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Optimal scaling of the CAST and of SDS Scale in a national sample of adolescents

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HIGHLIGHTS

- A new scoring methodology for SDS and CAST screening questionnaire was proposed.
- This is the study with the highest number of adolescents screened.
- Optimal scaling of the 6 items for CAST and 5 items for SDS were performed.
- The CAST and SDS are equally useful for screening for problematic cannabis use.
- CAST MCA scoring version has better known-groups criterion validity.

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ABSTRACT

Purpose: Psychometric and screening properties of the Cannabis Abuse Screening Test (CAST) and of the Severity Dependence Scale (SDS) were investigated using DSM-IV diagnoses of cannabis dependence (CD) as external criteria. Performance of the SDS and of the CAST were compared.
Methods: Cross-sectional European School Survey Project on Alcohol and Other Drugs (ESPAD) was carried out in Italy in 2009. The sample consisted of 5787 Italian adolescents aged 15–19 who reported cannabis last year use. Uni-dimensionality, internal reliability, external validity, and optimal scaling of the 6 items for CAST and 5 items for SDS were performed. The Munich Composite International Diagnostic Interview (M-CIDI) was used as a gold standard for DSM-IV diagnoses, and all outputs were assessed by 10-fold cross validation procedure.
Results: Both scales were uni-dimensional and Cronbach's α was 0.74 for SDS and 0.78 for CAST. High and comparable area under curve (AUC) values indicate a good ability of both scales to discriminate between individuals with and without dependence diagnosis. Based on balanced sensitivity and specificity, the optimal cut-off scores for problematic use disorders were 7 for CAST MCA and 4 for SDS MCA. Both CAST and SDS overestimated CD prevalence.
Conclusions: The CAST and SDS are equally useful for screening for problematic cannabis use disorders. Both clinical and research applications of the scales are possible.

1. Introduction

Cannabis is the illicit drug most widely available in Europe and its use is concentrated among young people. International efforts to develop and evaluate screening scales assessing cannabis related problems have increased (Legleye, Kraus, Piontek, Phan, & Jouanne, 2012; Piontek, Kraus, & Klempova, 2008).

The ESPAD survey provides comparable data on alcohol and drug use among high school students in Europe (Hibell et al., 2009). In Italy, drug use is widespread among students, with cannabis being the most used still at least five times more prevalent than any other drug. The data from 1999 to 2009 ESPAD-Italia® national school surveys reveal that the lifetime prevalence of cannabis is 30%. Cannabis is moreover the most consistently available illicit drug (Molinaro, Siciliano, Curzio, Denoth, & Mariani, 2012; Molinaro et al., 2011).

Regular cannabis use in adolescence might adversely affect mental health in young adults, and early cannabis use initiation seems to be associated with a wide range of social problems (Cox, Zhang, Johnson, & Bender, 2007; Dregan & Gulliford, 2012; Fergusson, Horwood, & Beautrais, 2003; Hall & Degenhardt, 2011; Legleye, Piontek, & Kraus, 2011; Mayet, Legleye, Falissard, & Chau, 2012; Moore et al., 2007). The individual health risk related to cannabis use is generally accepted to

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be lower than those associated with drugs such as heroin or cocaine. However, due to the high prevalence of cannabis use, the impact of the drug on public health may be significant.

Screening scales could help to identify at risk individuals and several instruments that are short enough to be used in general population surveys need to be validated (Legleye et al., 2011). On this purpose, the Severity of Dependence Scale (SDS) and the Cannabis Abuse Screening Test (CAST) were included in the ESPAD-Italia®2009 questionnaire, using the Munich Composite International Diagnostic Interview (M-CIDI) as "gold standard".

To assess the reproducibility of SDS and CAST scales among Italian students with a gap of three weeks between administration, a test–retest methodology (Curzio & Molinaro, 2009; Donner & Koval, 1980; Molinaro et al., 2012) was used for a subgroup of ESPAD-Italia®2009 sample and overall concordance was considered excellent.

Identifying methodologically reliable indicators would help for both epidemiological and clinical purposes. Screening scales might support risk-factor identification to prevent cannabis use related problems and have important implications for designing early and targeted interventions to prevent disorder progression (Behrendt, Wittchen, Höfler, Lieb, & Beesdo, 2009).

Notwithstanding the rapid progress in development and validation of screening and assessment tools for cannabis problematic use, in Italy, important gaps in instrumentation remain. Research in these areas is still required. The practical utility of several of the tools estimating cannabis problematic use, require skilled interviewers with considerable clinical experience, formal qualifications and training, and intensive supervision; for this reason, they may have limited viability in the different circumstances of community-based practice.

The present study aims at adapting to the Italian adolescents context and investigating the psychometric properties of the two, abovementioned (CAST and SDS), short screening test for cannabis problematic use. These scales were compared against M-CIDI cannabis dependence diagnoses (used as "gold standard").

2. Methods

2.1. Design and sample

The data were extracted from ESPAD-Italia®2009 database. The survey is designed to monitor drug use among European youths and, in 2009, a total of 32,461 Italian adolescents (15–19 years) participated (Molinaro et al., 2011, 2012). The survey was designed also to validate screening instruments including the CAST and the SDS. The mean age of participants was 17 and 49.2% of these were males. Prior to the survey, participants were informed about the purpose of the study and were guaranteed complete anonymity; participation was voluntary. The response rate of schools participating in the survey was 89.2%. The present analyses were restricted to adolescents reporting cannabis use in the previous year (n = 6999). The final sample comprised 5787 current cannabis users with complete data on gender, age and the assessed screening scales.

2.2. Translation and adaptation

Cross cultural adaptation of the two scales, CAST and SDS, has been carried out according to Beaton, Bombardier, Guillemin, and Ferraz (2000), and was divided into five phases: (1) translation of the CAST and of the SDS into Italian; (2) a web consensus conference among cannabis users to identify the appropriate terminology in order to make questions understandable; (3) back-translation to evaluate the initial translation; (4) committee analysis to identify cultural differences and language errors in the new instrument and (5) a pre-test to assess cultural equivalence, considering the user impressions about the instrument.

2.3. Measures

Lifetime use was assessed for cannabis and other illegal drugs. With regard to cannabis, frequency of use during the last 12 months was reported using a categorical response format (1–2 times, 3–9 times, and more than 10 times) and cannabis use in the last month and the daily use was reported too. The age of first use of cannabis was also reported using a categorical response format (13 years or less and 14 years or more) (Hibell et al., 2009). Tobacco consumption was reported using the category of daily use in the last 12 months. Alcohol use and binge drinking in last 12 months was reported too.

The Severity of Dependence Scale (SDS) is a 5-item questionnaire that provides a score indicating the severity of dependence. Each of the five items is scored on a 4-point scale (0–3). The total score is obtained through the addition of the 5-item ratings. The SDS assesses several features of cannabis individual use referred to past year: During the past year (1)"Did you think your use of cannabis was out of control?"; (2) "Did the prospect of missing a dose of cannabis makes you anxious or worried?"; (3) "Did you worry about your use of cannabis?"; (4) "Did you wish you could stop the use of cannabis?"; and (5) "How difficult did you find it to stop, or go without cannabis?".

All items are answered on a 4-point scale: 0 "never/almost never", 1 "sometimes", 2 "often", 3 "always/nearly always" and, only for the 5th item, 0 "not difficult", 1 "quite difficult", 2 "very difficult", and 3 " impossible". Computing a score using the full range of item responses yields a total score ranging from 0 to 15 (Gossop et al., 1995; Martin, Copeland, Gates, & Gilmour, 2006).

The CAST questionnaire is a 6-item scale screening for problematic patterns of cannabis use. The current study assesses the frequency of the following events within the past 12 months: (1) "Have you smoked cannabis before midday?"; (2) "Have you smoked cannabis when you were alone?"; (3) "Have you had memory problems when you smoked cannabis?"; (4) "Have friends or family members told you that you should reduce or stop your cannabis consumption?"; (5) "Have you tried to reduce or stop your cannabis use without succeeding?"; and (6) "Have you had problems because of your cannabis use (argument, fight, accident, poor results at school, etc.)?". All items are answered on a 5-point scale (0 "never", 1 "rarely", 2 "from time to time", 3 "quite often", and 4 "very often"). In its original version, positive response thresholds vary across questions. The threshold was set at "from time to time" for the first two questions as they do not screen problems but frequencies of use in different contexts, and at "rarely" for the others. Using this algorithm, individual test scores can range from 0 to 6; this version will be referred to as binary CAST in this study. Computing a score using the full range of item responses yields a total score ranging from 0 to 24. This test version will be referred to as full CAST (Legleye et al., 2011).

Diagnostic assessments for the past 12 months were based on the paper-and-pencil version of the Munich Composite International Diagnostic Interview (M-CIDI) (Budney, Hughes, Moore, & Vandrey, 2004; Lachner et al., 1998; Perkonigg, Lieb, & Wittchen, 1998). Cannabis dependence (CD) is defined by the presence of at least four of seven criteria: tolerance, withdrawal, using more or longer than intended, impaired control, much time spent using, reduced activities, and use despite problems (Swift, Hall, & Teesson, 2001).

2.4. Statistical analyses

2.4.1. Internal validity

Principal Component Analysis (PCA) was performed to examine the assumed construct validity and uni-dimensionality of the scales. The number of dimensions and the item loading structure of PCA with orthogonal rotation (varimax method) was conducted on the correlation matrix of the SDS and CAST items. Four classical criteria from PCA were used: 1) eigenvalue rule (number of factor with eigenvalue of >1); 2) Scree plot (number of factor before the break in the Scree plot);