

# Spanish version validation of the Marihuana Motives Measure in a drug-consuming adolescent sample

## *Propiedades psicométricas de la versión española del Marihuana Motives Measure en población adolescente consumidora*

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### Abstract

*Introduction:* Cannabis is the illicit drug mostly widely consumed by adolescents in Spain. The understanding of consumption motives is an important factor for intervention. In Spain, there are no available instruments for their evaluation, hence, the goal of this paper is to study the psychometric properties of the Marihuana Motives Measure (MMM) in a sample of adolescent consumers.

*Material and Method:* Firstly, translation and back-translation was performed. A total of 228 adolescent consumers of cannabis were evaluated. Factorial analysis was conducted, and the reliability of the total scores and of each scale of the questionnaire was studied through Cronbach's alpha. Test-retest reliability was analyzed through interclass correlations. Validity evidence of the MMM was examined through correlations between current cannabis use, subjective consumption effects measured with the Addiction Research Center Inventory (ARCI), and personality measured with the Millon Adolescent Clinical Inventory (MACI).

*Results:* High reliability was observed in total score of the MMM (Cronbach  $\alpha = .86$ ), and high and moderate reliability for each of the five factors obtained in the factorial analysis of the MMM, Social = .82, Enhancement = .72, Coping = .83, Expansion = .74, and Conformity = .64. Significant correlations were also observed between cannabis consumption motives and subjective effects, and between consumption motives and personality.

*Conclusion:* The Spanish version of the MMM shows a similar factorial structure as the one obtained by the original author, and its measures are reliable and valid for the study of cannabis consumption motives in adolescent consumer population.

*Keywords:* Adolescents; addiction; cannabis; motives; Marihuana Motives Measure.

### Resumen

*Introducción:* El cannabis es la sustancia ilegal que más consumen los adolescentes españoles. Entender los motivos de consumo es un factor importante para la intervención. Actualmente no existe en España un instrumento para su evaluación. El objetivo del presente trabajo es estudiar las propiedades psicométricas de la versión española del cuestionario *Marihuana Motives Measure* (MMM) en una población de adolescentes consumidores.

*Material y Métodos:* Se llevó a cabo una traducción y retrotraducción del MMM. Un total de 228 adolescentes consumidores de cannabis fueron evaluados. Se realizó un análisis factorial y se estudió la fiabilidad de la puntuación total y de cada una de las escalas del cuestionario a partir del Alfa de Cronbach. El estudio de la evidencia de validez del MMM se realizó mediante el examen de las correlaciones entre el uso actual de cannabis, los efectos subjetivos del consumo a través del cuestionario ARCI (*Addiction Research Center Inventory*) y la personalidad, mediante el cuestionario MACI (*Millon Adolescent Clinical Inventory*).

*Resultados:* Se observó una alta fiabilidad de la puntuación total del MMM (Alfa de Cronbach = 0,86) y entre alta y moderada para cada uno de los cinco factores obtenidos al realizar el análisis factorial del MMM, *Social* = 0,82; *Enhancement* = 0,72; *Coping* = 0,83; *Expansion* = 0,74; *Conformity* = 0,64. Además, se observaron correlaciones significativas tanto entre motivos de consumo de cannabis y efectos subjetivos, así como entre motivos de consumo y personalidad.

*Conclusiones:* La versión española del MMM muestra una estructura factorial similar a la obtenida por el autor original y sus medidas resultan fiables y válidas para el estudio de los motivos de consumo de cannabis en población adolescente consumidora.

*Palabras clave:* Adolescentes; adicción; cannabis; motivos; Marihuana Motives Measure.

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## Introduction

Cannabis is the illicit drug most frequently consumed by Spanish adolescents (ESTUDES, 2014). In addition, cannabis use is currently one of the causes that generates a greater demand for psychiatric treatment in this age group in Spain (ESTUDES, 2014), and the most highly present in patients who visit child-juvenile psychiatric emergency units (Arias Constantí et al., 2010). This situation is particularly concerning when considering the verified evidence of the multiple negative consequences associated with cannabis consumption (Degenhardt et al., 2010; Fox, Towe, Stephens, Walker, & Roffman, 2011) with school impact being one of the main ones (Horwood et al., 2010).

Possibly as a result of this increase in adolescent consumers of cannabis and the serious repercussions of its consumption, in recent years, studies on the effectiveness of treatments have increased (Fox, Towe, Stephens, Walker, & Roffman, 2011). The studied modalities include interventions based on motivational strategies that have proven to be effective in adolescent consumers (Fox, Towe, Stephens, Walker, & Roffman, 2011). Motivational models of substance use suggest that there are different motives for consumption and they consider these reasons to be essential in order to understand the context and the circumstances of addictive behavior, such as *when* or *where* people consume or with what *frequency* or which *amounts* (Cooper, 1994).

Taking as reference point the motivational model, Simons, Correia, Carey, and Borsari (1998) developed the *Marihuana Motives Measure* (MMM) to quantify the motives for cannabis consumption. The study of the psychometric properties of the MMM indicated that the instrument could be grouped into 5 subscales or factors with an internal consistency between .93 and .85. The original scales were called: 1) *Enhancement* or consumption to improve positive feelings, 2) *Social* or consumption to improve reinforcement and social cohesion, 3) *Coping* or consumption to cope with negative emotions, 4) *Conformity* or consumption to avoid social rejection, and 5) *Expansion* or consumption to expand consciousness. The different scales or motives included in the MMM have been proven to be predictors of cannabis-related problems (Simons, Correia, & Carey, 2000). Specifically, studies show the importance of the Social and Conformity motives for consumption as predictors of the consequences of consumption (Simons, Gaher, Correia, Hansen, & Christopher, 2005), as well as a positive correlation between the number of acknowledged reasons for consumption and greater severity (Zvolensky et al., 2007). Moreover, the psychometric properties of the MMM have been studied in non-Anglo-Saxon samples (Chabrol, Ducongé, Casas, Roura, & Carey, 2005), confirming the 5-factor structure and high internal validity of the questionnaire.

The motives for consumption have been studied mainly following two lines of research. The first line, focused on consumption and the perception of discomfort reduction, shows a consistent association between the subjective effects reported by cannabis users and their motives for using it, for example, the motivation to consume to deal with a worrisome situation and the reported relaxation effect (Dekker, Linszen, & De Haan, 2009; Scherrer et al., 2009; Zeiger et al., 2012). The second line of study aims to analyze the relationship between consumption motives and personality (Tragesser, Trull, Sher, & Park, 2008; Littlefield, Sher, & Wood 2010a; Littlefield, Sher, & Wood 2010b). These studies show that consumption motives are a clear mediator between personality and consumption (Adams, Kaiser, Lynam, Charnigo, & Milich, 2012). Specifically, personality factors related to negative affect are mainly associated with the consumption of cannabis and other substances due to Coping motives (Mezquita et al., 2011). Conversely, personality factors related to extraversion, sensation seeking, and impulsivity are primarily associated with the use of cannabis and other substances due to Enhancement motives (Mezquita et al., 2011).

The above-mentioned evidence emphasizes the need to identify and improve our understanding of the motives for consumption in adolescents. In addition, it emphasizes the importance of taking these motives into account as a key aspect for the development of pharmacological, psychotherapeutic, and preventive interventions (Hartwell, Back, McRae-Clark, Shaftman, & Brady, 2012). Given that experiences related to substance use during adolescence can affect and produce changes in the expectations of consumption at later stages (Monk, & Heim, 2016), understanding the motives for cannabis use at this stage can be an important factor for the development of interventions (Fox, Towe, Stephens, Walker, & Roffman, 2011). In addition, such assessment must be specific to each substance, as different reasons for consumption for different substances have been observed (Hartwell, Back, McRae-Clark, Shaftman, & Brady, 2012), as well as different motives for consumption according to the comorbid mental disorders presented by patients (Thornton et al., 2012). Therefore, the existence of measurement instruments, specific to the adolescent cannabis-consumer population, which evaluate the intention to consume (Lloret Irlas, Morell-Gomis, Laguía, & Moriano, 2018), the motivation to change (Kaminer, Ohannessian, McKay, & Burke, 2016), or the reasons for consumption are very relevant for the planning and monitoring of clinical interventions. However, research on the motives for cannabis use in adolescent population that presents a mental disorder is scarce, and there are no studies in our environment. One of the reasons for the lack of studies is the non-existence of instruments validated in Spanish to measure consumption motives.

The goal of the present paper is to study the psychometric properties of the MMM in a sample of adolescents with cannabis use disorder. We will thus try to offset the lack of measuring instruments with good psychometric properties, specific to each substance. The specific objectives of the paper are to translate and adapt the MMM questionnaire of Simons, Correia, Carey, and Borsari (1998) and to analyze the structure, reliability, and validity of the Spanish version of the MMM scores. We expected that the Spanish version of the MMM would show a factorial structure similar to the original version (Simons, Correia, Carey, & Borsari, 1998), good reliability of the instrument's total score and of the scores of each of its subscales. We also expected that the indices found would not be very different from the validation carried out in French adolescent population (Chabrol, Ducongé, Casas, Roura, & Carey, 2005).

## Method

### Participants

The participants were selected during the years 2011-2014 through consecutive sampling among the users of the Adolescents' Unit of Addictive Behaviors of the Psychiatry Service of the Sant Joan de Déu Hospital, Barcelona. The sample was made up of 228 participants, 64.9% ( $n = 148$ ) boys and 35.1% ( $n = 80$ ) girls, with an average age of 15.7 years ( $SD = 1.3$ ).

### Instruments

Consumption Record: cannabis use was assessed with the administration of an ad hoc clinical interview, recording, among other data, the following: age of consumption onset (first consumption), regular consumption age (1 monthly consumption), and current consumption (last 6 months and last month)

Psychopathology: we used the semi-structured interview *Kiddie-Sads-Present and Lifetime* (K-SADS-PL), Spanish version (Mattos & Rohde, 2007), which follows DSM-IV criteria. The K-SADS-PL is a semi-structured diagnostic interview designed to assess current and past episodes of psychopathology in children and adolescents, according to DSM-IV criteria. This scale is administered to the parents and the patient separately, obtaining a final score that collects all the information sources used.

Motives for consumption: we used the Spanish translation of the *Marihuana Motive Measure* (MMM; Simons, Correia, Carey, & Borsari, 1998). This is a 25-item questionnaire with a Likert-type response format. In adult population, the study of the factorial structure has yielded 5 factors (Expansion, Social, Conformity, Enhancement and Coping) and it has been shown to be reliable and valid (see Introduction).

Subjective effects of cannabis use: we administered the *Addiction Research Center Inventory* (ARCI; Martin,

Sloan, Sapira, & Jasinski, 1971), validated in Spanish population by Lamas, Farré, Llorente, and Camí (1994). This questionnaire consists of 49 items and 5 scales: the *Pentobarbital-Chlorpromazine-Alcohol Group* (PCAG) scale, which measures the intensity of the sedative effect on a range from 0 to 15; the *Morphine-Benzedrine Group* (MBG) scale, which measures euphoria on a range from 0 to 16; the *Lysergic-acid-Dyethyl-amide* (LSD) scale, which measures dysphoria and somatic symptoms, ranging from 0 to 14; the *Benzedrine Group* (BG) scale, which measures stimulation and ranges from 0 to 13; and the *Amphetamine* (A) scale measures empirical phenomena and ranges from 0 to 11 (Busquets, Torrens, Soler, Farré, & Bulbena, 2005). In the validated version in Spanish population, the reliability coefficients of the scales are: PCAG .87; MBG .81; LSD .55; BG .79; and A .49.

Personality: We administered the *Millon Adolescent Clinical Inventory* (MACI; Millon, 1993). It consists of 160 items with a true/false format and is organized into 31 scales, 27 with clinical significance, 12 personality patterns, 8 of expressed concerns, and 7 of clinical symptoms. In the validated version in Spanish population, the alpha coefficients of the basic personality scales range from (submissive) .74 to .90 (self-demeaning) (Millon, 2004).

### Procedure

The translation of the questionnaire was carried out following the guidelines for the translation and adaptation of tests of the International Test Commission (Muñiz, Elosua, & Hambleton, 2015). After assessing the relevance of the construct and the questionnaire, we contacted the author (Dr. Simons), who gave his authorization for the study of the MMM. Subsequently, two independent translations were made. On one hand, the authors of the study jointly conducted a translation, paying special interest to the linguistic, cultural, and psychological characteristics of the adapted text. On the other hand, the questionnaire was translated separately by three professional Spanish-speaking experts in child-adolescent mental health and with a high level of English. The two translations were subsequently compared, differences were discussed, and the final text was agreed on at a meeting in which the different translators participated. At this stage, consensus was sought, taking into account the linguistic, conceptual, and cultural aspects. Then, an official translator made the back-translation, which was sent to Dr. Simons. Once the modifications proposed by the original author of the questionnaire were considered by the authors, appropriate changes were made, and the translation was approved. This translation was administered to 15 patients of the Adolescent Unit of Addictive Behaviors independent interviews, in which comprehension of the questionnaire's content was assessed. The results of these interviews were then discussed by the authors, and changes were made

by consensus. The final version was again reviewed by the official translator and approved by all the professionals who had participated in the translation.

After obtaining the approval of the Ethics Committee of the Sant Joan de Déu Hospital, the study began. Participants were informed about the study and, if they agreed to participate, they signed their consent before being included. Inclusion criteria were being younger than 18 years of age and presenting abuse or dependence criteria (DSM-IV-TR) at the time of the evaluation. The only exclusion criterion was presenting acute mental pathology that would hinder comprehension of the questionnaires. No participant was excluded by this criterion.

The assessment is part of the routine diagnostic Protocol of the Adolescent Unit of Addictive Behaviors, where we performed three 45-minute visits. In the first visit, the psychiatric and toxicological anamnesis was performed, consumption was recorded, and urine analysis was carried out. In the second visit, the *Kiddie-Sads* interview was administered to the parents or guardians and the questionnaires were handed to the adolescent. On the third visit, the questionnaires were collected, and we supervised that they were duly completed, thus avoiding missing values. Twenty-four patients did not correctly complete all the questionnaires, so they were not included in the study.

### Statistical analysis

The study of the psychometric properties of the MMM was carried out following these steps: study of the factor structure, reliability of the measures, and evidence of validity. The statistical software used was SPSS 21 (IBM Corp, 2010). The factor structure of the MMM was studied using principal component factor analysis. As we expected that the different subscales would correlate with each other (Simons, Correia, Carey, & Borsari, 1998), we performed a principal components procedure with promax rotation. The name of retained factors was determined based on the analysis of two criteria. The first was the eigenvalues of the extracted factors, and the second was based on the study of the change of slope in the scree plot of the different factors. After determining the number of factors, we studied the reliability of the different measures of the questionnaire via Cronbach's alpha. We also analyzed test-retest reliability of the measure in a subsample ( $n = 24$ ) of the total sample, using intraclass correlations. The study of the evidence of validity of the measures of the MMM was carried out with Pearson correlations between the measures of the subscales of the MMM and the MACI and ARCI questionnaires.

## Results

### Participants

The mean age of onset of consumption was 12.9 years ( $SD = 1.7$ ) and the mean age of regular consumption was 13.8

years ( $SD = 1.5$ ). No significant differences were observed in the distribution by sex of the onset age of consumption (boys:  $M = 13.07$ ,  $SD = 1.69$  vs. girls:  $M = 12.81$ ,  $SD = 1.6$ ,  $t_{(226)} = 1.14$ ,  $p = .25$ ), or in the age of regular consumption (boys:  $M = 13.86$ ,  $SD = 1.44$  vs. girls:  $M = 13.59$ ,  $SD = 1.59$ ,  $t_{(226)} = 1.34$ ,  $p = .19$ ).

Regarding preferences, 83.8% of the adolescents reported preferring marijuana ( $n = 191$ ) to hashish, with no sex differences (boys: 81.8% ( $n = 121$ ) vs. girls: 87.5% ( $n = 70$ );  $\chi^2_{(1)} = 1.26$ ,  $p = .26$ ). The participants were diagnosed according to the DSM IV-TR criteria, 32.9% ( $n = 75$ ) with cannabis abuse and 67.1% ( $n = 153$ ) with cannabis dependency, with no significant sex differences ( $\chi^2_{(1)} = 0.009$ ;  $p = .93$ ).

Regarding comorbid psychopathology, we observed that 62.7% ( $n = 143$ ) presented a conduct disorder (a syndrome that includes disruptive behavior disorder not otherwise specified, oppositional defiant disorder, and dysocial disorder), 11.8% ( $n = 27$ ) presented attention-deficit and hyperactivity disorder, 11.8% ( $n = 27$ ) presented a psychotic disorder, 11.0% ( $n = 25$ ) presented an affective disorder (grouping major depressive disorder and bipolar disorder), 3.1% ( $n = 7$ ) presented an adaptive disorder, 3.9% ( $n = 9$ ) presented an eating disorder, and 4.4% ( $n = 10$ ) had an anxiety disorder.

### Factor structure of the MMM

Principal components factor analysis yielded a five-factor structure with eigenvalues equal to or greater than 1.00. The resulting structure explained 53.8% of the variance. The factor analysis showed a Kaiser-Meyer-Olkin index of 0.82 and a significant Bartlett's sphericity test ( $C^2(300) = 1917.02$ ,  $p < .001$ ), indicating that the procedure selected to reduce the scale was appropriate. The five-factor solution was the same as that of the original scale with the exception of items 15 and 5 (see Table 1). Regarding these items, our results showed that Item 15 ("Because I feel safer and more confident") loaded on the Coping factor instead of on the Social factor, and Item 5 ("to be sociable") had a similar loading on all factors (see Table 1).

### Reliability of the measures of the MMM

The reliability study showed a high reliability of the total MMM score (Cronbach  $\alpha = .86$ ) and values between moderate and high in the scores of each of the subscales (Social = .82, Enhancement = .72, Coping = .83, Expansion = .74, and Conformity = .64), as shown in Table 1. Pearson correlations of the subscale scores ranged between .21 in the scores of Conformity and Expansion and .57 in the scores of Enhancement and Social (in all cases,  $ps = .01$ ).

The intraclass correlation between the test-retest of the different MMM scores revealed correlations equal to or less than .42. The correlations were significant for all scores (Coping = .40, Enhancement = .35, Expansion = .30,

Table 1. Exploratory factor analysis of the Marihuana Motives Measure

Items	Coping	Expansion	Social	Enhancement	Conformity
(1) To forget my worries	.89		-.21		
(17) To forget problems	.89		-.11		
(4) Because it helps me feel better when I am depressed or nervous	.79		.13		
(6) To encourage me when I'm in a bad mood	.65		.22		
(15) Because I feel safer and more confident	.43	.35			
(23) To understand things differently		.81			-.13
(24) To expand the boundaries of my conscience		.76			-.23
(21) To get to know me better		.68		-.13	
(22) Because it helps me to be more creative and original		.67	-.17	.21	
(25) To be more open to new experiences		.57			
(16) To celebrate special occasions with friends			.86		
(14) Because it makes celebrations more fun			.84		
(3) Because it helps me to have fun			.77		
(11) Because it makes social events more fun			.70	.15	
(7) Because I like the feeling				.79	-.19
(13) Because it gives me pleasure				.70	.16
(10) To get high	.15			.65	
(18) Because it's fun			.23	.54	.10
(9) Because it's exciting				.45	
(20) So as not to feel isolated from others		-.12	-.15		.80
(12) To feel that I am part of the group of people who like me					.79
(19) So others will like me			-.12	.13	.73
(2) Because my friends insist	-.14	.34		-.21	.43
(8) Because the others would laugh at me for not doing so		-.22	.20	-.13	.35
(5) To be sociable	.23	.23	.21	-.12	-.28
Eigenvalue	6.09	2.38	1.97	1.84	1.17
% variance	24.34	9.51	7.89	7.36	4.68
Cronbach's alpha	.83	.74	.82	.72	.65

Note. Values below 0.10 were not included in the table. Rotated promax matrix.

and MMM total = .42; all  $p$ s  $\leq .05$ ), with the exception of Social (.22,  $p = .12$ ) and Conformity (.001).

### Evidence of the validity of the MMM measures

Evidence of the validity of the MMM was studied through the correlations between the current use of cannabis, the questionnaire of subjective effects of consumption (ARCI), and the personality questionnaire

(MACI). Consumption of cannabis in the last 6 months was significantly and positively associated with the motives of Coping ( $r = .22$ ,  $p = .001$ ) and Enhancement ( $r = .21$ ,  $p = .002$ ). However, cannabis use was not significantly associated with the motives of Expansion ( $r = .11$ ,  $p = .09$ ), Social ( $r = .08$ ,  $p = .220$ ), or Conformity ( $r = -.06$ ,  $p = .359$ ). As seen in Table 2, the subjective effects of cannabis showed significant correlations with the consumption motives.

Table 2. Validity of the MMM using Pearson's correlations with the ARCI and MACI questionnaires

	MMM Factors				
	Coping	Expansion	Social	Enhancement	Conformity
ARCI					
Sedation	.26**	.12	.11	.07	.17*
Euphoria	.35**	.39**	.24**	.22**	.16*
Dysphoria	.24**	.09	.15*	.12	.11
Stimulation	.08	.18**	-.03	.01	-.007
Empirical phenomena	.28**	.29**	.08	.007	.22**
MACI					
Introverted	.21**	.08	-.01	-.06	.23**
Inhibited	.21**	.01	.02	-.05	.29**
Doleful	.38**	.15	-.07	-.07	.21**
Submissive	.12	-.09	.03	-.08	.21**
Dramatizing	-.27**	.01	.03	.04	-.27**
Egocentric	-.26**	.04	.004	.07	-.24**
Unruly	-.004	.14	.02	.14	-.15
Forceful	.06	.07	-.001	.13	-.05
Conforming	-.27**	-.22**	-.004	-.10	-.06
Oppositional	.29**	.21**	-.01	-.01	.04
Self-demeaning	.33**	.12	-.05	-.002	.24**
Borderline Tendency	.29**	.008	.002	.003	.11

Note. MMM = Marihuana Motives Measure; ARCI = Addiction Research Center Inventory; MACI = Millon Adolescent Clinical Inventory. \* $p = .05$ . \*\* $p = .01$ .

The Coping scale of the MMM correlated significantly with all the scales of the ARCI ( $r = .24$  to  $.35$ ;  $p \leq .01$ ), with the exception of the Stimulation scale. The Expansion scale correlated significantly with the Euphoria ( $p < .001$ ) and Stimulation ( $p = .006$ ) scales of the ARCI. The Social scale correlated significantly with the Euphoria ( $p = .002$ ) and Dysphoria/Somatic Symptoms scales of the ARCI ( $p = .03$ ). The Enhancement scale only correlated significantly with the Euphoria scale of the ARCI ( $p = .001$ ). Finally, the Conformity scale correlated significantly with the Empirical symptoms ( $p = .001$ ), Euphoria ( $p = .02$ ) and Sedation scales ( $p = .01$ ). Lastly, the 5 MMM scales showed significant correlations with the personality scales of the MACI, mainly the Coping and Conformity scales of the MMM (see Table 2), which showed positive correlations with almost all the MACI scales, with the exception of Histrionic ( $-.29$ ,  $p = .01$ ), Egocentric ( $-.26$ ,  $p = .01$ ) and Conforming scales ( $-.27$ ,  $p = .01$ ), which correlated negatively with Coping; and Histrionic ( $-.27$ ,  $p = .01$ ) and Egocentric scales ( $-.24$ ,  $p = .01$ ) which showed negative correlations with Conformity (see Table 2).

## Discussion

This study was conducted to analyze the psychometric properties of the Spanish version of the *Marihuana Motive Measure* (MMM) in a sample of adolescents with cannabis use disorder. As expected, the factorial analysis of the questionnaire shows a five-factor structure similar to the one proposed by the original author. Furthermore, the results of reliability and evidence of validity of the different measures of the Spanish version of the MMM indicate that it is a good tool to use with Spanish adolescent consumers of cannabis.

The Spanish version of the MMM showed the same structure factor as the original version (Simons, Correia, Carey, & Borsari, 1998). The solution of five factors (Social, Coping, Conformity, Enhancement and Expansion) obtained is the same as the structure of the original scale with the exception of Items 15 and 5. Item 15 ("because I feel safer and more confident") loaded on the Coping factor instead of on the Social factor. The loading of this item on the Coping factor can be explained by the patients' perception that consumption helps them to deal with complex situations or emotions with more assuredness and self-confidence. On the other hand, the loading of Item 5 ("to be sociable") was similar on all factors, mainly on Coping, Expansion and Social. This could be interpreted as patients' perception that consumption provoked greater social disinhibition and therefore, it would help some of them to better cope with social situations that caused more anxiety or inhibition. This would also explain the negative loading of these items on the Conformity factor.

Internal consistency is good for the total scale and for each of the subscales, except for Conformity, which shows moderate internal consistency. A possible explanation is adolescents' difficulty to acknowledge the fear of being rejected. That is, when an adolescent is in a context of consumer friends and does not have sufficient skills to cope with it, these friends exert direct or social pressure to consume. On the other hand, this moderate consistency may be due to the fact that the Conformity factor includes items both related to the desire or need to feel acknowledged or approved by the group and items related to fear of rejection. The desire or need for approval and the fear of rejection may not be present in all patients, or they may not be aware of the relationship between these two motives and their own gregarious behavior. Finally, another explanation of this moderate consistency could be that the tools designed for adults do not necessarily behave the same way when applied to adolescents. The difference in development, consumption patterns, the relationship with family and friends may affect the factor structure of the instruments (Martin, Copeland, Gilmour, Gates, Swift, 2006). However, it can be considered that the factor structure of the Spanish translation shows good content validity for the different scales of the questionnaire.

Regarding the test-retest reliability of the scores, we expected low correlations between the two measurements with the MMM. This hypothesis was developed because the MMM assesses motives for consumption at a certain moment and, according to the motivational model, these motives are susceptible to change depending on the process of change experienced by the patient. In this sense, the results observed in this study show a low intraclass correlation (Fleiss, 1986), which, as mentioned, indicates that the motives for consumption are modified by the psychotherapeutic intervention. The only exception was the intraclass correlation of the Coping scale. This could indicate the patients' need to consume to ease their discomfort, which has been called the "spiral of discomfort", that is, the maintenance of consumption not in order to have fun but to avoid suffering, which is an indicator of the severity of consumption. This statement gains consistency when considering that the study sample was of patients presenting cannabis use disorder with a high prevalence of comorbid mental disorders. The results raise the possibility that the MMM is an adequate tool to monitor change in the therapeutic process.

The association observed between the motives and the subjective effects of the consumption is significant and points in the same direction, as observed in other studies (Deker, Linszen, & De Haan, 2009). In this regard, the results of this study shows that the Coping motives are related to the scales of Sedation and Dysphoria, a relationship that can be understood as the patient's need to seek emotion regulation and relaxation. Likewise, the

positive relationship between Coping and the subjective effect of Euphoria may indicate the energy gain secondary to decreasing discomfort. The Conformity factor is related to the Sedation scale, indicating that those who consume due to Conformity motives may be seeking to decrease the discomfort or concern they feel when they are exposed to interpersonal contexts. Finally, the relationship observed between Expansion motives for consumption and the Empirical phenomena scale is direct, as the two questionnaires evaluate the same construct, although the relationship is not perfect. This moderate relationship of the two phenomena can be explained because the Expansion factor measures motivation and the scale of Empirical phenomena, symptoms.

The intensity of the relationship between the MMM motives and scales of the ARCI is consistent with the study of Dekker, Linszen, and De Haan (2009), in which cannabis users reported many more positive than negative effects in the modulation of affect and the increase of relaxation when consuming, and moderately more positive than negative effects in the increase of energy and socialization. In fact, these authors state that the self-reported effects of consumption could be grouped into 4 main groups: to improve positive feelings, to relieve dysphoria, social reasons, and reasons related to disease and the sedative effects of the medication.

These results are important because they show the importance of the need to open future lines of research that will help clarify the relationship between the subjective response to drug consumption as a significant predictor of subsequent use and abuse of this substance, as noted in previous studies (Littlefield, Sher, & Wood, 2010a; Adams, Kaiser, Lynam, Charnigo, & Milich, 2012). In this sense, these investigations indicate that positive consumer experiences are associated with more prolonged use and an increased risk of abuse and dependency, whereas negative experiences are associated with less duration and frequency of consumption (Scherrer et al., 2009; Zeiger et al., 2012).

The study of the relationship between motives to consume and personality is based on the mediating role of the motives between personality and consumption (Littlefield, Sher, & Wood, 2010a; Adams, Kaiser, Lynam, Charnigo, & Milich, 2012), and also on the conceptualization that personality traits contribute to the motivation of behavior in general and to the motivation to consume substances, in particular (Littlefield, Sher, & Wood, 2010b). Our results revealed a relationship between Coping motives and personality traits associated with insecurity and the presence of interpersonal difficulties. Also, as expected, the Conformity motives are related to submissive personalities and assertiveness difficulties. These results are consistent with other studies that have found a clear and direct association between neuroticism

and Coping motives (Kuntsche, Knibbe, Gmel, & Engels, 2006). On the other hand, previous research had linked impulsiveness to the Enhancement motive (Littlefield, Sher, & Wood, 2010), arguing that the latter acts as a mediator between extroversion and alcohol consumption (Adams, Kaiser, Lynam, Charnigo, & Milich, 2012). However, we could not confirm these findings in our study because the basic personality scales were not significantly related to the Enhancement motive. This contradictory result could be explained by the type of questionnaire used in this study, designed to assess pathological personality traits, and by the fact that it was applied to a sample of patients who were being treated for the use of cannabis-related problems.

Despite the interest of the study results, there are some limitations that must be taken into account when generalizing the results, which underscore the need for studies that confirm the psychometric properties of the MMM in other samples. First, the sample was made up of adolescents who sought treatment for cannabis use disorder; therefore, the generalization of the results to community samples of adolescents with more normative consumption patterns should be carried out with caution. However, as discussed in the introduction, this study is the first one conducted with patients presenting cannabis use disorder. In this regard, the results of this study show that the measures of the MMM of the motives for consumption, when used in adolescents with cannabis consumption disorder, shows psychometric properties similar to those obtained by the original author (Simon et al., 1998) and in French adolescent population (Chabrol, Ducongé, Casas, Roura, & Carey, 2005), revealing the usefulness of the MMM in this population and the need for future studies of adolescents with more normative consumption. Secondly, the procedure used for the study of reliability was not the most appropriate (Zumbo et al., 2007). Although the Cronbach alpha coefficient of consistency has been widely used and is still used as an internal consistency index in questionnaires with a Likert-type response scale, this index may be an attenuated estimate of the lower limit of reliability, especially when the items have few response options and their asymmetry is high. In these cases, the ordinal alpha coefficient is more appropriate (Gadermann, Guhn, & Zumbo, 2012). Although the MMM has five responses, and the response asymmetry of the items approaches 0 in most of the items, this does not allow us to infer a low attenuation of Cronbach's alpha (Gadermann, Guhn, & Zumbo 2012), and although the estimate performed in this paper allows us to compare it with previous studies (Simon et al., 1998, Chabrol, Ducongé, Casas, Roura, & Carey, 2005), future studies should confirm the reliability of the measurements using the ordinal alpha coefficient. Thirdly, the lack of tools validated in our context to assess the evidence of the instrument's validity more consistently forced us to study the validity based on the use of measures

of indirectly related constructs. Despite these limitations, we believe that the results of this work are of great importance, as it focuses on the validation of a tool that will allow us to develop future research in a field as important as adolescent substance abuse.

In conclusion, from a therapeutic point of view, acting at an early stage in adolescent cannabis consumers is a key element to prevent long-term negative consequences (Castro-Fornieles, 2013) associated with consumption. Our understanding of the motives to initiate and maintain consumption can be useful to identify adolescents who are at risk and to establish prevention and intervention programs (Lee, Neighbors, Hendershot, Greossbars, 2009). The results of this study, conducted in a clinical sample, show that the measurements of the motives for consumption obtained with the MMM make this instrument a useful tool for clinical practice and the study of these patients. Measuring instruments applicable in our environment, like the MMM, facilitate individual assessment to address the complexity of adolescents' reasons for using drugs and offer the opportunity for future studies, given the importance of the motivational aspects to improve our understanding and management of these adolescents (Miller, & Rollnick, 1991).

### Conflict of interest

The authors declare they have no conflict of interest.

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