approach, whose measurement methods seems to be the best, was what was finally used to define the current severity levels and was incorporated into the 2011 ESCAPAD survey [18] to estimate the proportion of recent users likely to present a high risk of dependence.

Concurrently, an assessment of the abilities of the CAST to identify problem users in a clinical situation was conducted within the scope of the INCANT survey (INternational CAnnabis Need of Treatment) [19-20]. This validation study involved a prior clinical interview to diagnose any problem use or addiction and to invite patients taking the survey to respond to a mini questionnaire containing the CAST [21]. Although the results seemed to be less compelling than those for the general population, they did help justify the use of the test as a tool to identify young users likely to encounter problems related to their cannabis use and to refer them to a health professional.

Cannabis use and at-risk cannabis use in 17-year-olds in 2011

In 2011, 34.6 % of young 17-year-olds stated that they had smoked cannabis in the 12 months prior to the survey. The levels of cannabis use were higher among boys than among girls (37.8 % *versus* 31.2 %), even though this difference has diminished in recent years [22].

Table 1. Percentage of respondents answering "fairly often" or "very often" to various CAST questions in 2011

	Boys	Girls	All
You smoked cannabis alone	13.4	6.0*	**10.2**
You smoked cannabis before noon	12.7	6.2*	**9.9**
Friends or family members have mentioned that you should cut down on your cannabis use	12.0	6.7*	**9.7**
You tried to limit your use or stop using, without success	6.7	4.4*	**5.7**
You have experienced memory problems when smoking cannabis	4.9	5.0	**4.9**
You have had problems related to cannabis use	5.9	3.4*	**4.8**

*signifies a statistically significant difference between boys and girls, chisq² p<0.001
Source: ESCAPAD 2011 – OFDT survey.

1 out of 10 test responders stated having sometimes/often smoked cannabis alone in the 12 months preceding the survey. The same proportion of responders who had used in the last year stated having smoked in the morning or that their friends and family members had mentioned that they should cut down on their use. These are the CAST test items most often reported by responders who had used in the last year. The responses to the 3 other questions, which correspond directly to cannabis use-related problems, are answered positively half as often. In any event, the responses are positive for far fewer girls than boys, except for the memory disturbances, which are mentioned by 5% of users, regardless of whether they are male or female.

Table 2. CAST score of current 17-year-old cannabis users in 2011 (%)

| Risk level	Score = 0	0 <score < 3	3 ≤ score < 7	score ≥ 7
Boys	29	24	24	23
Girls	42	27	18	13
All	**35**	**25**	**22**	**18**

Source: ESCAPAD 2011 - OFDT

In 2011, of the 17-year-olds who had used cannabis in the last 12 months, 18% were at high risk of problem use (score ≥ 7, Table 2), and more boys than girls (+ 1.7) had problem use or even addiction.

When extrapolated to the entire 17-year-old population in 2011, 1 out of every 20 (around 39,000) 17-year-olds, were addicted to cannabis.

Although the risk of problem cannabis use is not only related to frequency of use, the probability of reporting one or more problems nevertheless increases with more intense use. Figure 1 below clearly demonstrates that the CAST test scores are higher among regular or daily cannabis smokers than among current[1] and monthly users, whose scores rapidly decline (none of them had a score above 13). Consequently, the mean scores vary widely with type of use: from 1.2 to 10.4 among current and daily users and from 1.4 to 6.0 among monthly and regular users.

Figure 1. **CAST test score by frequency of use**
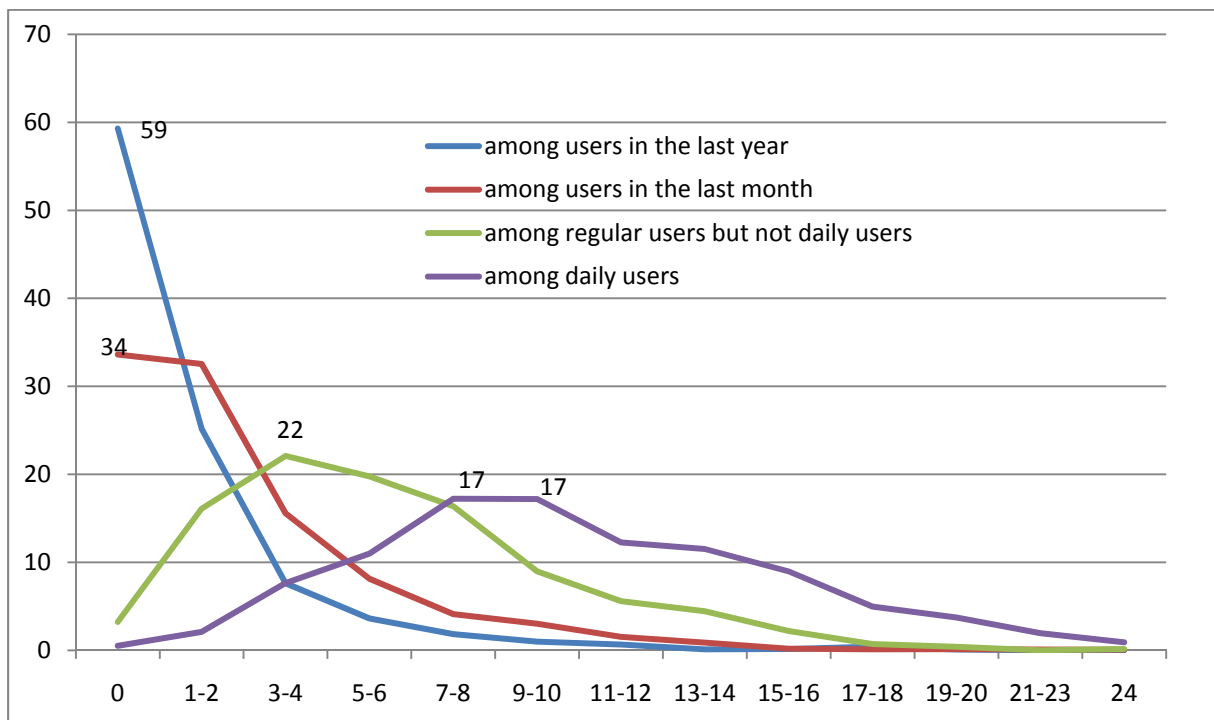
Interpretation: for those adolescents who had used cannabis in the last year but less than once a month, the modal score is "0" (59% of adolescents who had used in the last year had obtained a CAST score of 0), while for those users who stated having used on a daily basis, the modal cannabis scores stood at "7-8" and "9-10" for 17%.

Source: ESCAPAD 2011 – OFDT

---

[1] Current use or use in the last year: at least once in the last 12 months.

Conclusions and outlook

At present, the thresholds have not been definitely determined. The optimal CAST thresholds to target users vary depending on whether or not one refers to the theoretical DSM-IV with the abuse and addiction diagnoses or the statistically obtained empirical typology. The weaknesses of the DSM-IV [18] in its original version justify the consideration of the thresholds obtained by empirical typology (latent class) as more realistic. With respect to the nosographic criticisms regarding adolescents [23] by the DSM-V [7], it is appropriate to continue validating the test. Finally, the CAST was validated abroad in a recent Italian study. This study aimed to identify addiction among schooled adolescents in Italy [24]. By using the M-CIDI as a reference with a score of 4 instead of the traditional "3 and higher" mentioned in the publication by Legleye S, *et al.* [16], Italian researchers also concluded that a score of 7 or higher was the optimal point at which problem use should be described. Preliminary analyses also show that this threshold would be the most appropriate for targeting high risk users in the French general population (15-to-64-year-olds) surveyed with the 2010 Health Barometer survey of the INPES (using a methodology that also employs latent classes).

At least among young people, the test is an effective identification tool, regardless of the population, nationality and diagnostic references used [16, 24, 26]. The test still needs to be validated in the adult population. This should be completed by the end of 2013. We would like to specify that, in all studies, CAST overestimates the prevalence of high-risk use or addiction. Therefore, the test remains an identification tool that can be used to make comparisons and perform epidemiological analyses, but as it stands, cannot be used as a substitute for clinical diagnosis.

Subsequently, the proportion of 17-year-olds at high risk of problem use should be considered as most likely overestimated. These initial estimates based on current thresholds should therefore quickly be adjusted, even though such adjustments should not lead to major differences and the number of problem adolescent cannabis users is probably quite close to the current estimate of 39,000.

> **The ESCAPAD survey**
>
> The seventh French ESCAPAD 2011 national survey took place from 14 to 22 March 2011 in cooperation with the *National Service Directorate of the Ministry of Defence* (DSN, which recruits volunteers for France's armed forces) during France's *National Defence and Citizenship Day* (JDC) in all metropolitan centres as well as centres in French Guyana, Martinique, Guadeloupe and Reunion. All those called up who were present were surveyed, without exception. In total, 200 centres active during the period were involved (185 of these were in metropolitan France) and 32,249 French teenagers answered an anonymous, self-administered questionnaire about their health and their use of a dozen psychoactive substances. The participation rate (number of filled questionnaires/number of teenagers present) was 99.3%. The final analysed sample here included 27,402 17-year-olds from metropolitan France; the sample was weighted to give administrative departments their true demographic weight while respecting the departmental gender ratio. The survey sample is representative of all French 17-year-olds, whether in school or not. The ESCAPAD survey was approved by the French National Council for Statistical Information (CNIS) and was deemed of general public statistical interest by the Approval committee. It also received the approval of the French Data Protection Agency (CNIL).

Bibliography

1.   BECK F., GUIGNARD R., RICHARD J.B., TOVAR M.L. and SPILKA S., «Levels of drug use in France in 2010. An analysis of the Baromètre santé 2010 data on psychoactive substances use among the adult population », *Tendances*, n°76, 2011, 6 pages.

2.   EMCDDA (European Monitoring Centre for Drugs and Drug Addiction), *2011 Annual report on the state of the drugs problem in Europe*, Luxembourg, Publications Office of the European Union, 2011, 117 pages.

3.   ASBRIDGE M., HAYDEN J.A. and CARTWRIGHT J.L., « Acute cannabis consumption and motor vehicle collision risk: systematic review of observational studies and meta-analysis », *BMJ*, Vol.344, e536, 2012.

4.   INSERM, *Cannabis : quels effets sur le comportement et la santé ?*, Paris, INSERM, coll. Expertise collective, 2001, 429 pages.

5.   LEV-RAN S., ROERECKE M., LE FOLL B., GEORGE T.P., MCKENZIE K. and REHM J., « The association between cannabis use and depression: a systematic review and meta-analysis of longitudinal studies », *Psychological Medicine*, Online first 24 June 2013, pp. 1-14.

6.   MOORE T.H., ZAMMIT S., LINGFORD-HUGHES A., BARNES T.R., JONES P.B., BURKE M. and LEWIS G., « Cannabis use and risk of psychotic or affective mental health outcomes: a systema tic review », *The Lancet*, Vol.370, n°9584, 2007, pp. 319-328.

7.   APA (American Psychiatric Association), *Diagnostic and Statistical Manual of Mental Disorders, fifth edition: DSM-5*, Washington, DC, American Psychiatric Association, 2013, 947 pages.

8.   WHO, *The ICD-10 classification of mental and behavioral disorders. Clinical descriptions and diagnostic guidelines*, Geneva, WHO, 1992, 362 pages.

9.   BECK F. and LEGLEYE S., « Measuring cannabis related problems and dependence at the population level », in RÖDNER SZNITMAN S., OLSSON B., and ROOM R. (Dir.), *A Cannabis reader: global issues and local experiences. Perspectives on cannabis controversies, treatment and regulation in Europe*, Lisbon, EMCDDA, coll. EMCDDA monograph, 2008, pp. 29-57.

10.   OBRADOVIC I., *Évaluation du dispositif des "Consultations jeunes consommateurs" (2004-2007)*, Saint-Denis, OFDT, 2009, 173 pages.

11.   PABST A., KRAUS L. and PIONTEK D., « The Cannabis Abuse Screening Test (CAST): Examining the prevalence of cannabis-related problems among adolescents in 13 European countries », in HIBELL B., GUTTORMSSON U., AHLSTRÖM S., BALAKIREVA O., BJARNASON T., KOKKEVI A., and KRAUS L. (Dir.), *The 2011 ESPAD report - Substance use among students in 36 European countries*, Stockholm, CAN (The Swedish Council for Information on Alcohol and other Drugs), 2012, pp. 158-163.

12.   BECK F., LEGLEYE S. and SPILKA S., « Cannabis, cocaïne, ecstasy : entre expérimentation et usage régulier », in BECK F., GUILBERT P., and GAUTIER A. (Dir.), *Baromètre Santé 2005*, Saint Denis, INPES, 2007, pp. 169-178.

13.   LEGLEYE S., KARILA L., BECK F. and REYNAUD M., « Validation of the CAST, a general population Cannabis Abuse Screening Test », *Journal of Substance Use*, Vol.12, n°4, 2007, pp. 233-242.

14.   LACHNER G., WITTCHEN H.U., PERKONIGG A., HOLLY A., SCHUSTER P., WUNDERLICH U., TURK D., GARCZYNSKI E. and PFISTER H., « Structure, content and reliability of the Munich-Composite International Diagnostic Interview (M-CIDI) substance use sections », *European Addiction Research*, Vol.4, n°1-2, 1998, pp. 28-41.

15.   WITTCHEN H.-U., BELOCH E., GARCZYNSKI E., HOLLY A., LACHNER G., PERKONIGG A., PFÜTZE E.-M., SCHUSTER P., VODERMAIER A., VOSSEN A., WUNDERLICH U. and ZIEGLGÄNSBERGER S., *Münchener Composite International Diagnostic Interview (M-CIDI), Paper-pencil 2.2, 2/95*, München, Max-Planck-Institut für Psychiatrie, Klinisches Institut, 1995.

16.   LEGLEYE S., PIONTEK D. and KRAUS L., « Psychometric properties of the Cannabis Abuse Screening Test (CAST) in a French sample of adolescents », *Drug and Alcohol Dependence*, Vol.113, n°2-3, 2011, pp. 229-235.

17.   GARRETT E.S., EATON W.W. and ZEGER S., « Methods for evaluating the performance of diagnostic tests in the absence of a gold standard: a latent class model approach », *Statistics in Medicine*, Vol.21, n°9, 2002, pp. 1289-1307.

18.   LEGLEYE S., PIONTEK D., KRAUS L., MORAND E. and FALISSARD B., « A validation of the Cannabis Abuse Screening Test (CAST) using a latent class analysis of the DSM-IV among adolescents », *International Journal of Methods in Psychiatric Research*, Vol.22, n°1, 2013, pp. 16-26.

19.   PHAN O., HENDERSON C.E., ANGELIDIS T., WEIL P., VAN TOORN M., RIGTER R., SORIA C. and RIGTER H., « European youth care sites serve different populations of adolescents with cannabis use disorder. Baseline and referral data from the INCANT trial », *BMC Psychiatry*, Vol.11, n°110, 2011, pp. 1-10.

20.   RIGTER H., PELC I., TOSSMANN P., PHAN O., GRICHTING E., HENDRIKS V. and ROWE C., « INCANT: a transnational randomized trial of multidimensional family therapy versus treatment as usual for adolescents with cannabis use disorder », *BMC Psychiatry*, Vol.10, n°28, 2011.

21.   LEGLEYE S., KRAUS L., PIONTEK D., PHAN O. and JOUANNE C., « Validation of the Cannabis Abuse Screening Test in a sample of cannabis inpatients », *European Addiction Research*, Vol.18, n°4, 2012, pp. 193-200.

22.   SPILKA S., LE NEZET O. and TOVAR M.L., «Drug use among 17-year-olds: initial results of the ESCAPAD 2011 survey », *Tendances*, n°79, 2012, 4 pages.

23.   PIONTEK D., KRAUS L., LEGLEYE S. and BUHRINGER G., « The validity of DSM-IV cannabis abuse and dependence criteria in adolescents and the value of additional cannabis use indicators », *Addiction*, Vol.106, n°6, 2011, pp. 1137-1145.

24.   BASTIANI L., SICILIANO V., CURZIO O., LUPPI C., GORI M., GRASSI M. and MOLINARO S., « Optimal scaling of the CAST and of SDS Scale in a national sample of adolescents », *Addictive Behaviors*, Vol.38, n°4, 2013, pp. 2060-2067.

25.   CUENCA-ROYO A.M., SANCHEZ-NIUBO A., FORERO C.G., TORRENS M., SUELVES J.M. and DOMINGO-SALVANY A., « Psychometric properties of the CAST and SDS scales in young adult cannabis users », *Addictive Behaviors*, Vol.37, n°6, 2012, pp. 709-715.

26.   FERNANDEZ-ARTAMENDI S., FERNANDEZ-HERMIDA J.R., MUNIZ-FERNANDEZ J., SECADES-VILLA R. and GARCIA-FERNANDEZ G., « Screening of cannabis-related problems among youth: the CPQ-A-S and CAST questionnaires », *Substance Abuse Treatment, Prevention, and Policy*, Vol.7, n°13, 2012.