

Impulsivity in men with prescription of benzodiazepines and methadone in prison

Impulsividad en varones con prescripción de benzodiacepinas y metadona en prisión

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Abstract

Benzodiazepines and methadone use has been associated with various neuropsychological impairments. However, to the best of our knowledge, no studies have been carried out on the effect of these substances (either separately or combined) on impulsive personality, including studies in prisoners. The aim of this study is to examine the impulsive personality of a sample of 134 male prisoners using the Sensitivity to Punishment and Sensitivity to Reward Questionnaire (Torrubia, Avila, Molto, & Caseras, 2001) and the UPPS-P Scale (Cyders et al., 2007). Some of these were methadone users, methadone and benzodiazepines users, polydrug users in abstinence and non-dependent drug users. The results showed that drug users have greater sensitivity to reward, positive urgency, negative urgency and sensation seeking than non-dependent users. Methadone users showed more sensitivity to punishment and lack of perseverance with respect to other users. No differences were found between methadone+benzodiazepines users and other groups. The secondary aim is to examine which impulsive personality dimensions are related to the two motivational systems proposed by Gray (BIS-BAS) using exploratory factor analysis. Results showed two different components. One component was defined by the subscales sensitivity to reinforcement, positive urgency, negative urgency and sensation seeking. The second component was defined by the subscales sensitivity to punishment, lack of perseverance and lack of premeditation.

Keywords: benzodiazepines; methadone; impulsivity; prison; UPPS-P; SPSRQ.

Resumen

El consumo de benzodiacepinas y metadona se ha asociado a diversas alteraciones neuropsicológicas. Sin embargo, no conocemos estudios sobre el efecto de estas sustancias tanto de forma separada como de forma combinada en rasgos de personalidad impulsiva, y en menor medida en población penitenciaria. El objetivo principal de este estudio es examinar la impulsividad rasgo, medida con el Cuestionario de Sensibilidad al Castigo Sensibilidad a la Recompensa (Torrubia, Avila, Moltó y Caseras, 2001), y la escala de Evaluación del Comportamiento Impulsivo UPPS-P (Cyders et al., 2007), en una muestra de 134 varones de un centro penitenciario con consumo de metadona, metadona y benzodiacepinas, abstinentes de consumo, y no dependientes del consumo de sustancias (criterios DSM-IV). Los resultados mostraron que los grupos de consumidores presentan mayor sensibilidad a la recompensa, urgencia positiva, urgencia negativa y búsqueda de sensaciones que los no consumidores; los grupos de consumo de metadona presentan mayor sensibilidad al castigo y falta de perseverancia. El grupo de no consumidores presenta menor falta de perseverancia que el grupo de metadona y el grupo de metadona+benzodiacepinas. No se han encontrado diferencias específicamente del grupo de metadona+benzodiacepinas con el resto de los grupos. Como objetivo secundario, examinar, mediante análisis factorial exploratorio, qué dimensiones de personalidad impulsiva se relacionan con los dos sistemas motivacionales propuestos por Gray (SIC-SAC). Los resultados mostraron un componente definido por las subescalas sensibilidad al refuerzo, urgencia positiva, urgencia negativa y búsqueda de sensaciones, y un segundo definido por las subescalas sensibilidad al castigo, falta de perseverancia y falta de premeditación.

Palabras clave: benzodiacepinas; metadona; impulsividad; prisión; UPPS-P; SCSR.

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The 2013 report of the European Monitoring Centre for Drugs and Drug Addiction estimated that the average prevalence of problematic opiate use among adults (15-64 years of age) is 0.41%, equivalent to a total of 1.4 million cases in Europe in 2011. A considerable proportion, 48%, of those who began treatments for addiction in Europe in 2011 were consumers of opiates (chiefly heroin). A great deal of research focused on the prevalence and the effects of consuming these illicit substances can be found in the literature, whereas the amount of information available regarding the use of prescribed drugs is substantially smaller. Of these drugs, methadone is the most frequently used, being prescribed in up to 75% of opiate addiction cases. More specifically, in Spanish prisons the prevalence of methadone treatment is 7.9% (2012) of the interned population (Secretary General for Prisons, 2013), and in the same context benzodiazepines are prescribed for 28.7% of inmates (Subdirector General for Prison Health, 2007). Furthermore, the prevalence of benzodiazepine consumption among patients in methadone treatment is between 51% and 70% (Jones, Mogali & Comer, 2012), and around 46.5% in Spain (Fernández-Sobriño, Fernández-Rodríguez, & López-Castro, 2009). Despite this high rate of opiate and benzodiazepine consumption, there are relatively few studies of the neuropsychological effects of these medicines, especially benzodiazepines.

Benzodiazepines work at the level of the brain through the GABAA receptors, and their consumption has been linked to neuropsychological problems in relation to visuospatial ability, processing speed and verbal memory (Barker, Greenwood, Jackson, & Crowe, 2004, Stewart, 2005). At the same time, some research on users of the substance has found impulsivity disorders, suggesting behavioral disinhibition (Michel & Lang, 2003), impulsive decision making (Dassanayake et al., 2012; Lane, Tcheremissine, Liewing, Nouvion, & Cherek, 2005), and deficits in response inhibition (Acheson, Reynolds, Richards, & de Wit, 2006).

In various theoretical models of addiction, impulsivity is shown to be a highly relevant marker of vulnerability when explaining addictive processes, both in the analysis of onset and maintenance of substance use (Adan, 2002; Arce & Santisteban, 2006; Cano-Cervantes, Araque-Serrano, & Cándido-Ortiz, 2011; Cortés-Tomás, Giménez-Costa, Motos-Sellés, & Cadaveira-Mahía, 2014; Gullo, Loxton, & Dawe, 2014; Navas, Torres, Cándido, & Perales, 2014; Pattij & De Vries, 2013). The study of impulsivity has been characterized by at least two relatively independent approaches: (i) the study of cognitive impulsivity through neuropsychological tests, and (ii) the study of impulsivity as a character trait using self-report measures (Dougherty, Mathias, Marsh-Richard, Nouvion, & Dawes, 2008; Evenden, 1999, Perry & Carroll, 2008). The latter encompasses two fundamental theoretical assumptions. On the one hand, Gullo et al. (2014) provide evidence of the existence of two factors which explain

impulsivity in addictive behavior: “reward sensitivity” and “rash impulsiveness” (Dawe, Gullo, & Loxton, 2004; Dawe, & Loxton, 2004; Franken & Muris, 2006). On the other hand, Whiteside and Lynam (2001), and Cyders and Smith (2007) seek to explain the impulsive personality by using the five-factor model. In this model, they take the five factors constituting impulsivity to be positive urgency, negative urgency, (lack of) premeditation, (lack of) perseverance and sensation seeking. In parallel to these models, Gray and McNaughton (2000) posit the existence of two motivational systems in their neuropsychological model: BAS (behavioral activation system) and BIS (behavioral inhibition system). While some studies have linked the two impulsive personality factors proposed by Gullo et al. to BAS (Dawe et al., 2004; Loxton et al., 2008a), results of other research point to BAS being more closely associated with the urgency and sensation seeking dimensions, and BIS more with the (lack of) motivation and the (lack of) perseverance in the five-factor model (Verdejo-García et al., 2010a).

Taking these theoretical models as a starting point, the literature offers two instruments for measuring impulsive personality. Torrubia, Avila, Moltó and Caseras (2001) propose the use of the Sensitivity to Punishment/Sensitivity to Reward Questionnaire as an instrument which allows the assessment of two personality dimensions: sensitivity to punishment (SP) and sensitivity to reward (SR). Alternatively, Whiteside and Lynam (2001), and Cyders et al. (2007), basing their work on the factor analysis which underlies the five-factor model, recommend the UPPS-P scale of impulsive behavior, while Carlson and Pritchard (2013) suggest that addictive behavior is better explained using a combination of the UPPS-P scale and the SPSR questionnaire than either of them separately.

A variety of studies has investigated impulsivity as a personality trait among substance users and the substance dependent population. Overall, the results of this research show that impulsive personality is affected among consumers of psychostimulants (Albein-Urios, Martínez-González, Lozano, Clark, & Verdejo-García, 2012; Fernández-Serrano et al., 2011; Verdejo-García et al., 2010a), weekly binge-drinkers (Motos, Cortés-Tomás, Giménez-Costa, & Cadaveira-Mahía, 2015), alcoholics (Bravo de Medina, Echeburúa, & Aizpiri, 2007), and cannabis dependents under treatment (Bravo de Medina, Echeburúa, & Aizpiri, 2010). Although the number of studies on opiates is smaller, results also indicate that they could have an effect on the impulsive personality of non-dependent users (Dissabandara, Loxton, Dias, Daglish, & Stadlin, 2012; Nielsen et al. 2012). Nevertheless, as far as we are aware, there are no studies, certainly not with prisoners, into the effects of benzodiazepines and methadone, either separately or combined, on impulsive personality.

An investigation into the character traits among the prison population can be of interest for different reasons. Firstly because of the high prevalence of prescribed benzo-

diazepine/sedative use in this context (Subdirectorato General for Prison Health, 2007). Secondly, given that different studies have highlighted impulsivity as a risk factor in the explanation of criminal behavior (Carroll et al., 2006; Mathias, Marsh-Richard, & Dougherty, 2008; Ratchford & Beaver, 2008), it would be interesting to study the specific dimensions which are affected in this group. Finally, the lack of studies itself provides sufficient reason for investigating the subject in a prison context and, consequently, its potential role in prevention and treatment. The main aim of this study is, thus, to examine the impulsive personality of patients who are prescribed benzodiazepines in methadone maintenance treatment. A secondary objective, taking the theoretical models proposed for the explanation of impulsivity as a starting point, is to attempt to discover which impulsive character traits measured by the UPPS-P scale and SPSR questionnaire are associated with Gray's two motivational systems (BIS/BAS).

Method

Participants

The sample consisted of 134 male prisoners aged 18 to 50 from the Albolote prison in Granada. They were divided into four subgroups, three of which contained substance users and the other non-dependent users (herein referred to as non-users), each with a similar range of ages and years of schooling (see Table 1). The three substance user groups were composed respectively of methadone users (n=33), methadone+benzodiazepine users (n=29) and polydrug users in abstinence (n=43). All of them stated that their preferred method of drug consumption was the smoking of heroin and cocaine. A fourth group (n=29) was composed of individuals who were not dependent on substances (DSM-IV-TR criteria, 2002).

Given that the study was carried out in a closed prison context, the possibility that inmates could take drugs other than those prescribed was limited.

Individuals with a history of traumatic brain damage and neurological disorders and severe acute mental disorder measured by interview were excluded from the study.

Instruments

Impulsivity as a character trait

Impulsive Behavior Scale UPPS-P (Whiteside & Lynam, 2001, Spanish adaptation by Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010b). This consists of 59 items measuring five personality dimensions which can contribute to impulsive behavior: negative urgency, (lack of) perseverance, (lack of) premeditation, sensation seeking and positive urgency (Smith et al., 2007). The first dimension, negative urgency, assesses the tendency of the subject to give in to strong impulses, especially when these are accompanied

by negative emotions such as depression, anxiety or anger. The second dimension, (lack of) perseverance, evaluates the capacity of the individual to persist in carrying out tasks or fulfilling duties despite the boredom or fatigue these may involve. The third dimension, (lack of) premeditation, examines the ability of the person to consider the potential consequences of their behavior before acting. The fourth dimension, sensation seeking, evaluates the individual's proclivity for stimulation or excitement. The final dimension, positive urgency, focuses on the tendency of the subject to give in to impulses when these are preceded by strong positive emotions. Each item was measured using a four-option Likert-type scale from 1 (completely agree) to 4 (completely disagree). The total score for each of the five dimensions was used in the corresponding statistical analysis.

Sensitivity to Punishment/Sensitivity to Reward Questionnaire (SPSR) (Torrubia et al., 2001). This is a questionnaire of 48 items for evaluating two orthogonal personality dimensions: sensitivity to punishment (SP) and sensitivity to reward (SR). These scales measure the individual differences in the Behavioral Inhibition System (BIS) and the Behavioral Activation System (BAS) of Gray's neuropsychological personality model (Gray & McNaughton, 2000). The first system controls behavior in response to punishment signals, non-reward and new stimuli, and is related to the anxiety dimension (trait). The second system involves behavior in response to reward or non-punishment signals, and is related to the impulsivity dimension of personality. Various studies have shown the SP and SR scales to have adequate psychometric properties (Caseras, Avila & Torrubia, 2003, Verdejo et al., 2010b).

Procedure

The proposed research in prisons was approved by the Directorate General of Penal Institutions.

Participants were recruited for the study by means of individual contacts and through information posters in the different prison units. After informing them of the aims of the study and, in order to enhance the reliability of the information obtained, emphasizing that participation in the study would not have any negative repercussions for them, they signed an informed consent form and received a monetary compensation of €18 for their co-operation plus the possibility of receiving a report of the results.

Given that the instruments were part of a larger protocol aimed at assessing the neuropsychological properties of the sample, the participants were evaluated both individually and collectively.

Statistical analysis

Firstly, to test for the existence of possible differences between the groups in terms of the age and education variables, univariate analyses of variance (ANOVAs) were carried out, together with the non-parametric Kruskal-Wal-

lis test for the age variable. To test for possible differences between the four groups in relation to the UPPS-P scale and the SPSR questionnaire, two multivariate analyses of variance (MANOVAs) were run first of all. This was followed by post hoc univariate ANOVAs on statistically significant results of the MANOVAs in each of the dimensions of the two tests in which significant results had been obtained. Post hoc analyses (Tuckey test) were then carried out to examine possible differences between the four groups in the different dimensions of the two tests. At the same time, the effect size of group differences in the dependent variables was calculated by means of Cohen's *d*. The cutoff value for statistical significance was set at 5%. Finally, in order to test whether the structure of the principal components of impulsivity is maintained, an exploratory factor analysis was carried out with principal component extraction and varimax rotation. Components with eigenvalues greater than 1 were extracted.

Results

With regard to sociodemographic variables, the results showed that there were no statistically significant differences in terms of education. As age was not, however, distributed normally, the non-parametric Kruskal-Wallis test was applied (see Table 1).

The next step was to analyze the potential differences in the groups regarding the dependent variables associated with impulsive personality (UPPS-P & SPSR). Firstly, the MANOVA on the SPSR scores yielded statistically significant differences between the groups, with a Wilks' lambda of [F (6.258)= 5.852; p<.001, η²= .12]. The subsequent univariate post hoc ANOVAs on the two subscales revealed significant effects in SP [F (3.130)=3.481; p= .018, η²= .07] and in SR, [F (3.130)=9.528; p<.001, η²= .18]. The post hoc univariate ANOVAs indicated that there were significant differences only between the non-user and the methadone groups on the SP subscale (p= .034), while with regard to the SR subscale, results showed significant differences existing between the non-user group and the other three groups (p<

.001 in all comparisons). The effect sizes obtained (Cohen's delta) were medium to high for all comparisons (values between .74 and 1.20) (see Table 2).

Secondly, the MANOVA on the UPPS-P scores revealed statistically significant differences between the groups, with a Wilks' lambda of [F (15.348)= 4.058; p<.001, η²=.14]. The univariate ANOVAs for the five subscales showed significant effects in "positive urgency" [F (3.130)=9.058; p<.001, η²=.17] "negative urgency", [F (3.130)=13.273; p<.001, η²= .23] "sensation seeking", [F (3.130)=10.467; p<.001, η²= .19] and "lack of perseverance", [F (3.130)=5.655; p= .001, η²= .11] No significant results were obtained for "lack of premeditation", [F (3.130)= 1.396; p= .247, η²= .03]. The post hoc univariate ANOVAs revealed that significant differences existed in the "positive urgency", "negative urgency" and "sensation seeking" subscales between the non-user group and the other three groups (methadone, methadone+benzodiazepines, and in abstinence), with p values of ≤.005. The Cohen's delta values obtained were high in all comparisons (between 1.01 and 1.58). For the "lack of perseverance subscale" the results showed statistically significant differences between the non-user with reference to the methadone and methadone+benzodiazepines groups (p≤.017). The effect sizes obtained were medium to high (0.72 and 0.99) (see Table2).

Finally, exploratory factor analysis yielded a solution with two principal components and eigenvalues above 1 (3.398 & 1.123 respectively) which explained 64.59% of the total variance with good fit to the sample data (Kaiser-Meyer-Olkin KMO= .754, Bartlett's test of sphericity p< .001). The first component explains 33.72% of the variance and is defined by the "SR", "positive urgency", "negative urgency" and "sensation seeking" subscales, with factor loadings greater than .60. The second item explains 30.87% of the variance and is defined by the "lack of perseverance" and "lack of premeditation" subscales, with factor loadings above .80, and the "SP" subscale with a factor load of .47. The correlation matrix is to be found in Table 3. The factor loadings of the subscales in the two components are shown in the rotated factors matrix in Table 4.

Table 1. Descriptive scores, comparisons and significance of the sociodemographic characteristics of the groups

	Mt (n=33)	Mt+B (n=29)	A (n= 43)	NDS (n=29)	F/Chi squared	p
	M (SD)	M (SD)	M (SD)	M (SD)		
Age	36.06 (4.64)	34.96 (4.54)	31.88 (8.62)	34.57 (7.25)	5.69*	.128
Years of schooling	7 (2.23)	7.48 (1.66)	7.55 (1.85)	8.14 (1.86)	1.79**	.151

Note. Mt= methadone; Mt+B= methadone+benzodiazepines; A=Abstinent; NSD= not substance dependent; M= Mean; SD= Standard Deviation. *= value of the chi-square statistic (Kruskal-Wallis); **= value of statistic F

Table 2. Descriptive scores of the four groups in the different dimensions of the UPPS-P and SPSR scales. classified by the two components obtained. with the effect size of the comparisons between pairs of groups (Cohen's delta)

Instruments	Mt(n=33) M (ST)	Mt+B(n=29) M (ST)	A (n=43) M (ST)	NDS (n=29) M (ST)	Tuckey	d
SPSR						
SP	13.84 (4.62)	12.75 (5.96)	10.76 (5.19)	10.17 (5.23)	Mt>A=NSD	0.74 (Mt-NSD)
SR	12.60 (3.91)	12.51 (4.38)	12.46 (4.38)	7.79 (4.12)	NDS<Mt=Mt+B=A	1.20(Mt-NSD) 1.11(Mt+B-NSD) 1.09(A-NSD)
UPPS-P						
Positive urgency	32.69 (8.37)	34.41 (9.39)	30.69 (6.93)	23.96 (8.63)	NDS<Mt=Mt+B=A	1.02(Mt-NSD) 1.15(Mt+B-NSD) 1.01(A-NSD)
Negative urgency	31.33 (6.87)	34.20 (6.72)	30.51(6.10)	23.86(6.33)	NDS<Mt=Mt+B=A	1.12(Mt-NSD) 1.58(Mt+B-NSD) 1.07(A-NSD)
Sensation seeking	32.12 (7.08)	32.75 (7.94)	33.23 (5.33)	24.96 (7.02)	NDS<Mt=Mt+B=A	1.03(Mt-NSD) 1.05(Mt+B-NSD) 1.38(A-NSD)
Lack of perseverance	21.42 (4.67)	20.58 (5.44)	19.20 (3.30)	17.24 (3.57)	NDS<Mt=Mt+B	0.99(Mt-NSD) 0.72(Mt+B-NSD)
Lack of premeditation	21.96 (5.23)	22.41 (5.90)	21.55 (4.20)	19.67 (4.95)		

Note. Mt= methadone; Mt+B= methadone+ benzodiazepines; A=Abstinent; NSD= not substance dependent.

SP= Sensitivity to Punishment; SR= Sensitivity to Reward; M= Mean; SD= Standard Deviation.

* Cohen's d >.80 indicates a large effect size

Table 3. Intercorrelations between the different dimensions of the SPSR questionnaire and the UPPS-P scale

Dimension	1	2	3	4	5	6	7
1. SP	-----						
2. SR	.236**	----					
3. Negative urgency	.366**	.527**	-----				
4. Lack of premeditation	.077	.199*	.428**	----			
5. Lack of perseverance	.307**	.341**	.395**	.599**	-----		
6. Sensation seeking	.029	.543**	.460**	.181*	.240**	-----	
7. Positive urgency	.342**	.581**	.759**	.439**	.481**	.471**	-----

Nota. N= 134. SC= Sensibilidad al Castigo; SR= Sensibilidad a la Recompensa.
* p < .05. ** p < .01.

Table 4. Factor loadings extracted from the principal components with a varimax rotation of the UPPS-P scale and SPSR questionnaire dimensions.

Dimension	Components		Communality (h ²)
	1	2	
SP	.164	.471	.249
SR	.820	.180	.704
Negative urgency	.675	.508	.714
Lack of premeditation	.069	.815	.669
Lack of perseverance	.167	.832	.702
Sensation seeking	.837	-.002	.700
Positive urgency	.688	.541	.700
Percentage of variance	33.72	30.87	
Total percentage of variance	64.59		

Note. Factor loadings >.40 are printed in bold. SP= Sensitivity to Punishment; SR= Sensitivity to Reward.

Discussion

The primary objective of this research was to examine the impulsive personality of prison inmates receiving methadone maintenance treatment and prescribed benzodiazepines. Results showed that substance using groups (methadone, methadone+benzodiazepines and abstinent) displayed greater “sensitivity to reward”, positive urgency”, “negative urgency” and “sensation seeking” than non-users. It was also found that users in the methadone groups (methadone, methadone+benzodiazepines) exhibited greater “sensitivity to punishment” and “lack of perseverance”. No differences specific to the methadone+benzodiazepines group in relation to the other groups were detected. Finally, exploratory factor analysis of the two questionnaires yielded a component defined by the “SR”, “positive urgency”, “negative urgency” and “sensation seeking” subscales, and a secondary component defined by the “lack of perseverance” and “lack of premeditation” subscales.

The differences between the substance consuming groups and the non-user group in terms of positive and negative urgency, sensation seeking and SR could indicate that these personality traits are generally related to substance use. However, while all the scales have been linked in the literature to addiction, the two “urgency” scales appear to be more consistent in differentiating between addicted and non-addicted groups (Verdejo-García et al., 2007, 2010a) indicating aspects of emotional instability more typical of the greater psychopathological comorbidity found in user groups as opposed to non-users (Billeux et al., 2012; Casares-López et al., 2011). The “SR” scale has also been consistently linked to drug use (Balconi, Finocchiaro, & Campanella, 2014; Stautz & Cooper, 2013), possibly due to its connection with the mesolimbocortical pathway, which mediated by more sensitized dopaminergic transmission among users (Robinson & Berridge, 1993). Finally, although the “sensation seeking” scale is less consistently linked to addiction in the literature (Verdejo-García et al., 2007, 2010a), it also emerges from our study as a trait of impulsivity associated with substance use. This may be explained by the fact that our user groups are characterized by more severe drug use and a greater frequency of involvement in risk situations that this implies, which could also constitute a personality construct typical of prison inmates (Lykken, 1995).

Meanwhile, the groups with methadone users (methadone and methadone+benzodiazepines) displayed a greater lack of perseverance and SP. These data would suggest that the abstinent groups possess the tolerance to frustration and boredom as well as the ability to concentrate on a task required by rehabilitation treatment (with or without specialized support). Methadone user groups, more needy of pharmacological support, also undergo such treatment. Methadone affects the processes of selective attention (Mintzer & Stitzer, 2002; Prosser et al., 2006; and unpublished data

obtained in the present sample), and at the same time the powerful processes of response inhibition associated with the “lack of perseverance” scale (Cyders & Coskunpinar, 2011). This indicates the possibility of a common underlying process which differentiates the groups of methadone users from non-users in particular. The higher SP associated with methadone groups may be related to a down-regulation of noradrenergic activity due to the chronic stimulation of the mu opioid receptor affecting how punishment is perceived, as proposed by Ersche et al. (2005).

Finally, with respect to the impulsive personality traits of our groups, we should highlight the fact that no differences were found between them in the “(lack of) premeditation” dimension. This scale has been linked to a decision-making process (Zermatten, Van der Linden, d’Acremont, Jermann, & Bechara, 2005) and is a consistent predictor of such externalizing behaviors as criminality (Gordon & Egan, 2011) or violence in general (Derifenko, DeWall, Metzger, Walsh, & Lynam, 2011; Miller, Zeichner, & Wilson, 2012), which suggests that it could be considered as a dimension of impulsivity common to prison inmates and not specific to substance dependence.

The results in relation to our secondary objective bear some similarity to those found in studies (Mitchell et al., 2007; Perales, Verdejo-García, Moya, Lozano, & Pérez-García, 2009; Verdejo-García et al., 2010a) linking BAS more to the urgency and sensation seeking dimensions, and viewing BIS, given its factor loading, as more connected to the lack of premeditation and lack of perseverance dimensions. In our study all substance users, irrespective of the drug preferred, exhibited deficits on all scales included in the first factor emerging from the componential analysis, more closely linked to BAS, and in line with separate research showing that BAS plays an important role in the addiction to different substances, including heroin, methadone, cocaine, ketamine, alcohol and tobacco (Abdi, Roudsari, & Aliloo, 2011; Bijttebier, Beck, Claes, & Vandereycken, 2009; Carlson & Pritchard, 2013; Dissabandara et al., 2012, 2014; Franken, Muris, & Georgieva, 2006; Loxton et al., 2008a; Lyvers, Duff, Basch, & Edwards, 2012; Nielsen et al., 2012). Furthermore, our results would indicate that methadone users have the greatest deficits on the scales comprising the second factor, linked more closely to BIS. However, it is true that the relationship of BIS to substance use is not as well-established in the literature as that of BAS (Bijttebier et al. 2009; Dissabandara et al. 2012; Ersche et al. 2005).

These results have some important clinical implications regarding the inclusion of impulsivity trait evaluation in the processes of assessing and treating addiction disorders. In terms of assessment, our results would facilitate the development of new self-reporting instruments by taking the overlap between the UPPS-P and SPSR scales into account, as well as the dimensions proposed in Gray’s model. As far as treatment is concerned, Staiger, Kambouropoulos, and

Dawe (2007) highlight the importance of developing specific treatments depending on the results of personality trait assessment such as, for example, “contingency management” therapy for patients with prominent traits of “reward sensitivity”, training in conflict resolution skills, mindfulness, or Linehan’s dialectical behavior therapy for “rash impulsivity” traits and cognitive behavior strategies for comorbid anxiety traits. Finally, it has been discovered recently that the scores on the “sensation seeking” scale of the UPPS are potential moderators of motivational enhancement therapy results (Moshier, Ewen, & Otto, 2013).

Alongside its considerable strengths, our study also has some limitations. One of its advantages is the type of sample used, firstly because of its profile of methadone and benzodiazepine consumption, which allows us to discover the separate and combined effects of these substances on the impulsive personality, and secondly by virtue of its prison context. In terms of limitations, we have to highlight the absence of non-prison control groups which could have demonstrated more clearly the variables specific to the criminological context and the potential differences between user groups. In addition, our sample consisted solely of males. While it is true that 92.4% of the Spanish prison population is made up of male inmates (Secretary General of Prison Institutions General Report, 2012), it would be interesting to study whether these results can be extended to the female prison population. Finally, despite being the object of this study and forming part of comprehensive theories, self-report measures do not completely encompass the complex phenomenon of impulsivity. It would therefore be interesting if future studies were complemented by other measurements of impulsivity, whether self-report or laboratory based.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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