

Relationship between drug use and psychopathological variables of risk in university students

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Abstract

Background: Research has been studying the relationships between drug use and the risk of suffering psychopathological disorders. This study analyzed the relationships existing between this use and certain psychotic disorder risk variables: hallucination, schizotypy and cognitive fusion. **Method:** Several screening questionnaires on drug use (CAGE), a questionnaire on "cognitive fusion" (TAFS), another on hallucination proneness (LSHS-R) and another on schizotypy (O-LIFE-R) were given to a sample of 308 students at the University of Almeria with a mean age of 19.51 years (SD= 2.11). **Results:** The results found show how cognitive fusion is positively related to use of cannabis and cocaine, the scores on the schizotypy scale correlated positively with use of alcohol and cannabis, and the scores on a hallucination proneness correlated positively to use of cannabis. Regression equations were found that predicted the use of these substances from the variables of vulnerability to suffering from schizophrenia spectrum disorders. **Conclusions:** The results show an association between drug use and the risk variables studied.

Keywords: drug use, cognitive fusion, schizotypy, hallucinations, schizophrenia.

Resumen

Relaciones entre el consumo de drogas y variables de riesgo psicopatológicas en jóvenes universitarios. Antecedentes: la investigación ha venido estudiando las relaciones entre el consumo de sustancias y el riesgo de padecimiento de trastornos psicopatológicos. En este estudio se han analizado las relaciones existentes entre dicho consumo y determinadas variables de riesgo para los trastornos psicóticos: alucinaciones, esquizotipia y fusión cognitiva. **Método:** se administraron diversos cuestionarios de screening relativos al consumo de drogas (CAGE), un cuestionario de "fusión cognitiva" (TAFS), otro de predisposición a las alucinaciones (LSHS-R) y otro de esquizotipia (O-LIFE-R), a una muestra de 308 estudiantes universitarios de la Universidad de Almería, con una media de edad de 19,51 años (DT= 2,11). **Resultados:** los resultados hallados muestran cómo la fusión cognitiva se relaciona positivamente con el consumo de cannabis y cocaína; cómo las puntuaciones en la escala de esquizotipia correlacionan positivamente con el consumo de alcohol y cannabis y cómo las puntuaciones en una escala de predisposición a las alucinaciones correlaciona positivamente con el consumo de cannabis. Se establecieron ecuaciones de regresión que predecían el consumo de dichas sustancias a partir de las variables de vulnerabilidad al padecimiento de trastornos del espectro esquizofrénico. **Conclusiones:** los resultados muestran una asociación entre el consumo de sustancias y las variables de riesgo estudiadas.

Palabras clave: consumo drogas, fusión cognitiva, esquizotipia, alucinaciones, esquizofrenia.

The severe consequences of chronic alcohol, cocaine, cannabis or other substance use, in some cases generating irreversible neurological damage, is widely known and referred to in the literature (Fernández-Artamendi, Fernández-Hermida, Secades, & García-Portilla, 2011; Urigüen y Callado, 2010). Studies on the general population have found that the risk of patients with a drug use disorder suffering another mental disorder is about 4.5 times higher (Grant, 1996; Regier et al., 1990). Alcohol and cannabis are the substances used the most by teenagers and young

people (21-27 years) around the world. Epidemiological studies report 54.3% prevalence of cannabis and 95.1% of alcohol some time in life (Wittchen et al., 2007). In Spain, prevalence in the 15-34 year age group is 92.2% for alcohol, 42.4% for cannabis and 13.5% for cocaine, according to the report published in 2011 of a domestic survey on alcohol and drugs in Spain (*Dirección General Plan Nacional Sobre Drogas*, DGPNSD, 2011). Concern for use of drugs by young people is increasing, especially due to the consolidation of a recreational-party use pattern (concentrated especially on weekends), which involves acute use peaks with consequences that may be dramatic and often irreversible. Drug abuse by young people is therefore considered a first rate social and public health problem. Epidemiological data on the Spanish university population are not as systematic as on the general population. A study before this one on the same population at the University of Almería (Zaldívar, López-Ríos, García-Montes, &

Molina, 2011) reported that use of alcohol, cannabis and cocaine is higher among young people in universities than in the general population. It also found that alcohol was the substance preferred by university students and was the one they most often became inebriated with (about 70% of students) followed by cannabis.

Alcohol and cannabis are the drugs most used by young people and the one they start earliest with, often showing comorbid psychopathology. Alcohol is often associated with affective disorders (anxiety and depression) and cannabis with schizophrenia spectrum disorders (Bukstein, Brent, & Kaminer, 1989; Chopra & Smith, 1974; Esterberg, Goulding, McClure-Tone, & Compton, 2009; Regier et al., 1990). Since 1997, the World Health Organization has held that cannabis, the drug this article is basically about, impacts negatively on mental health because it can cause a dependence syndrome similar to other drugs, induce its own psychoses, cause amotivational syndrome, and trigger the onset of and aggravate the course of schizophrenia (OMS, 1997).

In a review of the effects of cannabis, Quiroga (2002) showed that continued use of cannabis from early ages by genetically vulnerable subjects is a risk factor for schizophrenia, the first episode of which usually appears after using cannabis for one year before 18 years of age with one or more positive and fewer negative symptoms than nonuser schizophrenics, worse response to antipsychotics and more relapses in the following 15 years. If the psychopathological effects of cannabis are undeniable and have been known for a long time, what follows in the discussion is whether cannabis is the detonator of schizophrenic disorders or vice versa (Fernández-Artamendi et al., 2011; Quiroga, 2002; Morgan & Curran, 2008; Schiffman, Nakamura, Earleywine, & Labrie, 2005). In teenagers, some psychiatric alterations seem to be an etiological factor of drug use (Bukstein, Brent, & Kaminer, 1989) and also the reverse, that is, in a high percentage of young people with dual pathology, drug use has preceded the diagnosis of the other clinical syndrome, mainly schizophrenia (Caton, Gralnick, Bender, & Simon, 1989).

Schizotypy is understood as a multidimensional construct which is a precursor of psychotic disorders, and this relationship has traditionally (Meehl, 1962) and widely been referred to in the literature on the subject (see Fonseca, Muñiz, Lemos, García-Cueto, Campillo, & Villazón, 2007, for a review). Schizotypy extends over a continuum (Johns & van Os, 2001) from non-pathological personality to psychosis, and the variations over this continuum describe different degrees of proneness or risk to schizophrenic disorders. In fact, several different studies have demonstrated that high scores on the schizotypy scale seem to indicate certain proneness to the development of schizophrenia spectrum disorders (Chapman, Chapman, Kwapił, Eckblad, & Zinser, 1994; Gooding, Kathleen, & Matts, 2005; Domínguez, Saka, Lieb, Wittchen, & Van Os, 2010; Domínguez, Wichers, Lieb, Wittchen, & Van Os, 2011). Thus, schizotypy in what is called the “psychometric high risk paradigm” (Fonseca-Pedrero, Lemos-Giraldez, Paino, Villazón, & Muñiz, 2009) is understood as a marker of vulnerability to schizophrenia spectrum disorders (mainly in symptoms associated with thought disorders and negative symptoms, such as withdrawal and blunted affect). Schizotypy has also been associated with alcohol and drug abuse (Fumero, Santamaría, & Navarrete, 2009). Indeed, some studies have shown the relationship between the use of cannabis (and alcohol) and schizotypy (Dumas et al., 2002; Mass, Bardong, Kindl, & Dahme, 2001; Nunn, Rizza, & Peters, 2001; Skosnik, Spatz-Glenn, & Park, 2001).

Along this same line, the literature holds that the presence of certain subclinical psychotic or “psychotic-phenotype” experiences are distributed over a continuum in the general population, with a range that goes from normality to presence of disorders, understanding this as a model of stress vulnerability (Fonseca-Pedrero et al., 2009; 2010; Johns & van Os., 2001). Empirical evidence shows that the presence of certain symptoms (e.g., hallucinatory experiences) is a risk factor for development of schizophrenic spectrum disorders (Welham et al., 2009). So it is very common in psychopathology to speak of hallucination proneness (Launay & Slade, 1987) as a measure of vulnerability to psychotic disorders (Fonseca et al., 2009; 2010).

The concept of “cognitive fusion” refers to the extent to which a person believes his thoughts and actions to be equivalent, responding to them as if they could cause some effect on the world by themselves, that is, as if they were fact. Acceptance and Commitment Therapy (Hayes, Strosahl, & Wilson, 1999) considers thought-action fusion as one of the key elements in understanding psychopathology and acceptance could be considered an antidote of this fusion since it would involve experiencing thoughts or other private events that could be distressing without trying to change them or escape from them. A high level of cognitive distortion of this type has been basically associated with obsessive-compulsive disorder (Shafran, Thordarson, & Rachman, 1996), although some authors (García Montes, Pérez-Alvarez, Sass, & Cangas, 2008) suggest that cognitive fusion could also be considered a variable on a continuum of proneness or risk of psychological disorders of various types.

On the basis that one of the most important challenges of psychopathology today is research into what psychological variables make a person most vulnerable to the appearance of psychological disorders, the purpose of this study was to examine the relationship between drug use and risk variables of schizophrenic disorders, specifically schizotypy, hallucination proneness and cognitive fusion, in a population of young university students. Thus, according to the literature on the subject, a stronger relationship would be expected between use of cannabis and these variables, especially schizotypy and hallucination proneness.

Method

Participants

A total of 308 student volunteers who received 7€ as an economic incentive, took part in this study. The participants were from 21 degree programs at the University of Almeria (of a total of 30), with a mean age of 19.5 years ($SD= 2.10$). Of these, 159 were women (51.6%) and 145 were men (47.5%). Four of the participants did not fill in the information on sex, and were therefore disqualified. All of them stated that they had no health problems, history of psychiatric or neurological illness, and all were aged 18-24 years.

Instruments

CAGE Screening Test for Alcohol (Ewing, 1984; Spanish version by Rodríguez-Martos, Navarro, Vecino & Pérez, 1986).

To assess participants' risk in use of alcohol, cannabis and cocaine, they were given the Spanish version of the CAGE (Ewing, 1984) screening questionnaire (Rodríguez Martos et

al., 1986). This instrument, originally developed to detect use of alcohol, consists of four yes or no questions related to social criticism, guilt, morning intake and the need to stop using it. These items are alternated with items from other questionnaires. Each positive response scores one point, so the questionnaire range is 0 to 4 points. A score of one or two points is considered indicative of the person having some alcohol problem (risk) and three or four points reveal dependency. The questionnaire has shown high test-retest reliability (.80 to .95) and an adequate correlation with other measurement instruments on the same substance (Dhalla & Kopec, 2007; Zaldívar, Molina, García-Montes, & López-Ríos, 2009). The CAGE, considered the best known, most widely used scale, has been validated in different contexts to identify problematic use of alcohol (Ewing, 1984). In the Spanish version by Rodríguez Martos et al. (1986), used in this study, it was found that a cut-off score of 1 shows a sensitivity of 86% to 90% and a specificity of 52% to 93%. This questionnaire is also commonly applied as a screening instrument for other substances by replacing the word "alcohol" with the one of interest (Muñoz, Roa, Pérez, Santos, & de Vicente, 2002; Zaldívar et al., 2009). In this study, it was used to evaluate cannabis and cocaine in addition to alcohol. We have labeled these versions "CAGE-cannabis" and "CAGE-cocaine".

Thought-Action Fusion Scale — TAFS —, Shafran, Thordarson, & Rachman, 1996; adapted by Odriozola, 2011).

The TAFS consists of 19 items answered on a 5-point Likert-type scale that measures the fusion of a person's thoughts and behavior. According to Shafran et al. (1996), the scale has a 3-factor structure: TAF-moral, related to the extent to which a person makes moral equivalents of his thoughts and the actions performed (e.g., "it is almost as bad to wish someone harm as to do it"), TAF-likelihood-for-others, that measures to what point a person believes that having a thought about a third person can make it easier for what he has thought to happen (e.g., "if I think of a relative/friend being in a car accident, this increases the risk that he/she will have a car accident) and TAF-likelihood-for-self, where, unlike the previous factor, the content of the thought affects oneself, (e.g., "If I think of myself falling ill, this increases the risk that I will fall ill"). A total score for the sum of these factors is also given. We used the adapted version by Odriozola (2011), who shows the Cronbach alpha coefficients for the three sub-scales as .93 for the TAF-moral subscale, .92 for the TAF-probability-for-others and .89 for the TAF-probability-for-self.

Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE-R, Gutiérrez-Maldonado, Berrante-Vidal, Obiols, Aguilar, & Aguilar, 1999).

The experimental Spanish abridged version of the O-LIFE-R by Mason, Claridge & Jackson (1995) was used. This scale is a widely validated measure of schizotypy. It consists of 40 items answered on a true-false scale. Factor analysis of the questionnaire provides four structural components (Gutiérrez-Maldonado et al., 1999): unusual experiences (referring to positive symptoms, such as strange cognitive and perceptive experiences, magical thinking and unusual beliefs), cognitive disorganization (which evaluates cognitive deficits, mainly attention and concentration), introverted anhedonia (related to the negative traits of schizophrenia describing displeasure from physical and social intimacy), and impulsive nonconformity (which refers to disinhibition, impulse control problems, and aggressive, reckless or abusive behavior). The psychometric properties of this abridged scale and its correspondence with the original version of the O-LIFE and its

incidence on cognitive processes relative to attention, perception and executive functioning have been studied by Álvarez-López (2005). The results indicated reliability, measured by a Cronbach alpha coefficient of .73 for the Unusual Experiences subscale, .75 for Cognitive Disorganization, .73 for Introverted Anhedonia and .56 for Impulsive Nonconformity. Highly significant correlation indices of over 0.81 were also found between the O-LIFE and its homologs in the O-LIFE-R for Unusual Experiences, Cognitive Disorganization and Introverted Anhedonia. However, the Impulsive Nonconformity scale, did not have such high correlation indices with its homolog in the extended version ($r = .78$).

Launay-Slade Hallucination Scale Revised (LSHS-R, Bentall & Slade, 1985; adapted version by Fonseca-Pedrero et al., 2010).

The Launay-Slade Hallucination Proneness Scale (Launay & Slade, 1981), modified by Bentall & Slade (1985), is an instrument designed to measure proneness to auditory hallucinations in a normal population. It is comprised of 12 items which are filled in on a 5-choice Likert-type answer scale. This research used the adapted Spanish version by Fonseca-Pedrero et al. (2010), which had a Cronbach alpha of .90.

Procedure

Participants were recruited using informative posters distributed throughout the University of Almeria Campus offering an economic compensation of 7€. After a first interview in which they were told about the goals of the study and any doubts they may have had about their participation were clarified, they were given an appointment for another session in which they filled out the various questionnaires mentioned above (see instruments) and others as part of a wider research project. They also answered a brief self-report of socio-demographic information and other matters related to health and psychiatric problems. The questionnaires were anonymous and informed consent was received from all participants. The study was approved by the University Ethics Committee. Of the 320 participants who came to the first session, 308 answered the questionnaires for this study in the second session (once those participants who were not within the 18-24 year age range or reported that they had had or were currently suffering from neurological or psychiatric disorders had been disqualified).

Data analysis

Data were analyzed using the PASW 18 statistical package for Windows.

Results

Table 1 shows the descriptive statistics (mean, SD, kurtosis and skewness), and Table 2 the frequencies and percentages of scores on drug use screening scales.

As observed in Table 1, the scores that fit to a normal distribution are those related to the O-LIFE-R and TAFS scales, although some of the factors in these tests are at a slight distance from this distribution. The measures of use, especially CAGE-cocaine, have a platykurtic distribution and positive asymmetry, which shows that the values tend to meet on the left side of the curve, that is, beneath the mean, and there are only a few values in the center of the curve. Participant LSHR-R scores also follow a platykurtic distribution and negative asymmetry.

Table 2 shows how in this sample of university students, most dependency problems refer to alcohol, with a far from negligible 10.4%. 7.8% of the participants show dependency on cannabis, and

Table 1
Descriptives results (Mean, standard deviation, Kurtosis and Skewness) of the scales CAGE, O-LIFE-R, LSHR-R y TAFS

| Scales and subscales | n | M | SD | Kurtosis | Skewness |
|------------------------------|-----|-------|-------|----------|----------|
| CAGE alcohol | 308 | 1.05 | 1.21 | -.34 | .74 |
| CAGE cannabis | 308 | .55 | 1.22 | 2.80 | 1.95 |
| CAGE cocaine | 308 | .21 | .82 | 10.25 | 3.28 |
| O-LIFE-R | 308 | 67.02 | 18.01 | .12 | .25 |
| Subscale unusual experiences | 308 | 10.38 | 6.02 | .017 | .64 |
| Cognitive disorganization | 308 | 12.84 | 5.02 | -.62 | .017 |
| Introverted anhedonia | 308 | 5.68 | 3.33 | .49 | 1.02 |
| Impulsive nonconformity | 308 | 8.83 | 3.72 | -.17 | .12 |
| LSHR-R | 306 | 20.18 | 5.71 | 2.09 | 1.25 |
| TAFS (total) | 307 | 24.24 | 13.72 | .34 | .44 |
| Subscale moral | 307 | 19.43 | 10.61 | -.10 | .29 |
| Likelihood others | 307 | 2.59 | 3.51 | 2.04 | 1.51 |
| Likelihood self | 307 | 2.28 | 2.83 | 1.20 | 1.28 |

Table 2
Frequency, percentage and cutoff points of substance use scales

| Cutoff points | CAGE alcohol | CAGE cannabis | CAGE cocaine |
|---------------|---------------|---------------|---------------|
| 0 | 122 (39.6) | 233 (75.6) | 275 (89.3) |
| 1 | 94 (30.5) | 24 (7.8) | 14 (4.5) |
| 2 | 60 (19.5) | 27 (8.8) | 15 (4.9) |
| 3-4 | 32 (10.4) | 24 (7.8) | 4 (1.3) |

1.3% on cocaine according to the CAGE. Furthermore, although they do not reach the cut-off point for dependency, 50% of the students who participated in the study showed alcohol-related risk, 16.6% cannabis-related and almost 10% cocaine-related.

Table 3 shows the correlations between participants' scores on alcohol, cannabis and cocaine screening tests and their TAF, O-LIFE and LSHS-R scores.

Table 3 shows that there is a positive relationship between cannabis use as measured by the CAGE and the TAFS probability-for-self subscale. There is also a positive relationship between the participants' scores on the CAGE-cocaine and the TAFS probability-for-others subscale. The O-LIFE-R and its various factors is the most closely related to use of the substances, and it should be emphasized that the participants' total scores on the O-LIFE-R are directly and statistically significantly related to use of both alcohol and cannabis. It should also be stressed that the highest correlation was between cocaine use measured by the CAGE and the introverted anhedonia factor on the O-LIFE-R. It is worth underlining that the relationship between use of the substances and auditory hallucination proneness showed a statistically significant coefficient between the participants' scores on the CAGE-cannabis and the LSHS-R.

To find out which of the factors studied could predict use of alcohol, cannabis and cocaine as measured by the CAGE, three linear regression analyses were done in which the predictive variables entered were the TAFS and O-LIFE-R factors and participant scores on the LSHS-R, and as dependent variables, for each of them, the participants' scores on the CAGE-alcohol, CAGE-cannabis and CAGE-cocaine scales. In all three analyses, the stepwise variable selection method was used, taking a probability of F over 0.10 as the starting criterion. Statistically significant results were found for the three analyses: for the CAGE-alcohol ($F(1, 305) = 10.13, p \leq .01$), for the CAGE-cannabis ($F(1, 305) = 13.40, p \leq .01$) and for CAGE-cocaine ($F(1, 305) = 14.56, p \leq .01$). The percentages of variance explained for the three equations were modest and very similar (adjusted $r^2 = .04$ for CAGE alcohol, adjusted $r^2 = .03$ for cannabis, and adjusted $r^2 = .04$ for cocaine).

Table 4 shows a summary of the most relevant parameters of these regression equations.

Table 3
Correlations (Pearson) between the punctuations of the instruments of screening of consumption of drugs and the scales TAFS, O-LIFE-R y LSHS-R

| | CAGE cannabis | CAGE cocaine | TAFS total | TAF moral | TAF Likelihood others | TAF Likelihood self | O-LIFE-R total | Unusual experiences | Cognitive disorganization | Introverted anhedonia | Impulsive nonconformity | LSHS-R |
|---------------------------|---------------|--------------|------------|-----------|-----------------------|---------------------|----------------|---------------------|---------------------------|-----------------------|-------------------------|--------|
| CAGE alcohol | .49** | .51** | -.06 | -.10 | .05 | .04 | .18** | .18** | .11* | .12* | .17** | .08 |
| CAGE cannabis | | .65** | .05 | .00 | .11 | .12* | .16** | .16** | .05 | .13* | .19** | .16** |
| CAGE cocaine | | | .02 | -.03 | .11* | .09 | .03 | .06 | -.04 | .21** | .05 | .08 |
| TAFS total | | | | .91** | .67** | .63** | .17** | .19** | .11* | .04 | .05 | .30** |
| TAF moral | | | | | .33** | .30** | .05 | .08 | .09 | -.01 | -.09 | .15** |
| TAF likelihood others | | | | | | .80** | .27** | .25** | .09 | .12* | .25** | .36** |
| TAF likelihood self | | | | | | | .30** | .33** | .12* | .10 | .28** | .44** |
| O-LIFE-R total | | | | | | | | .85** | .73** | .38** | .71** | .53** |
| Unusual experiences | | | | | | | | | .45** | .21** | .54** | .60** |
| Cognitive disorganization | | | | | | | | | | .23** | .35** | .28** |
| Introverted anhedonia | | | | | | | | | | | .19** | .25** |
| Impulsive nonconformity | | | | | | | | | | | | .40** |

* $p \leq .05$, ** $p \leq .01$

Table 4

Analysis of multiple regression for CAGE alcohol, CAGE cannabis y CAGE cocaine

| Variable criterion | Factors predictores | β | t | p | R ² corrected | Change in R ² |
|--------------------|-------------------------|---------|-------|------|--------------------------|--------------------------|
| CAGE-Alcohol | Unusual experiences | .19 | 3.33 | ≤.01 | .04 | .03 |
| | TAF-moral | -.12 | -2.13 | .03 | | .01 |
| CAGE-Cannabis | Impulsive nonconformity | .17 | 3.49 | ≤.01 | .03 | |
| CAGE-Cocaine | Introverted Impulsive | .22 | 3.90 | ≤.01 | .04 | |

As observed, the variables that predict problematic use of alcohol as measured by the CAGE, refer to the presence of unusual experiences on the O-LIFE-R and the TAF moral fusion subscale, with a percentage of variance of .03 explained by the first variable and .01 by the second. The negative β coefficient of the last factor, which shows a negative relationship between alcohol and moral fusion, would also have to be stressed. The equation that predicts use of cannabis includes a single factor, which belongs to the O-LIFE-R scale and is related to impulsive nonconformity, that is, disinhibition, impulse control problems and reckless behavior by people who have greater problems with cannabis. The CAGE-cocaine may be predicted directly from the introverted anhedonia factor, and also from the O-LIFE-R, which would indicate a certain tendency to independence and being a loner by people who have problematic behavior related to this substance.

Discussion

This research started out from the hypothesis that there would be a relationship between substance use and certain risk variables linked to schizophrenic spectrum disorders. We think this hypothesis has been partly confirmed. That is, it has been shown how alcohol is related to higher schizotypy scores, both on the O-LIFE-R scale as a whole, and the various factors that it comprises. By predicting use of alcohol from the risk variables considered, it was demonstrated how the regression equation included two factors, the first related to the presence of unusual experiences and the second, negative, related to the moral thought-action fusion subcomponent. Use of cannabis is found together with higher scores on the cognitive fusion scale, and specifically, affects the supposed influence the person believes his thoughts have in causing a direct effect on what is going to happen, that is, the TAFS “probability-for-self” factor. Use of cannabis is also linked to a higher level on the schizotypy scale, and especially, the factors “unusual experiences”, “introverted anhedonia” and “impulsive nonconformity” on the O-LIFE-R, as well as high levels of hallucination proneness, as measured by the Launay-Slade questionnaire. All of this is in agreement with the abundant literature which associates substance use, especially cannabis, and schizotypy and psychotic symptomology. To predict problematic use of cannabis only the variable “impulsive nonconformity” on the O-LIFE-R was added to the regression equation. Problematic use of cocaine is also linked to the variables considered, and thus, according to the results found, participants with higher scores on the CAGE-cocaine have higher scores on the cognitive fusion scale. And although greater use of cocaine is not related,

according to the data analyzed, with higher schizotypy scores, it does emphasize one of the O-LIFE-R subscales (“introverted anhedonia”) as significantly linked to higher use, and this is the only variable that is included in the regression equation predicting use of this substance.

Taken all together, we understand these results as supporting the relationship usually found between drug use and vulnerability to schizophrenia spectrum symptomology or schizotypy characteristics, especially with regard to use of cannabis in a sample of a nonclinical population, (e.g., Dumas et al., 2002; Mass et al., 2001; Schiffman et al., 2005; Skosnik et al., 2001). Going further into the specific contributions of this study, it is worth pointing out how the factors on the O-LIFE-R are differentially related to the problematic use of the substances considered, thereby aligning it with the work begun by Esterbert et al. (2009). This research stressed the relationship of the use of cannabis with the “unusual experiences” factor on the O-LIFE (Nunn et al., 2001). The same study by Nunn et al. (2001) also showed lower scales on the “introverted anhedonia” subscale for users of cannabis and alcohol than for persons who did not use these substances. However, our results have found a positive relationship between the use of the three substances studied, alcohol, cannabis and cocaine, and the O-LIFE-R factor “introverted anhedonia”. We think this positive relationship between drug use and “introverted anhedonia” falls within the expected to the extent that the inability to enjoy social relations or activities with other people can become an important risk factor leading the person to use more and more, entering a sort of vicious circle, which in turn leads to greater isolation and inability to enjoy activities. Some comment should also be made on the relationship found between the CAGE-cannabis scores and those on the hallucination proneness scale. In principle, this is consonant with the typical effects of cannabis, which include confusion, amnesia, delusions, anxiety, agitation and hallucinations (Chopra & Smith, 1974). Furthermore, hallucinations seem to increase with the duration of the use of the substance and sometimes persist even after use has stopped (Ashton, 1999), which would also explain this correlation between problematic use of cannabis and higher hallucination proneness.

The relationship found between the use of cannabis and cocaine with different facets of thought-action fusion may be understood as a generic predisposition to psychological disorders of various types, mainly related to control of private events, such as obsessions, impulses, etc. In fact, as argued by García-Montes et al. (2008), the concept of thought-action fusion may be considered a modern form of superstition, which when it becomes chronic, leads a person to act on fictitious causes of behavior and to lose the real contingencies on which behavior depends from sight. It remains to be determined whether this characteristic is a consequence of use or if use is rather a way of psychologically facing a high degree of cognitive fusion. Nevertheless, this relationship could lead to interventions directed at lessening the degree of fusion with own thoughts (Hayes et al., 1999), and therapeutic alternatives, such as acceptance and commitment therapy, comprehensive distancing and mindfulness, might especially be proposed.

Finally, it would be advisable to reflect on some of the limitations of this study. In the first place, the correlational nature of the design impedes any type of causal relationships to be established among the variables studied. Another limitation has to do with the possible effects of use or abstinence when the instruments were being filled out by the participants (not controlled for). One thing that should be

taken into consideration is the possibility of the presence of alkaloids with potentially different effects in the same substance. Continuing with cannabis, it has been shown that it contains cannabinoids that could even have contrary effects on symptoms similar to those in patients with schizophrenic spectrum disorders (Morgan & Curran, 2008). Thus, according to data found by Morgan & Curran (2008), although Δ^9 -tetrahydrocannabinol (Δ^9 -THC) seems to be related to positive symptoms very similar to those typical of schizophrenic patients, cannabidiol (CBD) would produce contrary effects which could even be qualified as "antipsychotic". Future research might use analyses of hair samples to determine greater presence of one or another type of cannabinoid, thereby increasing its accuracy. Such a strategy would palliate to some extent biases from the exclusive use of the self-reports used in this study. In this sense, another limitation is not having used other instruments in addition to the

CAGE to evaluate the use of substances. Finally, a limitation we should stress has to do with the type of sample used. Obviously, if a sample of drug addicts had been used stronger correlations might have been found among the variables. It should be kept in mind that our sample is healthy and that substance use is not in general problematic. However, taking into account that our purpose was to explore the psychopathological vulnerability of young people, we think that the type of sample used was appropriate. Nevertheless, future research should also use samples of dependent subjects.

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References

- Alvarez-López, E. (2005). *Personalidad esquizotípica y marcadores cognitivos. Correlatos cognitivos de la esquizotipia psicométrica* (Tesis doctoral) [Schizotypal personality and cognitive markers. Cognitive correlates in psychometric schizotypy]. Departamento de personalidad, evaluación y tratamiento psicológico. Universidad de Barcelona.
- Ashton, C. (1999). Pharmacology and effects of cannabis: A brief review. *British Journal of Psychiatry*, 178, 101-106.
- Bentall, R.P., & Slade, P.D. (1985). Reliability of a scale measuring disposition towards hallucination: A brief report. *Personality and Individual Differences*, 6, 527-529.
- Bukstein, O.G., Brent, B.A., & Kaminer, Y. (1989). Comorbidity of substance abuse and other psychiatric disorders in adolescents. *American Journal of Psychiatry*, 146(9), 1131-1141.
- Caton, C.L., Gralnick, A., Bender, S., & Simon, R. (1989). Young chronic patients and substance abuse. *Hospital Community Psychiatry*, 40(10), 1037-1040.
- Chopra, G.S., & Smith, J.W. (1974). Psychotic reaction following cannabis use in East Indians. *Archives of General Psychiatry*, 30, 24-27.
- Chapman, L.J., Chapman, J.P., Kwapil, T.R., Eckblad, M., & Zinser, M.C. (1994). Putatively psychosis-prone subjects 10 years later. *Journal of Abnormal Psychology*, 103, 171-183.
- DGPNSD (2011). Delegación del Gobierno para el Plan Nacional sobre Drogas. *Encuesta domiciliaria sobre alcohol y drogas en España (EDADES)* [Domiciliary survey about alcohol and drugs in Spain]. Centro de Publicaciones de la DGPNSD.
- Dhalla, S., & Kopec, J.A. (2007). The CAGE questionnaire for alcohol misuse: A review of reliability and validity studies. *Clinical and Investigative Medicine*, 30, 33-41.
- Domínguez, M.D., Saka, M.C., Lieb, R., Wittchen, H.U., & van Os, J. (2010). Early expression of negative/disorganized symptoms predicting psychotic experiences and subsequent clinical psychosis: A 10-year study. *American Journal of Psychiatry*, 167, 1075-1082.
- Domínguez, M.D., Wichers, M., Lieb, R., Wittchen, H.U., & van Os, J. (2011). Evidence that onset of clinical psychosis is an outcome of progressively more persistent subclinical psychotic experiences. An 8-year cohort study. *Schizophrenia Bulletin*, 37, 84-93.
- Dumas, P., Saoud, M., Bouafia, S., Gutknecht, C., Ecochard, R., Dalery, J., Rochet, T., & D'Amato, T. (2002). Cannabis use correlates with schizotypal personality traits in healthy students. *Psychiatry Research*, 109, 27-35.
- Esterberg, M.L., Goulding, S.M., McClure-Tone, E.B., & Compton, M.T. (2009). Schizotypy and nicotine, alcohol, and cannabis use in a non-psychiatric sample. *Journal of Addictive Behaviors*, 34, 374-379.
- Ewing, J.A. (1984). Detecting alcoholism. The CAGE questionnaire. *The Journal of the American Medical Association*, 252, 1905-1907.
- Fernández-Artamendi, S., Fernández-Hermida, J.R., Secades, R., & García-Portilla (2011). Cannabis y salud mental [Cannabis and Mental Health]. *Actas Españolas Psiquiátricas*, 39(3), 180-190.
- Fonseca-Pedrero, E., Lemos-Giráldez, S., Paino, M., Villazón, U., & Muñiz, J. (2009). Validation of the Schizotypal Personality Questionnaire Brief form in adolescents. *Schizophrenia Research*, 111, 53-60.
- Fonseca-Pedrero, E., Lemos-Giráldez, S., Paino, M., Sierra, S., Villazón, U., García-Portilla, M., & Muñiz (2010). Dimensionality of hallucinatory predisposition: Confirmatory factor analysis of the Launay-Slade Hallucination Scale-revised in college students. *Anales de Psicología*, 26, 41-48.
- Fonseca-Pedrero, E., Muñiz, J., Lemos-Giráldez, S., García-Cueto, E., Campillo, A., & Villazón, U. (2007). La multidimensionalidad de la esquizotipia a revisión [The multidimensionalidad of the esquizotipia a revisión]. *Papeles del Psicólogo*, 28(2), 117-126.
- Fumero, A., Santamaría, C., & Navarrete, G. (2009). Predisposición al consumo de alcohol y drogas en personas vulnerables a la esquizofrenia [Predisposition to alcohol and drug consumption in schizophrenia vulnerable people]. *Revista Neurológica*, 49(1), 8-12.
- García-Montes, J.M., Pérez-Álvarez, M., Sass, L., & Cangas, A. (2008). The role of superstition in psychopathology. *Philosophy, Psychiatry & Psychology*, 15, 227-237.
- Gooding, D.C., Kathleen, A.T., & Matts, C.W. (2005). Clinical status of at-risk individuals 5 years later: Further validation of the psychometric high-risk strategy. *Journal of Abnormal Psychology*, 114, 170-175.
- Grant, B.F. (1996). Prevalence and correlates of drug use and DSM-IV drug dependence in the United States: Results of the National Longitudinal Alcohol Epidemiologic Survey. *Journal Substance Abuse*, 8, 195-210.
- Gutiérrez-Maldonado, J., Barrantes-Vidal, N., Obiols, J.E., Aguilar, A., & Aguilar, E. (1999). Versión reducida del Oxford-Liverpool Inventory of Feelings and Experiences. Comunicación presentada en el V Congreso de Evaluación Psicológica, Benalmádena (Málaga).
- Hayes, S.C., Strosahl, K.D., & Wilson, K.G. (1999). *Acceptance and commitment therapy*. Nueva York: The Guilford Press.
- Johns, L.C., & van Os, J. (2001). The continuity of psychotic experiences in the general population. *Clinical Psychology Review*, 21, 1125-1141.
- Launay, G., & Slade, P.D. (1981). The measurement of hallucinatory predisposition in male and female prisoners. *Personality and Individual Differences*, 2, 221-234.
- López-Quintero, C., Pérez de los Cobos, J., Hasin, D.S., Okuda, M., Wang, S., Grant, B.F., & Blanco, C. (2011). Probability and predictors of transition from first use to dependence on nicotine, alcohol, cannabis, and cocaine: Results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug and Alcohol Dependence*, 115, 120-130.

- Mason, O., Claridge, G., & Jackson, M. (1995). New scales for the assessment of schizotypy. *Personality and Individual Differences, 18*, 7-13.
- Mass, R., Bardong, C., Kindl, K., & Dahme, B. (2001). Relationship between cannabis use, schizotypal traits, and cognitive function in healthy subjects. *Psychopathology, 34*, 209-214.
- Meehl P.E. (1962). Schizotaxia, schizotypy, schizophrenia. *American Psychology, 17*, 827-838.
- Morgan, C.J., & Curran, H.V. (2008). Effects of cannabidiol on schizophrenia-like symptoms in people who use cannabis. *British Journal of Psychiatry, 192*, 306-307.
- Muñoz, M., Roa, A., Pérez, E., Santos, A.B., & de Vicente, A. (2002). *Instrumentos de evaluación en salud mental* [Instruments of assessment in mental health]. Pirámide: Madrid.
- Nunn, J.A., Rizza, F., & Peters, E.R. (2001). The incidence of schizotypy among cannabis and alcohol users. *Journal of Nervous and Mental Disease, 189*, 741-748.
- Odriozola, P. (2011). *El papel del pensamiento mágico en las alucinaciones y el trastorno obsesivo-compulsivo. Comparación entre grupos clínicos y no clínicos* (Tesis doctoral) [The paper of the magic thought in the hallucinations and the obsessive - compulsive trastornos. Comparison between clinical and not clinical groups]. Departamento de Psicología. Universidad de Oviedo.
- OMS (1997). Organización Mundial de la Salud. Division of mental health and prevention of substance. Abuse Cannabis: A health perspective and research agenda. WHO/MSA/PSA/97.4 English Only Distr.: General. Geneva.
- Quiroga, M. (2002). Cannabis y psicopatología comórbida [Cannabis and comorbic psychopathology]. *Adicciones, 14*(2), 191-200.
- Regier, D.A., Farmer, M.E., Rae, D.S., Locke, B.Z., Keith, S.J., Judd, L.L., & Goodwin, F.K. (1990). Comorbidity of mental disorders with alcohol and other drug abuse: Results from the Epidemiological Catchment Area (ECA) Study. *JAMA, 264*, 2511-2518.
- Rodríguez-Martos, A., Navarro, R.M., Vecino, C., & Pérez, R. (1986). Validation of KFA(CBA) and CAGE questionnaires in the diagnostic of alcoholism. *Drogalcohol, 11*, 132-139.
- Schiffman, J., Nakamura, B., Earleywine, M., & LaBrie, J. (2005). Symptoms of schizotypy precede cannabis use. *Psychiatry Research, 134*, 37-42.
- Shafran, R., Thordarson, D.S., & Rachman, S. (1996). Thought-action fusion in obsessive compulsive disorder. *Journal of Anxiety Disorder, 10*, 379-391.
- Skosnik, P.D., Spatz-Glenn, L., & Park, S. (2001). Cannabis use is associated with schizotypy and attentional disinhibition. *Schizophrenia Research, 48*, 83-92.
- Urigüen, L., & Callado, L.F. (2010). Cocaína y cerebro [Cocaine and Brain]. *Trastornos Adictivos, 12*(4), 129-134.
- Verdoux, H., & van Os, J. (2002). Psychotic symptoms in non-clinical populations and the continuum of psychosis. *Schizophrenia Research, 54*, 59-65.
- Welham, J., Scott, J., Williams, G., Najman, J., Bor, W., O'Callaghan, M., & McGrath, J. (2009). Emotional and behavioural antecedents of young adults who screen positive for non-affective psychosis: A 21 year birth cohort study. *Psychological Medicine, 39*, 625-634.
- Wittchen, H., Fröhlich, C., Behrendt, S., Günther, A., Rehm, J., Zimmermann, P., et al. (2007). Cannabis use and cannabis use disorders and their relationship to mental disorders: A 10-year prospective-longitudinal community study in adolescents. *Drug and Alcohol Dependence, 88*, 60-70.
- Zaldívar, F., López-Ríos, F., García-Montes, J.M., & Molina, A. (2011). Consumo auto-informado de alcohol y otras drogas en población universitaria española [Self-reported consumption of alcohol and other drugs in a spanish university population]. *Electronic Journal of Research in Educational Psychology, 9*(1), 113-132.
- Zaldívar, F., Molina, A.M., López Ríos, F., & García Montes, J.M. (2009). Evaluation of alcohol and other drug use and the influence of social desirability: Direct and camouflaged measures. *European Journal of Psychological Assessment, 25*(4), 244-251.