Validity of the self-report on drug use by university students: Correspondence between self-reported use and use detected in urine

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The purpose of this work was to determine the validity of a self-report on recent drug use (cocaine and cannabis) in a sample of university students of both sexes and to explore the role of attitudes toward substance use as related to this report. The subjects (506) were volunteers aged 17-35 years (who received an economic incentive) recruited at the University of Almería (Spain). The results were analyzed on the basis of correspondence between the self-report of recent use and a urine test. Three logistic regression analyses between self-reported use and attitudes toward drugs were also performed. The results show that the convergent validity of the self-report of drug use and the urine test is quite satisfactory, with percentages of agreement varying from .89 to .98 and Kappa of .66 and .56 for cannabis and cocaine, respectively. Sensitivity of the self-report is 57.1% (cocaine) and 91.8% (cannabis), and specificity is 99.4% (cocaine) and 89.6% (cannabis). The differences found in correspondence between the two substances are discussed with regard to self-reported attitudes on drug use.

Validez del autoinforme del uso de drogas en estudiantes universitarios: correspondencia entre el autoinforme y el uso detectado en orina. El objetivo de este trabajo ha sido comprobar la validez del autoinforme del consumo reciente de drogas (cannabis y cocaína) en una muestra de jóvenes universitarios de ambos sexos y explorar el papel de las actitudes hacia el consumo en relación al informe de éste. Los sujetos (506) fueron voluntarios (recibiendo un incentivo económico) con edades entre 17-35 años, captados de la Universidad de Almería (España). Los resultados se analizaron a partir de las correspondencias entre el autoinforme del consumo reciente y el test de orina. También se realizaron tres análisis de regresión logística entre el consumo autoinformado y las actitudes hacia las drogas. Los resultados señalan que la validez convergente del autoinforme de consumo de drogas con el test de orina es bastante buena, con porcentajes de acuerdo que oscilan entre 0.89 y 0.98, y valores Kappa de 0.66 y 0.56 para el cannabis y cocaína, respectivamente. La sensibilidad del autoinforme es de 57.1% (cocaína) y 91.8% (cannabis), y la especificidad es de 99.4% (cocaína) y 89.6% (cannabis). Las diferencias encontradas en las correspondencias entre las dos sustancias se discuten en relación a las actitudes informadas por los sujetos en relación al consumo de drogas.

Evaluation of drug use based on the subject's self-report is the most widely used practice (Del Boca & Noll, 2000) for epidemiological research in addiction, as it has two very clear advantages, low cost and the possibility of collecting an abundance of information from many people. However, the validity of estimations based on their use has frequently been questioned (e.g., Harrison, 1997).

Drug use is frequently considered within a social-cultural framework as improper, shameful, dangerous, and even illegal, so that the subject's own report on it may be subject to deception, hiding, faking and other types of bias in the response (Brown,

Kranzler & Del Boca, 1992; Del Boca & Darkes, 2003; among many others). For this reason, and because the results found in different epidemiological studies on drug use do not coincide (which could be explained by differences in samples, substances and methodologies used —Harrison, 1997—), there has been a certain tendency to believe that results from self-reported use are only the «tip of the iceberg» of real consumption and that therefore, the studies estimating the most prevalence were the most valid, although this affirmation has also been placed in doubt (Del Boca & Darkes, 2003). Thus, submerged in this climate of skepticism on the scant validity of self-reported use, various studies conducted in the 1970s and early 1980s explored the validity of other alternatives for evaluation (Poikolainen, Podkeltnova, & Alho, 2002; Wish, Hoffman, & Nemes, 1997), such as biomedical addiction markers, biochemical use markers and family reports. However, although such studies showed a lack of perfect correspondence between measurements from self-reports and measurements from other sources, the general conclusion was that the self-report offered a reliable

approximation valid for measuring drug use if conducted under optimum conditions (Del Boca & Noll, 2000; Harrell, 1985).

Wish et al. (1997), give three important reasons why conclusions from the early literature supporting the validity of self-reports must be re-evaluated. First, most of the validity studies were based primarily on indirect measures, usually assessments of internal consistency or the construct validity of responses, which may have influenced overestimation of their validity. In the second place, because in recent decades, the sensitivity of biological measurements for detecting recent drug use has advanced considerably. The third reason has to do with possible recent changes in attitudes toward illicit drug use which can affect the social desirability of the self-report. As suggested by Del Boca & Darkes (2003), attitudes toward use as a social context factor, can influence the validity of the self-report because of its relationship to social desirability. That is, the subject's report would vary depending on his perception of the rightness/wrongness of drug use, so that if wrongness were perceived (or adverse contingencies expected), the report would be distorted in an attempt to create a better image of himself by minimizing his use report. However, as Schwarz, Groves & Schuman (1998), point out, the wrongness perceived in drug use and, therefore, the tendency to underreporting, cannot be generalized to all populations (e.g., these authors showed how some teenagers who perceived use of alcohol to be socially desirable tended to increase their use report) so favorable/unfavorable attitudes about use in each specific sample must be known beforehand.

The validity of the self-report cannot be generalized to all populations either. So self-reports on drug use must be corroborated by other objective measures in both clinical and normal populations (and in different stages of development and different cultural contexts, Dana, 2001; Golub, Lyberty, & Johnson, 2005; Harrison, 1997; Wish et al., 1997). This is indispensable for delving further into the factors affecting the validity of the self-report in each case, because although the self-reported use of drugs has certain limitations or biases that cannot be obviated, we cannot just stop using it. In fact, one of the biggest advantages it has is that it can provide certain information (history of use, determinants and consequences of use, etc.) that cannot be found in any other type of measure. On the other hand, all objective measures have their advantages and weaknesses (see Harrison, 1997; Wish et al., 1997; Wolf et al., 1999).

In this state of things, the use of the self-report with controls or biochemical measures that test the validity of self-reported data seems indispensable, and not just in special populations (for example in prisoners, patients seeking treatment for their addiction, employees on the job, etc.) where it is easy to see a potential motivation for under or over-reporting, but also in community populations or populations of young people with different cultures where the supposed advantage of the bias in their response is not so clear (Fendrich, Johnson, Wislar, Hubbell, & Spiehler, 2004; Golub et al., 2005). Moreover, although in most of the studies examined, the validity of self-reports has been strong, findings in certain samples have sometimes been variable (Babor, Brown, & Del Boca, 1990; Buchan, Dennis, Tims, & Dymond, 2002; Brown et al., 1992; Magura & Kang, 1996). Golub et al. (2005) suggests that several factors appear to have clearly contributed to this divergence between measures. The percentage of users of some drugs (especially marijuana) that disclose their activity changes over time, the accuracy of urinalysis has increased with time and the percentage of infrequent users changes over time (urinalyses are less likely to detect infrequent users, especially of marijuana).

Fendrich et al. (2004) give two important reasons for including objective measures in self-reports on use in the general population: a) drug testing can play a role in generating more accurate prevalence estimates regarding recent use of certain substances, and b) drug testing can clarify the nature of under-reporting by providing more information about levels of under- (or over-) reporting, its variation across substances, and the characteristics of those under- (or over-) reporting.

This work is part of a broader study, the purpose of which was to evaluate the use of drugs in university students, their attitudes, and other personality variables related to its use, and thereby attempt to make the conditions under which the self-report is given minimize response bias and specifically, social desirability or underreporting. These results have been published elsewhere (García-Montes, Zaldívar, López-Ríos, & Molina, in press; Zaldívar, Molina, López-Ríos, & García-Montes, in press). However, the concrete purpose of this article is first, to analyze only the correspondence between self-reported recent use of cocaine and cannabis (substances frequently used by the young population) and urinalysis. Another purpose is to evaluate favorable attitudes about the use of these substances and discuss their possible relationship to the correspondence found, as well as exploring the predictive value of attitudes with regard to self-reported use. These attitudes have been investigated in other recent studies (Espada, Pereira, & García-Fernández, 2008; Tortajada et al., 2008), which found them to have an important predictive role in the consumption of alcohol and other drugs.

Del Boca & Darkes (2003) suggest that the variables that influence the validity of the self-report can be classified as a) social context factors, b) personal characteristics of the informer and c) demands of the task. They also make suggestions concerning the design of the self-report on substance use, and especially, the conditions under which it is to be used. The self-report applied in this study followed the recommendations of these authors and several different strategies recommended in specialized literature on the subject (Del Boca & Darkes, 2003; Zaldívar, 2006) in an attempt to reduce possible response biases in social context factors, depending on the perceived probability of negative consequences. These were: a) the conditions under which it was given ensured participant anonymity and confidentiality of data based on codes and application conditions (see procedure), b) a specific measure of perceived rightness/wrongness in consuming drugs was used (favorable/unfavorable attitude toward drugs –see variables and instruments–) c) sample was not only made up strictly of volunteers (a very common strategy) as this might affect the validity of the data (group bias), but included an economic incentive for participation and d) included biochemical measures of recent substance use to corroborate the self-report.

The second group of variables, characteristics of the informers, can also influence the answers: sociodemographic variables (sex, education, age, etc.), personality, attitudes and beliefs about drugs and, very relevant, limitations in the ability to remember. At this level, the self-report applied in this research was applied to a specific sample: university students of both sexes. Furthermore, the items analyzed in this study (whether they had used the two substances the previous weekend or not –and answers to some drug attitude scales) are a memory task of minimum difficulty.

The third group of variables corresponds to the demands of the task, which includes a wide range of variables, such as how it is given (interview, telephone interview, self-report questionnaires, etc.) the complexity, duration, etc. In this study, to minimize these possible adverse effects, a self report was chosen instead of an interview because of its greater confidentiality and anonymity. Furthermore, the average duration of the self-report (complete) was about an hour and to decrease the complexity of the task, very simple answer formats were chosen (yes or no and 5-point agreement scale).

Keeping in mind that it was attempted to minimize the social desirability bias in this study, the first hypothesis is that the correspondence between the self-report on use and use detected in urine will be almost perfect. The second hypothesis suggests that favorable attitudes about drug consumption will have some predictive value on the report of their use, in the sense that more favorable attitudes would be associated with reporting more use and vice versa.

Method

Participants

The sample in this study is made up of 506 participants, 308 women (60.87%) and 198 men (39.13%), all of them students in the 15 different degree programs at the University of Almería (which has about 11,800 students and offers 36 degrees). The average age of the subjects in the sample is 20.9 with a standard deviation of 2.4, a median of 21, and ranging from 17 to 35. The social and economic level reported by 91% of the participants was average.

Variables and instruments

Two evaluation techniques were used a) self-report, based on a self-administered questionnaire, and b) biochemical analysis of urine samples to measure use of cocaine and cannabis.

a) Self-report

A self-administered questionnaire was given the sample in this study. This questionnaire formed part of a broader study that measured variables related to the use of alcohol and other drugs, personality, etc., the results of which are not described in this article. Specifically and insofar as they affect this study, the variables measured based on the self-report were:

– Recent use of cocaine and cannabis. The questionnaire included six items which asked whether they had used these substances the weekend before (last Friday, Saturday or Sunday, that is, in the 72 hours before filling out the questionnaire, since it was given on Mondays).
– Favorable attitudes toward use of cocaine and cannabis. 2 subscales were included that evaluate the favorable attitude toward use of cannabis and cocaine, based on the Scale of Attitudes towards Use of Drugs designed by Macià (2000) and adapted by González et al. (2003) for alcohol and ecstasy. For this study, the scales were readapted for cannabis and cocaine, by making changes in the items on the original scale to refer to the specific substance (cannabis and cocaine). Each of the subscales is made up of 11 items

scored on a 5-point Likert-type scale (from 1 –very unfavorable– to 5 –very favorable).

b) Biochemical analysis

As a direct measure of recent use (previous 72 hours) of cocaine and cannabis, a biochemical urine analysis was made of the samples collected from the subjects. The test used for the detection of cocaine and cannabis metabolites was Emit® II Plus, which is a homogeneous enzyme immunoassay technique widely used to analyze specific compounds present in human urine, as it has suitable validity indices (Gold & Bensinger, 1987; Pérez, Pérez, Martínez, & Pérez, 2007). Urine testing typically has a window of detection of around 72 hours for some substances (cocaine), although cannabis can be detected several weeks later if the use is chronic (Cone, 1997).

Procedure

Participants in this study were recruited by placing informative posters around the university campus. The posters announced the place where information on participation in the study was available, and the compensation paid for it (10€).

When the students arrived for their appointments, they were given the necessary information concerning the general purposes of the research (to evaluate certain aspects of personality, life style, health and drug use), anonymity and confidentiality of data, tasks to be performed (answer the questionnaire and have a urine test –to find out their general state of health–), and the day and time they would have to come (Monday at 9 a.m.). The reason that the questionnaire was given only on Mondays was to be able to detect weekend use in the urine test. Six to twelve days passed between the time when the subjects were given the appointment and the day of the test.

When they agreed to participate (only two subjects refused due to scheduling problems) about 20-25 students per session were given appointments until the sample was complete (82.6% were on time for their appointments).

The day the tests were given, two experimenters greeted the participants in a classroom. When they were seated, with enough space between them to remain anonymous, they were given the questionnaire to be filled out, and a sticker with a personal code number was put on it. As each subject finished filling out the questionnaire and handed it to the experimenter, he put another sticker with the same number as the self-report on the urine sample jar, which he gave to the subject and asked him to go to the restroom. At the door of the restroom, a member of the research team watched that everything proceeded without incident. Afterwards, when the participants handed in the jar of urine, they were paid and thanked for their cooperation. The entire process took an average of one hour.

Urine samples were taken and stored and reagents and calibrators were prepared for biochemical analysis following manufacturer's instructions, and everything was done as part of the routine work of the Andalusian Government's Delegation of Health in Almería.

Data analysis

The data found were entered in the SPSS 14.0 for Windows information system for their statistical analysis.

Results

The use detected by urine analysis was considered the external criterion of goodness, so the correspondence between self-reported use and detection of use in urine provided the sensitivity index (the ability of the self-report to detect use), the specificity index (ability of the self-report to detect nonusers), and the false negative and false positive rates. Agreement between the two tests was also calculated based on the Kappa statistic and the percentage of agreement. These results are shown in Table 1.

As may be seen in Table 1, for cocaine use, the self-report shows a moderate sensitivity of 57.1% and an almost perfect specificity of 99.4%. The percentage of false positives is very low (0.6%), while false negatives are much higher (42.9%). Agreement between the self-report on use of cocaine and the urine test found by the Kappa statistic was moderately high and statistically significant (Kappa= .565, p<.01), with a rather high percentage of agreement (0.98). No statistically significant differences were found by sex in the 1.3% of the women and 1.5% of the men reporting use.

The self-report sensitivity to recent use of cannabis was 91.8%, which is much better than the sensitivity found for the report on cocaine (57.1), and specificity was 89.6%. On the other hand, the percentage of false positives (10.4%) is a slightly higher than results for cocaine (0.6%), while false negatives are quite a bit lower (8.2% compared to 42.9% for cocaine). 17.9% of women and 28.8% of men reported use, which is a significant difference by sex (χ^2= 134.46 (1), p<.005). Agreement between the self-report on use of cannabis and the urine test is rather high, with a statistically significant Kappa of .666 (p<.001), and a rather high percentage of agreement (0.89).

Table 2 shows the descriptive results (mean and standard deviation) and Chronbach's Alpha for the Scale of Favorable Attitudes on Use of Cocaine and Cannabis for users whose answers were congruent with the urine test (sensitivity group), the

congruent nonuser group (specificity group), a false positive group and a false negative group, and the ANOVA performed with these groups.

As may be observed in Table 2, subjects' attitude toward cannabis was more favorable than toward cocaine (t= -11.32(505), p<.001). Although there was no significant difference by sex for cocaine (t= -90 (504), p= .366), there was for cannabis (*t*= -2.79(504), p<.001), with men showing more favorable attitudes toward use than women. On the other hand, while differences in means found on the subscales of favorable attitudes based on the subgroups found (sensitivity group, specificity, false positives and false negatives) are not significant for cocaine, they are for cannabis. There are thus statistically significant differences between the sensitivity group and the specificity group, and between this one and the false positive group.

To find out whether attitudes about drug use were significantly related to reported use, two logistic regression analyses were performed using the weekend use reported (for cannabis and cocaine) as the DV, and the attitudes toward these drugs as the predictor variable, which was always included in the equation by the enter method. Similarly, to analyze whether favorable attitudes toward use could explain the congruent and incongruent (with the urinalysis) reports on nonuse, that is, whether attitudes could explain the false positives found, another logistic regression analysis was made, in which the DV was congruence or incongruence with nonuse (specificity and false positive groups). Table 3 shows the results.

As seen in Table 3, the scores on the subscales on favorable attitudes toward use would only explain 4.9% of total sample variation for cannabis, and nil for cocaine. The positive estimated coefficient B indicates an association between the two variables, although slight in both cases but the Wald statistic is only significant for cannabis. Furthermore, the regression equation for cannabis would correctly predict 99.7% of the subjects who refer to nonuse and only 0.9% of those who say they had used it. For cocaine, the

	Data source Self-report = Urine test =	+ + Se(%)	− − Sp(%)	+ − FP(%)	− + FN(%)	Percent agreement	Kappa*
Substance							
Cocaine (n= 506)		4 (57.1)	496 (99.4)	3 (0.6)	3 (42.9)	0.98	0.56
Female (n= 308)		3 (60.0)	302 (99.7)	1 (0.3)	2 (42.0)	0.99	
Male (n= 198)		(50.0)	1 (99.0)	194 (1.0)	2 (50.0)	1 0.98	
Cannabis (n= 506)		67 (91.8)	388 (89.6)	45 (10.4)	6 (8.2)	0.89	0.66
Female (n= 308)		30 (90.9)	250 (90.9)	25 (9.1)	3 (9.1)	0.90	
Male (n= 198)		37 (92.5)	138 (87.3)	20 (12.7)	3 (7.5)	0.88	

Table 1
Validity of self-reported use of drug compared with urine test

Se: Sensitivity. Sp: Specificity. FP: False Positives. FN: False Negatives
*: Kappa p< 0.01

Table 2
Mean, standard deviation, F, significance and Chronbach's alpha for the Subscales on favorable attitudes toward drug use

Subscales	Mean	Sd	Alpha	F (d.f.)	Sig.
Favorable attitudes toward use of cocaine (n= 506)	1.73	.84	.75		
Female (n= 308)	1.70	.84			
Male (n= 198)	1.77	.85			
GSe (n= 4)	1.52	.45			
GSp (n= 496)	1.73	.85		.399 (3,502)	.797
GFP (n= 3)	2.06	1.00			
GFN (n= 3)	1.45	.655			
Favorable attitudes toward use of Cannabis (n= 506)	2.10	.88	.82		
Female (n= 308)	2.01	.87			
Male (n= 198)	2.23	.87			
GSe (n= 67)	2.43 a	.96			
GSp (n= 388)	1.99 a, b	.85		9.25(3,502)	.000**
GFP (n= 45)	2.51 b	.74			
GFN (n= 6)	2.45	.90			

GSe: Sensitivity Group, GSp: Specificity Group, GFP: False Positive Group, GFN: False Negative Group.
a,b: Groups sharing the same letter are statistically different.
** p<.001

Table 3
Logistic regression analysis

D.V.D.	Variables in the equation	B	Wald (gl)	Sig.	Odd ratio	Cox and Snell R^2	Hosmer and Lemeshow Test		
							Chi- squared	g.l.	sig.
1	Favorable attitudes toward use of cannabis	.058	23.293 (1)	.000*	1.060	.049	28.883	8	.000*
2	Favorable attitudes toward use of cocaine	.002	.004 (1)	.952	1.002	.000	5.156	7	.641
3	Favorable attitudes toward use of cannabis	.771	14.07 (1)	.000*	2.163	.036	10.736	8	.217

1: Dependent variable: Self-reported of use of cannabis during the previous weekend (no= 0, yes= 1)
2: Dependent variable: Self-reported of use of cocaine during the previous weekend (no= 0, yes= 1)
3: Dependent variable: Specificity and false positive groups for cannabis (group of specificity= 0, group of false positives= 1)

* p<.001

equation correctly predicted 100% of the subjects who said they had not used it and 0% of those who did. Favorable attitudes explained only 3.6% of the variance in report congruence/incongruence with urinalysis for nonusers of cannabis. The estimated coefficient B indicates a positive association between the two variables, and the Wald statistic is statistically significant. The regression equation has no predictive value in the group of false positives; however, it is 89.6% in the specificity group.

Discussion

The results of this study, in general, show a good convergent validity of the self-report on recent drug use with the urine test, with 89% to 98% agreement and Kappa of 0.66 and 0.56 for cannabis and cocaine, respectively. However, this concordance may be explained for cocaine by the small number of users found in the total sample. The high rate of agreement found in this study for cannabis contrasts with other more moderate results (Kappa=

0.4) found in the study by Buchan et al. (2002) with a clinical sample of adolescents, while the result was similar for a clinical sample of adults in a study by Brown et al. (1992), who found 84% agreement for cannabis and 93% for cocaine.

Concerning the ability of the self-report to detect cocaine use, it should be pointed out that sensitivity was moderate (57.1%) and its consequent percentage of false negatives relatively high (42.9%). However, when interpreting these results, it should be kept in mind that only a small number of participants (only 7, that is, 1.4% of the total sample) said they had used cocaine during the previous weekend. The results found for sensitivity indicate that more subjects say they have used cocaine during the previous weekend (7 subjects) than are detected in the urine test as having taken it (4 subjects). Keeping in mind that over-reporting is not very frequent in normal populations (Fendrich et al., 2004), this result is hard to explain, unless the amounts taken were so small that they did not show up as significant in the urine tests, which would make us think that perhaps the self-report on cocaine use

(given in optimum conditions) may be even more sensitive or accurate than the urine test (which could be substituted by the hair assays, Wish et al., 1997). Nevertheless, another possible explanation could be that the substance taken was not very pure. Or that overreporting may be due to malingering, which has been described in the literature associated with attitudes toward use in a young, adolescent population (Schwarz et al., 1998). On the other hand, the results found for false negatives (42.9%) show that the self-report has a strong tendency to under-reporting use. This is compatible with most studies, both in normal and special populations (Fendrich et al., 2004; Magura & Kang, 1996), although in this study, there was more. However, it should be taken into account that this percentage refers only to 3 subjects, that is, the small size of the sample of users in this study could again explain this result.

It should be mentioned that coincidence of self-reported THC use with findings in the urine samples is higher than for cocaine, which might be related to there being more cannabis users than cocaine users. For the use of this substance, self-report sensitivity (91.8%) and specificity (89.6%) can be considered excellent and in agreement with the hypothesis posed. However, the contrary should also be mentioned. That is, the percentage of false negatives (8.2%), which, although not very high, should be discussed. Of 394 persons who say they had not used cannabis during the previous weekend, 6 were found in urine. This supports a slight tendency to under-reporting of cannabis, although much less than for cocaine (compatible with the results in Fendrich et al., 2004), which could be related, as mentioned above, to the larger number of users. Another possible explanation is that subjects answered honestly, that is, they had not taken cannabis during the previous weekend, however, they had taken it before that and this would explain the positive urine test, which is likely in chronic users (Cone, 1997; Harrison, 1997; Golub et al., 2005). The percentage of false positives found (10.4%) implies that of 112 persons who reported having used cannabis the previous weekend, it was not detected in urine for 45 subjects. Again, the interpretation is not necessarily unfavorable for self-report validity, if not entirely the contrary, that is, it may be due to a tendency of subjects to report any consumption, no matter how little, and that might not be detectable in the urine test (Wolff et al., 1999). In fact, Golub et al. (2005), show that one of the inaccuracies of the urinalysis for marihuana is that it fails to detect infrequent users. Another possible explanation is that there is a tendency to its over-reporting, which would have to be related to a favorable attitude toward its use, and would therefore not be hidden nor would there be deception concerning it. In fact, the results found on the subscales used to measure favorable attitudes toward drug use could at least partly explain this. The more favorable attitudes toward the use of cannabis in the sensitivity group than in the specificity group, and more interestingly, more in the group of false positives than in this one, could explain the congruence/incongruence of the report, that is, that over-reporting is due to favorable attitudes toward use of cannabis. However, the regression analysis using belonging to the Sp or FP groups as the DV, explains a very low percentage of variance (only 3.6%), which still leaves an open question that must be solved in future research, for example, by asking subjects about the incongruence found between the test and the self-report.

The traditional relationship attributed to drug use attitudes and their use (Jessor & Jessor, 1977) is partly backed by the results of this study. The Wald statistic for cannabis was significant, so attitudes have a significant role in predicting self-reported use (especially in predicting non-use), although the magnitude of the association appears to be relatively small. However, this was not the case for cocaine, possibly due to the small number of users.

In general, the good results found for validity of the self-report in this study may be partly due to the application of the questionnaire following some of the recommendations proposed in the literature concerning minimization of reporter bias (confidentiality, anonymity, participation incentives, minimum mnesic difficulty of the task, etc.). Another alternative hypothesis is that it is due to participants knowing beforehand that they were going to have a urinalysis, however, it should be mentioned that in the instructions they were told that the analysis was to find out their general state of health, with no explicit mention of testing for drug use. In any case, new research would have to be done to find out whether results are similar without urine tests, with other biological tests (for example the hair test), with other samples (risk or clinical populations, etc.) and with other questionnaires and application conditions.

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