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Inpatient group psychotherapy for addiction patients in times of COVID-19

Grupo de psicoterapia para pacientes con adicciones hospitalizados en tiempos de COVID-19

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The pandemic and inpatient group psychotherapy

As the COVID-19 pandemic evolves, it has become more and more difficult to find a health-related area untouched by its consequences, either direct or indirectly (Legido-Quigley et al., 2020). Inpatient group psychotherapy has been no exception. In this report we describe the navigation of our inpatient group for addiction patients during the pandemics.

A challenge in itself, inpatient group psychotherapy for patients with substance abuse has therefore faced important issues since March 2020. The first, common to many health procedures, has been being put on hold due to pandemic-related scarcity of resources or rearrangement of priorities. Moreover, overburdened health professionals have found increasingly difficult to keep up with their routine tasks, especially when tasks depend on professionals' motivation and persistence (Rubino, Luksyte, Perry & Volpone, 2009). For example, inpatient group psychotherapy might not be a reimbursed procedure, or in many wards it might not even be considered an essential part of the care of patients with substance abuse (Bandelow et al., 2016; Emond & Rasmussen, 2012).

Secondly, given the world-wide implemented measures of isolation and social distance, group therapy has become a challenge, including its inpatient version. In Catalonia, for example, a prohibition of meetings exceeding 6 people has been enforced for many months. While in outpatient settings telemedicine could be a valid alternative (Uscher-Pines et al., 2020), today's inpatient settings lack the possibility to incorporate online solutions. Therefore, they must have fully adapted to this constraint. That means patient selection has been one of the great challenges of inpatient group psychotherapy, where prioritization must have taken place.

Another obstacle has been the obligation of mask wearing, which in Spain, as in many other countries, has become mandatory at all times. We believe this is not a minor issue, since reports already describe the implications that the use of masks may have on interpersonal communication and emotion reading, fundamental constructs in group psychotherapy (Carbon, 2020).

Finally, on top of that, addictions and mental health could be facing a greater challenge: that of competition with other health areas for the allocation of resources, a major issue given the limitation of health resources and the economic crisis ensuing from this pandemic (Li, 2020). As

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seen throughout history, stigma will be a significant barrier in this new chapter (Vigo, Kestel, Pendakur, Thornicroft & Atun, 2019; Volkow, 2020).

All that being said, it has been our intention through the pandemics to advocate for the continuity of inpatient group psychotherapy for patients with substance abuse, since it has been our belief that it has been possible to overcome many of the beforementioned barriers, and we have also felt the need for maintaining such a group has been greater than ever.

Taking advantage of difficult circumstances

Starting with the COVID-19 safety measures, the inpatient group has actually significant advantages with regards to groups in outpatient settings. It is now common practice in many wards to test patients for SARS-CoV-2 before admission. That, together with the frequent testing of professionals, and the practically complete vaccination programme of healthcare workers, makes the inpatient setting a safe and SARS-CoV-2-free environment.

Although in our experience the group can run quite effectively despite the masks, if we feel that the patient and the group can highly benefit from a complete facial expression, we exceptionally ask patients to momentarily lower the mask to share what must be shared. Interestingly, we sometimes feel this symbolically equates emotion expression and sharing to other vital activities for which mask wearing can be waived, such as eating.

But even in a safe environment, we still must deal with legal constraints. For example, capacity limitations. In the case of Catalonia, the maximum number of people that can meet at the same time and the same place has been six (including therapists) during eight months. That has led to groups of five patients (with one therapist) or four patients (if a cotherapist also attends). The only possibility for inpatient group therapy therefore has been to create small groups. In our experience, it has also been an opportunity for a real “Small group”, where a reduced number of participants can develop more intimate, cohesive groups. For that to happen, though, careful selection of patients must have taken place. In fact, patient selection could be considered one of the great challenges of successful group therapy (Gans & Counselman, 2010). Given the current legal constraints, it has also become paramount in inpatient group therapy.

We operate in an 8-bed inpatient Addictive Behaviours Unit, embedded in an Acute Psychiatry Ward of 24 beds. Our inpatient group is conducted by one psychiatrist, in co-therapy with one clinical psychologist. Prior to COVID-19, with no capacity limitations, we used to invite all patients from the Ward, even those who were not under the care of the Addiction team. That usually led to groups ranging between 8 and 12 patients. Under the current restrictions, we have been forced to select patients. In that respect, we have followed three main directives. First, we have prioritized substance

abuse patients under our own care. Although “combined” therapy has raised a great deal of controversy (Gans, 1990), we believe that, under such circumstances, it can enhance therapeutic work by previous knowledge of patients’ ambivalences, resistances, and needs. Second, patients with a higher degree of functioning and mindedness have also been prioritized. Finally, we have tried to keep stability in the patients attending the group, so that more cohesiveness could be achieved. In so doing, we expected patients to take greater profit from group work. Not surprisingly, we have come across some patients who have felt disappointed or left out from the group. Usually, an honest response in individual therapy is provided to these patients regarding the impossibility of attendance. In our experience, most patients have readily understood the situation and have been easily reassured that despite not being able to attend the group, they are receiving adequate care. All in all, we argue in favour of a careful selection of patients, a fact that has been determined as crucial for the success of group therapy (Kösters, Burlingame, Nachtigall & Strauss, 2006).

Another key issue for the survival of inpatient group psychotherapy for patients with substance abuse during this pandemic has been space navigation.

The architecture of our inpatient unit provides two main rooms for patients’ activities outside their sleeping rooms. The biggest one is where meals take place. The second, significantly smaller, is the usual location of group and other therapeutic activities. Worth noting, our Unit runs under a closed-door policy. All windows are closed and patients have no access to “outside air” while in the ward. During the first two months of the pandemic, groups were not held. Then, when the initial fears were put under control, we felt the necessity and the responsibility to restart the group. We asked for a meeting with the medical and nurse coordinators. We exposed our reasons and our commitment to both patients’ safety and quality of care, and our therapy group was restarted. Since then, when the incidence of COVID-19 has been again alarmingly high, we have changed the location to the biggest room, with better ventilation. Although the space has some important inconveniences, such as being in front of the nurse station and being in the middle of the main corridor (both affecting the privacy of the group), we have preferred to run the group under lesser favourable conditions to running no group.

The importance of inpatient group psychotherapy

But beyond arguing that technical solutions and adaptations have been feasible, we believe it is fundamental to argue in favour of the reasons that should compel wards to maintain their inpatient groups in spite of the current difficulties.

Taking into account the scarcity of health resources derived from the pandemic-related economic recession, cost-effective treatments should be a priority (López-Pelayo et al., 2020). Group therapy has repeatedly proved to be so (Tucker & Oei, 2007; van der Spek et al., 2018).

Worth remembering too, and in spite of the amount of evidence generated by inpatient groups being far from that of outpatient modalities (Burlingame et al., 2016), it has also been shown to be effective (Kösters et al., 2006).

Also, worth noting, distress, isolation and ensuing loneliness have become prominent features of this pandemic (Pfefferbaum & North, 2020). Moreover, in times of crisis, vulnerable populations, such as those with substance use disorders, usually suffer disproportionate consequences when compared to the general population. Isolation, for example, is more notorious for inpatients due to restrictions in relatives' visits to healthcare settings (Li, 2020). Also, noteworthy, healthcare staff also suffers consequences in the form of excessive workload, stress and burnout (Amanullah & Ramesh Shankar, 2020). This emotional overload might be easily transferred to the ward milieu and to inpatients themselves, a fact well reported in the literature (Hall, Johnson, Watt, Tsipa & O'Connor, 2016). Therefore, we claim that, inpatient group therapy for substance use disorders patients should not be relegated from the strategy that mental health is deploying in these pandemics. Yalom therapeutic factors of group psychotherapy can easily show us the reasons (Yalom, 1983). The need for instillation of hope, universality, cohesiveness and catharsis seems almost self-explanatory for anytime in inpatient psychiatry, but more even so amidst the current panorama.

A user of intravenous cocaine with a dually diagnosed psychotic disorder was constantly complaining about her committed admission to the ward. She reported the lack of fresh air and the impossibility of walking outside the ward (both restrictions due to the pandemics) to be major distress sources during her stay. She however was a constant attendee of the group, in which she was able to work well, showing good insight into her cocaine addiction. She was also able to give support in a consistent manner to other patients. In her last session, before being discharged to a long-term ward, she was asked about her overall experience within the group. She said "I believe the group is the only really positive thing I got from my stay".

Conclusions

COVID-19 has probably been one of the greatest black swans for modern healthcare systems, which seemed to be near fatal collapse at some points during these last months. Collaboration, persistence and the commitment, motivation and professionalism of healthcare professionals have probably avoided greater damages to the system.

Although far from completely recovering our previous normality, the advance of vaccination campaigns all over the world and the decline of incidence rates might shed some optimism to many fields, including that of group psychotherapy. We are already deescalating some of the restrictions we have endured, but we hope we will be able to

retain many of the lessons we have acquired. We expect the difficulties our inpatient group has come across have made it stronger and more ready to cope with future challenges.

Not a new phenomenon, crisis always brings new opportunities. A good time for inpatient group psychotherapy to show its relevance.

Conflict of interests

The authors declare that they have no conflicts of interest, nor have they received any type of funding for the realization of this article.

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Women who inject drugs and violence: Need for an integrated response

Mujeres que usan drogas inyectadas y violencia: Necesidad de una respuesta integrada

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Abstract

The aim of this study was to describe the prevalence of physical and/or sexual violence experienced by women who inject drugs (WWID) and identify associated factors. A cross-sectional study was conducted among 120 WWID in a network of harm reduction centres using an anonymous questionnaire. Oral fluid samples were also collected to estimate the prevalence of HIV and hepatitis C. Univariate and multivariate Poisson regression models with robust variance were performed to identify the factors associated with experiencing violence, obtaining prevalence ratios (PR) and their 95% confidence intervals. The results showed that the prevalence of violence reported by WWID in the last 12 months was 45.8% (42.2% physical and 11.9% sexual aggression). In multivariate analysis, variables associated with experiencing violence were homelessness (PR = 1.59; CI: 1.07-2.38), reporting exchanges of sex for money or drugs (PR = 1.65; CI: 1.19-2.29), reporting a previous sexually transmitted infection (PR = 1.49; CI: 1.04-2.15) and/or injecting drugs less frequently than daily (RP = 2.29; CI: 1.49-3.54). This study highlights the importance of establishing detection protocols and systems of referral to the network of attention to women suffering violence, within the centres of the drug addiction care network, as well as the development of multilevel strategies that take into account not only individual factors but also other social and/or structural aspects that may be playing a relevant role in addressing this problem.

Keywords: Harm reduction centres; hepatitis C; women; drug injection; HIV; violence.

Resumen

El objetivo de este estudio fue describir la prevalencia de violencia física y/o sexual experimentada por mujeres que usan drogas por vía inyectada (MUDVI) e identificar factores asociados. Se realizó un estudio transversal en 120 MUDVI usuarias de centros de reducción de daños mediante un cuestionario anónimo y recogida de muestras de fluido oral para estimar la prevalencia del VIH y de la hepatitis C. Los factores asociados a la presencia de violencia se analizaron mediante un modelo de regresión de Poisson con varianza robusta univariante y multivariante, obteniendo razones de prevalencia (RP) y sus intervalos de confianza al 95%. Los resultados muestran que la prevalencia de agresiones en los últimos 12 meses fue del 45,8% (42,2% agresiones físicas y 11,9% agresiones sexuales). A nivel multivariante, las variables asociadas a la presencia de violencia fueron estar sin domicilio fijo (RP=1,59; IC: 1,07-2,38), ejercer el trabajo sexual (RP=1,65; IC: 1,19-2,29), haber sufrido alguna infección de transmisión sexual (RP=1,49; IC: 1,04-2,15) y/o inyectarse drogas no de forma diaria (RP=2,29; IC: 1,49-3,54). Este estudio pone de manifiesto la importancia de establecer protocolos de detección, y derivación a la red de atención a la violencia de género, dentro de los centros de la red de atención a las drogodependencias, así como el desarrollo de estrategias multinivel que tengan en cuenta no solamente factores individuales sino también otros aspectos sociales y/o estructurales que pueden estar jugando un papel relevante a la hora de abordar este problema.

Palabras clave: Centros de reducción de daños; hepatitis C; mujeres; uso de drogas inyectadas; VIH; violencia.

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Research, prevention and treatment of addictions is generally viewed from an androcentric perspective, that is, with a focus on the male point of view. This has led to women becoming invisible in the phenomenon, and consequently in the responses or policies to address it (Jiménez, Molina & García-Palma, 2014). The stigmatization and social rejection endured by women with drug addiction problems, and particularly women who inject drugs (WWID), results in less social or family support, greater isolation, and failure and/or delay to request help in overcoming the problem (Arpa, 2017; Falcón, 2006; UN Women, 2014). According to UNAIDS, data on HIV prevalence disaggregated by sex has been reported by 48 countries since 2011, with important differences depending on geographic area in the estimates of HIV prevalence in WWID. In most of these countries (28 of 41) the prevalence of HIV observed in women is higher than that reported in men who inject drugs (UNAIDS, 2014). In Catalonia, the estimated HIV prevalence in WWID recruited in harm reduction centres between 2008 and 2011 was also higher than that observed in men (38.7% and 31.5%, respectively) (Folch et al., 2008).

In the descriptions of factors associated with the increased vulnerability of WWID to HIV infection, hepatitis C and other sexually transmitted infections (STIs), the literature highlights factors at individual level (low self-esteem, loneliness, risk), social and/or community level (substance use issues in the family, partner conflicts), and factors at the structural level (discrimination, laws and policies) (Baral, Logie, Grosso, Wirtz & Beyrer, 2013; El-Bassel, Wechsberg & Shaw, 2012). One of these factors recurrently described in the literature is the physical and/or sexual violence that WWID experience, mainly at the hands of their sexual partners, and which can reduce their ability to protect their own health by negotiating safer sexual and injection practices (Azim, Bontell & Strathdee, 2015; Iversen, Page, Madden & Maher, 2015). Moreover, the prejudices and social stigma suffered by women drug users because they do not meet the expectations of the socially accepted ideal limit and/or delay access to treatment and rehabilitation centres (Malinowska-Sempruch, Rychkova & Foundations, 2015).

In recent years, various authors have highlighted the synergistic interactions found among the epidemics of substance abuse, gender violence, and HIV infection, known as the SAVA syndemic (Substance Abuse, Violence and AIDS) (Gilbert et al., 2015; Meyer, Springer & Altice, 2011). Although gender-based violence against women, including child sexual abuse, intimate partner violence, and sexual assault (UN General Assembly, 1993), is not a direct mechanism for HIV transmission, a recent meta-analysis indicates that it can cause an increase in HIV risk between 28-52% among different populations of women,

including the group of women who use drugs (Li et al., 2014). The psychological consequences associated with the violence suffered by these women, such as anxiety, depression and low self-esteem, may limit their ability to apply safer injection and sexual practices (Wagner et al., 2009). Violence in women with drug addiction problems also results in problems of access and adherence to treatment. Furthermore, both the care network for women victims of gender violence and the drug addiction care network have had difficulties in incorporating the twin perspectives of drug dependence and violence in their care protocols (Lipsky et al., 2010; Ruiz-Olivares & Chulkova, 2016), despite the evidence shown by some studies of psychosocial interventions addressing intimate partner violence in women who use drugs in drug treatment centres (Gilbert et al., 2006; Tirado-Muñoz, Gilchrist, Llagoña, Gilbert & Torrens, 2015.)

There have only been a few studies in Spain quantifying and/or specifically addressing violence in women drug addicts and its consequences. An example of such studies is one carried out in Catalonia in drug treatment centres in which no differences were observed in terms of the levels of violence suffered by men and women attendees, although in terms of the type of violence, women suffered psychological and sexual violence more frequently (Arribas-Ibar et al., 2018). It is therefore important to provide elements which can help design appropriate and evidence-based actions for the comprehensive management of gender-based violence and drug addiction. The objective of this study was thus to describe the prevalence of physical and/or sexual violence experienced by WWID who attend harm reduction centres in Catalonia and to identify factors associated with having suffered some act of violence in the previous 12 months.

Methods

Descriptive cross-sectional study carried out in 2014-15 in harm reduction centres among WWID as part of the integrated system for epidemiological surveillance of HIV/STIs in Catalonia. Harm reduction programs in these centres include syringe exchange programs (SEPs), outreach programs, drug addiction treatment and monitoring centres (TMC) and supervised injection rooms.

Participants

A convenience sample of WWID was selected, stratifying by centre and geographic area of origin, and using proportional allocation. Previously, a prospecting or mapping study was carried out in order to describe the type of population attending each centre. The inclusion criteria were being aged over 18 and having injected drugs at least once in the last 6 months.

Questionnaire

Epidemiological and behavioural information was collected using an anonymous questionnaire administered by interviewers, translated into Spanish, Romanian, and Russian, and adapted from the WHO model (WHO, 1994). The questionnaire collected information on sociodemographic characteristics, patterns of drug use, injection-related risk behaviours, sexual behaviour, knowledge of serological status regarding HIV, HCV and other STIs, use of social and health services, prison stay, access to prevention and violence suffered in the last year, among others. Specifically, the questions regarding violence were: *“In the last 12 months, how many times have you suffered any type of physical aggression (been beaten, pushed, hit, ...)?*, and *In the last 12 months, how many times have you suffered any type of sexual assault or abuse?* The dependent variable was defined as having suffered some act of physical violence and/or sexual assault or abuse in the last 12 months.

Biological samples

In addition, oral fluid samples were collected using the ORASURE device (Epitope Inc. USA) to estimate the prevalence of antibodies against HIV and HCV infection, respectively. ADALTIS Detect-HIV kits, version 4, were used to detect anti-HIV antibodies in oral fluid samples (Chohan et al., 2001), and the HCV 3.0 SAvE ELISA (Ortho-Clinical Diagnostics) assay for the detection of anti-HCV antibodies (Judd et al., 2003). Being an anonymous study, with testing valid for an epidemiological study but not approved for individual diagnosis, test results were not made available to the participants; however, participants were offered the possibility to be tested at the Voluntary Counselling and Testing sites network of Catalonia.

Ethical aspects

All participants signed informed consent form. The study protocol was approved an informed consent form by the Ethics Committee of the Hospital Universitari Germans Trias i Pujol.

Statistical analysis

A descriptive analysis of the main variables was carried out and Pearson's χ^2 test and Fisher's exact test were used to compare proportions according to whether or not the women had suffered violent situations. Quantitative variables were compared using the t-test for independent samples after running Levene's equality of variance test. The factors associated with having suffered sexual and/or physical violence in women were analyzed using a Poisson regression model with robust univariate and multivariate variance (Espelt, Bosque-Prous & Mari-Dell'Olmo, 2019; Espelt, Mari-Dell'Olmo, Penelo & Bosque-Prous, 2017), estimating prevalence ratios (PR) and their 95% confidence

intervals (CI). Variables with a significance level < 0.10 in the univariate analysis were included in the multivariate model, and an error level of 5% was considered for all analyses. The SPSS version 17 statistical package was used.

Results

Of the total 120 WWID participating in the study, more than half (67.2%) were of Spanish origin and 32.8% were from other countries, mainly from Eastern Europe (42.9%) and Italy (35.7%). The mean age was 35.4 years (SD: 8.9; range: 18-61 years), and 50.8% of the women were currently being treated for their addiction.

The prevalence of assaults in the last 12 months was 45.8% in total, 42.2% in the case of physical assaults and 11.9% for sexual assaults. Both types of violence were reported by 8.3% of WWID. Among the WWID who claimed to have suffered some type of physical aggression in the last 12 months ($n = 51$), 37.3% occurred on one occasion, 23.5% on two, and the rest on three or more occasions (39.2%). In the case of the 15 women who had suffered sexual assaults, 66.7% stated that it was only once, 20% twice and 13.4% three or more times.

Table 1 describes the socio-demographic and behavioural profile of the women based on whether or not they suffered any type of physical and/or sexual assault. Statistically significant differences are observed in the percentage of WWID who reported having had commercial sex, this percentage being higher among WWID who claimed to have suffered some type of aggression in the last 12 months (29.1% and 9.7%, respectively).

The self-reported lifetime prevalence of STIs was higher in WWID who claimed to have suffered some type of violence (49.1% (CI: 36.4%-61.9%) vs. 24.6% (CI: 15.8%-36.3%); $p < 0.001$). There were no significant differences in the prevalence of HIV and HCV between women who claimed to have suffered some type of violence and those who did not (Figure 1).

Regarding people who assaulted them physically and/or sexually, intimate partners stand out in first place (43.1% and 35.3%, respectively), with friends and/or acquaintances second (22.4% and 23.5%, respectively). Approximately 6% of WWID who have suffered physical or sexual violence affirm that it came from their sexual clients, while 10% of those suffering physical violence affirm that it was from the police (Table 2).

The factors associated at the univariate and multivariate level with having suffered sexual and/or physical violence are presented in Table 3. At the multivariate level, an association is observed between being homeless (RP = 1.59; CI: 1.07- 2.38), performing sex work (RP = 1.65; CI: 1.19- 2.29), declaring to have suffered any STI (RP = 1.49; CI: 1.04-2.15) and/or injecting drugs not on a daily basis with the presence of violence in WWID (RP = 2.29; CI: 1.49-3.54).

Table 1. *Socio-demographic profile, drug use patterns and sexual behaviours in WWID in relation to suffering violence or not (previous 12 months).*

	Physical and/or sexual violence		p
	No (n=65) %	Yes (n=55) %	
Age: Under 30 years	19 (29.2)	18 (32.7)	0.679
Country of origin: Spain	42 (64.6)	47 (67.3)	0.094
Primary or lower level of education	42 (64.6)	35 (63.6)	0.911
Ever in prison	34 (52.3)	38 (69.1)	0.061
Currently in treatment	32 (49.2)	28 (50.9)	0.953
Years of injecting: 0-5	22 (33.8)	15 (27.8)	0.476
Injecting daily or 2-3 days/week*	48 (73.8)	39 (70.9)	0.720
Accepted used syringes*	10 (15.4)	10 (18.2)	0.682
Given used syringes to others*	21 (32.3)	18 (32.7)	0.961
Shared other paraphernalia*	41 (63.1)	38 (70.4)	0.402
Sex with stable partner (SP)*	40 (61.5)	38 (69.1)	0.387
Sex with occasional partner (OP)*	14 (21.5)	15 (27.3)	0.465
Inconsistent use of condoms with SP*	33 (50.8)	33 (60.0)	0.597
Inconsistent use of condoms with OP*	5 (7.7)	9 (16.4)	0.324
Sex with clients*	6 (9.7)	16 (29.1)	0.007
Sex with injecting SP	25 (38.5)	28 (50.9)	0.171

Note. *previous 6 months.

Table 2. *Physical and/or sexual violence in WWID by type of perpetrator (previous 12 months).*

	Physical violence (n=51) %	Sexual violence (n=15) %
Intimate partner	43.1	35.3
Parents	3.4	0.0
Relatives	3.4	0.0
Friends/acquaintances	22.4	23.5
Sex clients	6.9	5.9
Involved in drug trafficking	5.2	11.8
Neighbours	0.0	5.9
Police	10.3	0.0
Unknown	25.9	2.4

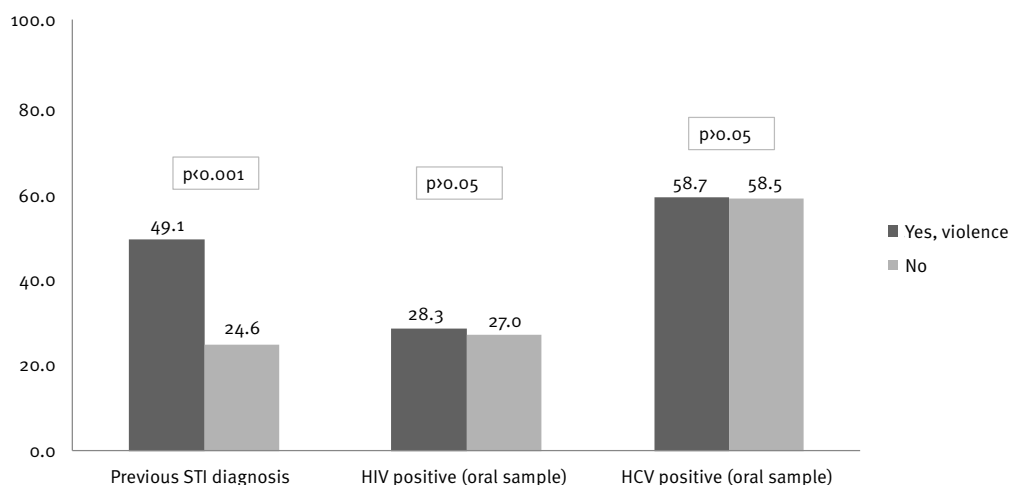


Figure 1. Self-declared STIs and prevalence of HIV and HCV in WWID in relation to suffering violence or not.

Table 3. *Socio-demographic profile, drug use patterns and sexual behaviours associated with suffering violence in WWID (previous 12 months).*

	P	RP	IC95%	RPa	IC95%
Age					
< 30 years	48.6	1			
30 years or over	44.6	0.92	0.61-1.38		
Country of origin					
Spain	46.8	1			
Other	43.9	0.94	0.62-1.43		
Educational level					
Primary or lower	45.4	1			
≥ Secondary	46.5	1.02	0.68-1.53		
Ever in prison					
No	35.4	1			
Yes	52.8	1.49	0.96-2.32		
Homeless*					
No	42.6	1		1	
Yes	57.7	1.36	0.90-2.03	1.59	1.07-2.38
Source of income*					
None legally	37.5	1			
Legal	51.4	1.37	0.89-2.11		
Years of injecting					
0-5	40.5	1			
> 5	47.6	1.17	0.75-1.85		
Daily injecting					
No	59.1	1.99	1.26-3.16	2.29	1.49-3.54
Yes	29.6	1		1	
Accepting used syringes*					
No	45.0	1			
Yes	50.0	1.11	0.68-1.81		
Giving used syringes to others*					
No	45.7	1			
Yes	46.1	1.01	0.67-1.53		
Stable partner*					
No	40.5	1			
Yes	48.7	1.2	0.78-1.86		
Occasional partner					
No	44.0	1			
Yes	51.7	1.17	0.77-1.80		
Sex with clients*					
No	41.1	1		1	
Yes	72.7	1.77	1.24-2.52	1.65	1.19-2.29
Stable partner who injects					
No	40.3	1			
Yes	52.8	1.31	0.89-1.93		
HIV (oral fluid)					
No	45.2	1			
Yes	46.9	1.04	0.67-1.61		
HCV (oral fluid)					
No	45.8	1			
Yes	45.6	0.99	0.66-1.49		
Any STI					
No	36.4	1		1	
Yes	62.8	1.73	1.19-2.52	1.49	1.04-2.15

Note. *previous 6 months; PR: Prevalence ratio; PRa: Adjusted prevalence ratio.

Discussion

The data from this study confirm the high prevalence of physical and/or sexual assaults suffered by WWID in Spain, often from their intimate partners, a prevalence higher than that observed in women in the general

population (Llopis, Castillo, Rebolida & Stocco, 2005). Specifically, approximately half of WWID using harm reduction centres in Catalonia claim to have suffered this type of violence in the previous year, and this prevalence is higher in women who carry out sex work and who are

homeless, thus justifying the need to develop combined prevention strategies (UNAIDS, 2010) which take into account not only individual factors but also other social and/or structural aspects that may be playing a relevant role in addressing this problem.

A range of previous studies have already shown an association between being a female drug user and a higher probability of suffering some type of violence (Arribas-Ibar et al., 2018; Llopis et al., 2005). Most of the violent situations experienced by WWID attending harm reduction centres happen with their intimate partners, many of whom are also injecting drug users. In these couples it has been observed that separating the relationship from substance use is a complex matter given the mixture of ambivalent attitudes towards both (Chait & Calvo, 2005). In addition, WWID often do not identify situations of violence towards them or assume the greater aggressiveness of their partners when they are under the influence of drugs to be “normal” (Martínez Redondo, 2009). However, it would be a mistake to focus exclusively on intimate partner violence because a high percentage of these attacks also occur in environments involving friends and acquaintances and even strangers, as well as in the form of physical aggression by police. Previous studies carried out in other countries such as Canada also show a high percentage of WWID (43.5%) who say they have been victims of violence by acquaintances (Marshall, Fairbairn, Li, Wood & Kerr, 2008).

The study shows an association between suffering some type of violence in the previous year and engaging in sex work in exchange for money and/or drugs, a result which is consistent with earlier studies carried out internationally (Azim et al., 2015). WWID who perform sex work often face certain social and structural barriers which stop them from accessing prevention programs and the necessary socio-health services (El-Bassel, Shaw, Dasgupta & Strathdee, 2014). In addition to situations of violence faced by women involved in sex work, especially women who practise on the street (Deering et al., 2013), WWID face particularly high-risk situations for HIV infection and other STIs, such as using drugs with their clients (Strathdee et al., 2011), or difficulties in negotiating condom use with stable clients who give them more money to finance their drug use (Robertson et al., 2014).

Living on the street is also associated with having suffered some type of violence in the previous year, a result already observed in earlier studies in both men and women who inject drugs (Marshall et al., 2008). Homeless WWID suffer worse forms of subordination and inequality which exacerbate their invisibility and social exclusion, and which are sometimes expressed through violence, either by their partners or their clients if carrying out sex work (Bourgois, Prince & Moss, 2004). This association could also be due to different factors related to the precarious social conditions

of these people (criminal activities, poverty, little social support...) (Marshall et al., 2008).

A higher prevalence of lifetime STIs is observed in WWID who have suffered violence (49% vs. 25%). Although this issue is not exclusive to the WWID population, studies show women who have suffered some type of sexual violence from their partners have a higher risk of HIV/STI infections (Decker et al., 2014), with condoms being less frequently used in sexual relations due to the difficulties in negotiating their use when violence is involved. It can be said that drug use, violence and associated infections are synergistic health problems that interact with each other and negatively affect the health of the population, in this case of the WWID population (Gilbert et al., 2015).

A surprising fact is that WWID who injected daily had a lower probability of suffering violence compared to WWID injecting less frequently. A more detailed analysis of the characteristics of use would be necessary to be able to interpret the results correctly (other routes of administration, polydrug use, etc.).

Among the limitations of the study, we must first highlight the fact that it is not possible to generalize the data to all WWID in Catalonia since the sample was selected only in harm reduction centres, so we have no information regarding women who do not access these centres. However, attempts were made to diversify the type of recruitment centre as much as possible, and people from other countries were included to provide the most representative sample possible. Moreover, the prevalence of some risk behaviours collected through the self-report could be underestimated, as could the percentage of women who say they suffered some type of physical and/or sexual assault. To minimize this, we sought to establish an environment of anonymity to facilitate the conduct of the interviews, using simple and understandable language. In addition, certain types of violence may not have been collected with the question included in the questionnaire (psychological violence, for example). Furthermore, the psychometric properties of the questionnaire in the present work were not assessed. Despite the small sample size, this is one of the few studies in our country to address the problem of addictions from a gender perspective. It would be interesting to be able to carry out future studies with a greater number of participants in order to perform analyses with greater statistical power. Finally, being a descriptive cross-sectional study, no causal relationships can be established between situations of violence and the risk factors analyzed.

Despite the limitations, the data from this study show that a high percentage of WWID recruited in harm reduction centres have been the victims of physical and/or sexual violence on some occasion; this is particularly the case of women with worse social conditions such as those who report living on the street and those involved in sex

work. The importance is therefore justified of establishing detection protocols and systems of referral to the care network for victims of gender violence within the network of drug addiction care centres used by the women, given the difficulties they sometimes have in identifying situations of violence because these have become a “normal” part of their daily lives.

Furthermore, it is also important to train the professionals who care for women, to create safe spaces for them from which they can work safely, without men, and also to work towards new types of masculinity based on respect for women. Finally, it should be ensured that women who use drugs and who also face situations of violence can access resources providing holistic interventions with comprehensive care for such women, given that most of these services are designed to serve men as the visible majority.

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Conflict of interests

Albert Espelt is Associate Editor of the journal *Adicciones*. However, this played no role in the editorial process.

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Internet Addiction Test research through a cross-cultural perspective: Spain, USA and Colombia

La investigación del Internet Addiction Test desde una perspectiva intercultural: España, Estados Unidos y Colombia

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Abstract

Internet users worldwide often experience problems related to their Internet use, and although culture has an important influence over how people communicate, what they value, and therefore how they use the Internet, little cross-cultural research on the subject of problematic Internet use has been carried out. The Internet Addiction Test (IAT), the most common measurement tool for this purpose, has been used in various countries. In this study we compared and analyzed the cross-cultural results found in the most recent research on the IAT factor analysis. We found that in countries with two or more studies, results are often replicated, suggesting that cultural context influences Internet behaviors. We conducted our own IAT factor analysis studies in three countries – Spain, USA, and Colombia – with a total of 1,273 participants. We compared our results with those from previous studies in the same countries and found similar results. The most notable finding was that all the IAT factor analyses, both ours and the previous ones in the same regions, contained a factor related to loss of control/time management problems and another factor related to emotional/psychological problems, thereby suggesting that impulse control problems and unfulfilled emotional needs are the most important components in the development of problematic Internet use in various countries around the world. Future research on problematic Internet use should focus on these aspects.

Key Words: Internet addiction; problematic Internet use; cross-cultural; Internet Addiction Test; factor analysis.

Resumen

Los usuarios de Internet frecuentemente experimentan problemas relacionados con su uso de Internet y, aunque la cultura tiene una influencia importante en la forma en que las personas se comunican, en lo que valoran y, por lo tanto, en cómo utilizan Internet, hay escasas publicaciones sobre investigación intercultural del uso problemático de Internet. La herramienta más común para medir dicho uso, el Internet Addiction Test (IAT), se ha utilizado en varios países. En este estudio comparamos los resultados interculturales de las investigaciones más recientes sobre el análisis factorial del IAT. Encontramos que los resultados a menudo se replican en países con dos o más estudios, lo que sugiere que el contexto cultural influye en los comportamientos en Internet. Llevamos a cabo nuestros propios estudios de análisis factorial del IAT en tres países (España, EE. UU. y Colombia) con 1.273 participantes. Al comparar nuestros resultados con los de estudios anteriores en esos países, encontramos que nuestros resultados también fueron similares a los de estudios anteriores. El hallazgo más notable fue que todos los análisis factoriales de IAT, tanto los nuestros como los anteriores en las mismas regiones, contenían un factor relacionado con la pérdida de control/problemas de gestión del tiempo y otro factor relacionado con problemas emocionales/psicológicos, lo que sugiere que el control de impulsos y las necesidades emocionales no satisfechas son componentes importantes en el desarrollo del uso problemático de Internet en todo el mundo. La investigación futura sobre el uso problemático de Internet debería centrarse en estos aspectos.

Palabras clave: Adicción a Internet; uso problemático de Internet; intercultural; Prueba de adicción a Internet; análisis factorial.

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Although Internet use is a global phenomenon, there has been little research on the topic of problematic Internet use from a cross-cultural perspective. This is a weakness in the literature that should be addressed because people from different cultural backgrounds have very different communication practices, values and motivations, and therefore have different Internet behaviours as well. Consequently, when they experience problems associated with Internet use, the nature of those problems also differs depending on their sociocultural context.

Psychometric analyses such as factorial analysis of Internet addiction questionnaires show different results in almost every country studied, and the majority of studies comment that this variation probably exists in part due to cultural differences. However, very few studies have taken a cross-cultural approach to the study of Internet addiction and little attention is given to culture in the problematic Internet use research in general. Taking a cross-cultural approach to this subject could help identify culture's influence on problematic Internet behaviours, which would facilitate the development of customized evaluation tools and treatment practices for problematic Internet users in different populations.

Problematic Internet Use and Internet Addiction

Problematic Internet Use (PIU) is an important problem to study as half the world's population uses the Internet regularly and the popularization of the smartphone has made Internet access even easier and more frequent (Stevens, 2018). Studies have shown that Internet Addiction (IA) is associated with disorders such as anxiety (Ho et al., 2014; Lee & Stapinski, 2012; Younes et al., 2016), depression (Orsala, Orsalb, Unsalc & Ozalp, 2013; Younes et al., 2016), stress (Pedrero-Pérez et al., 2018; Samaha & Hawi, 2016; Younes et al., 2016), low self-esteem (Bahrainian, Alizadeh, Raeisoon, Hashemi & Khazae, 2014; Bozoglan, Demirer & Sahin, 2013), loneliness (Bozoglan, Demirer & Sahin, 2013; Yao & Zhong, 2014), insomnia (Chen & Gau, 2016; Younes et al., 2016), suicidality (Lin et al., 2014), impulsivity (Lee, Choi, Shin, Lee, Jung & Kwon, 2012), substance abuse (Ho et al., 2014; Lee, Han, Kim & Renshaw, 2015) and ADHD (Ho et al., 2014; Weinstein, Yaacov, Manning, Danon & Weizman, 2015), among others. That being said, it is still under discussion whether problematic Internet use can be labeled as an addiction (Kardefelt-Winther, 2014; Sánchez-Carbonell, Beranuy, Castellana & Chamarro, 2008; Starcevic, 2013; Widyanto & Griffiths, 2006), and Internet addiction is not included in the DSM-V (Petry & O'Brien, 2013) nor in the ICD-11 (Bobes, Flórez, Seijo & Bobes, 2019) although specific problematic activities done online such as gambling and video gaming are included. The reluctance to definitively confirm the existence of an Internet Addiction disorder is due to

issues with its theoretical development, methodology and conceptualization across studies, and because the levels of severity of problems associated with Internet "addiction" are usually not comparable with the severity of problems caused by other confirmed addictions.

The focus on an addiction framework may have contributed to problems with diagnosis and treatment of problematic Internet use because the leading tool for diagnosis, the Internet Addiction Test, has unstable structural validity. The IAT was developed by Young (1998), based on the DSM-IV (American Psychiatric Association, 1994) criteria for pathological gambling and has been the most widely used measure for the study of problematic Internet use around the world. It was designed to have unidimensional structure, however, it has been found to have varying numbers of factors, ranging from 1 to 6 (Laconi, Rodgers & Chabrol, 2014). Although its reliability is consistently strong (Laconi, Rodgers & Chabrol, 2014; Panayides & Walker, 2012), its factorial structure differs in almost every study, thus making it difficult to identify which components of problematic Internet use are more relevant to address in diagnosis and treatment. Many of the studies in the IAT factor analysis literature mention the potential role of culture in the psychometric differences found across studies, however IAT research with a cross-cultural perspective is scarce.

Culture

Although there have been few studies on the subject of Internet Addiction/Problematic Internet Use (PIU) with a cultural focus (Lopez-Fernandez, 2015), those that exist have found interesting cultural differences in Internet use.

Durkee et al. (2012) studied pathological Internet use in Austria, Estonia, France, Germany, Hungary, Ireland, Israel, Italy, Romania, Slovenia, Spain, and Sweden, and found that the highest rate of maladaptive Internet use (18.2%) and pathological Internet use (11.8%) was found in Israel and the lowest rates were found in Italy (8.8% and 1.2%). They also found that when comparing metropolitan and micropolitan areas, adolescents living in metropolitan areas showed a higher risk for PIU. They highlighted the importance of this finding and indicated that there must be a significant difference in metropolitan vs micropolitan culture which should be further investigated.

Tsitsika et al. (2014) found that prevalence rates of Internet Addictive Behaviour were higher in the Southern and Eastern/Middle European countries and lower in the Northern European countries. More specifically, they found that the country with the highest rate of dysfunctional Internet behaviour was Spain with a rate of 23% and the lowest was Iceland with 8%. These results contradict the results of another cross-cultural Internet study by Laconi et al. (2018) which compared problematic Internet use in Italy, Germany, France, Poland, Spain, Turkey, Hungary,

England and Greece and found that the Spanish sample had one of the lowest rates of PIU.

Seabra et al. (2017) found an interesting paradox in their comparison between Portuguese and Brazilian Internet users. They expected to find more problematic use among Portuguese users as they had more Internet users per capita and easier access to the Internet than the Brazilians. However, they found that Brazilian users had higher levels of Internet Addiction, thereby demonstrating that ease of access and usage prevalence in a country are not sufficient to predict problematic Internet use.

To facilitate cross-cultural comparison of IAT factor analysis research from around the world, we organized the latest meta-analysis findings on IAT's factor analysis (Moon et al., 2018) according to geographical region and identified similarities/differences of interest (Table 1). One aspect of the research we found interesting to note was the different ways that research teams labeled the factors they identified. There is no standard for factor naming, therefore the factor names selected by each team indicate how they summarized the combination of items within that factor. This offers insight on how the teams from different countries interpret the factors and what aspect of them they see as most significant.

Comparison of IAT factor analysis studies around the world

Asia and Europe had the highest number of IAT factor analysis studies, so we compared their factors to identify if there were interesting similarities and/or differences. There were a couple of things to note about the factor names themselves. Firstly, Asia was the only continent in which the word "withdrawal" (in the sense of withdrawing from people) was used in the labeling of factors and 50% of the studies contained a mention of "neglect of work/duty" whereas only one other study in all the other papers around the world mentioned such a construct (Tsimtsiou et al., 2014). From a cultural perspective, these two differences may be because of the collectivist nature of most Asian communities. Being an active part of society is very important and highly valued, therefore withdrawing from the group or neglecting one's role in the community is seen as a sign of a problem. On the other hand, in the European studies, the word "emotion/mood" was used in the factor labeling of almost 60% of the studies, whereas it was not used at all in the factor labeling of Asian studies. This could be because the personal, internal experience of the individual receives more attention in European countries, which tend to be more individualistic, than it does in Asian countries (Hofstede, 1983). There is not enough data to make conclusions in this regard, therefore more research is recommended to explore these potential cultural differences more in depth.

There was too much variation in the results among studies to make reliable conclusions about broader geographical regions, and since it is unwise to rely on any single study to accurately represent a population, we instead examined countries for which two or more IAT factor analysis studies had been conducted in order to see if results were replicated, which would add support to the theory that cultural context influences Internet behaviours. We identified the three countries from the meta-analysis in which two or more studies were conducted – South Korea, Italy, and Turkey – and we compared their findings to see how closely the results were replicated.

In the South Korean studies the findings were similar: both studies had a primary factor centered around time management, with almost all the items from Sung, Shin and Cho (2014) Factor 1 included in Lee et al. (2013) Factor 1. Both studies also had a Withdrawal factor, with all of the items in Lee et al. Withdrawal factor included in Sung et al.'s Withdrawal Factor. The studies had different samples, with Sung et al. using teenage participants aged 13-15 and Lee et al. using university students. This age difference may be an important contributor to the findings that they did not share such as that Sung et al. found four factors and Lee et al. found three.

The three studies from Italy (Faraci, Craparo, Messina & Severino, 2013; Fioravanti & Casale, 2015; Servidio, 2017) all showed nearly the same findings. Each study used university students in the sample (Fioravanti & Casale used university students as well as high school students), and each had a two factor structure with the primary and secondary factors containing almost the same items across all studies; one factor was related to emotional/psychological problems and the other factor was related to loss of control of time and interference with daily life.

The results from Turkey (Boysan et al., 2017; Kaya, Delen & Young, 2016) were different: although both studies explained nearly the same percent variance (46% in Kaya et al. and 45% in Boysan et al.), Boysan et al. found a unidimensional structure whereas Kaya et al. identified four separate factors. As the samples were very similar culturally and demographically, differences may be attributed to the fact that different statistical analyses were used.

Hypothesis

Considering that two of the IAT factor analysis replication studies within-country showed very similar results (Korea and Italy) and one replication study did not show similar results as the original (Turkey), we wanted to further investigate whether IAT factor analysis results would be replicated within-country. Considering that IAT factor analyses are so different between countries with number of factors found ranging from 1 to 5, our hypothesis was that if IAT factor analysis studies within-country show very

Table 1. *Chart of International IAT Factor Analysis Studies.*

	Population Studied	No. of Participants	No. of Factors	Total Variance (%)	Name of Factors (and number of items)
East Asia					
1. South Korea: Sung et al. (2014)	Middle school students	1,722	3	50.0	1. Time management (6), withdrawal behaviours (8), neglect work (4). 2. Lack of control (8), neglect of duty (7), problematic use (2), social relationship disruption (2), e-mail primacy (1). 3. –. 4. Neglect of duty (6), online dependence (4), virtual fantasies (5), privacy and self-defense (3). 5. Excessive Internet use (9), dependence (5), withdrawal (3), avoidance of reality (3). 6. Withdrawal and social problems (9), time management and performance (6), reality substitute (3).
2. Malaysia: Guan et al. (2015)	College medical students	162	5	64.0	
3. India: Dhir et al. (2015)	High school students	1,914	1	41.4	
4. Bangladesh: Karim et al. (2014)	University students	172	4	55.7	
5. South Korea: Lee et al. (2013)	University students	279	4	58.9	
6. China: Lai et al. (2013)	Middle and high school students	844	3	-	
Europe					
1. Italy: Servidio (2017)	University students	659	2	41.0	1. Interpersonal, emotional, and obsessive conflict as a result of Internet use (11), online time management and compromised personal well-being (7). 2. –. 3. Mood (8), relationship (4), responsibilities (5), duration (3). 4. Mental disorder (11), time management disorder (9). 5. Emotional and cognitive preoccupations with the Internet and social consequences (11), loss of control and interference with daily duties (9). 6. Emotional investment (11), time management and performance (8). 7. Psychological/emotional conflict (10), time management (6), neglect work (4). 8. –. 9. Emotional and cognitive preoccupation with the Internet (11), loss of control and interference with daily life (7). 10. –. 11. Preoccupation (12), loss of control (8). 12. Emotional/psychological conflict (9), time management issues (5), mood modification (6).
2. Turkey: Boysan et al. (2016)	College students	453	1	44.9	
3. Turkey: Kaya et al. (2016)	University students	407	4	46.0	
4. Polish: Hawi et al. (2015)	College students	1.245	2	44.6	
5. Italy: Fioravanti et al. (2015)	Students aged 14-26	840	2	45.6	
6. Spain: Fernandez-Villa et al. (2015)	College students	851	2	55.0	
7. Greek: Tsimtsiou et al. (2014)	College medical students	151	3	55.3	
8. Portugal: Pontes et al. (2014)	High school and university students	593	–	–	
9. Italy: Faraci et al. (2013)	College students	485	2	42.2	
10. Portugal: Conti et al. (2012)	University students	77	–	–	
11. Germany: Barke et al. (2012)	College psychology students	1,041 online, 841 offline	2	46.7 online, 42.0 offline	
12. United Kingdom: Widyanto et al. (2011)	General population (Internet users)	12.225	12.3	12.56,3	
North America					
1. Canadá: Watters et al. (2013)	High school students	1,948	–	–	1. –. 2. Dependent use (12), excessive use (8).
2. USA: Jelenchick et al. (2012)	University students aged 18-20	215	2	91.0	
South America					
1. Colombia: Puerta-Cortés et al. (2012)	General population (Internet users)	1,117	3	47.8	1. Consequences for the use of the Internet (7), cognitive and emotional dimension (10), control of time (3).
Africa					
Middle East Asia					
1. Pakistan: Waqas et al. (2018)	College students (medical and dental)	522	1	34.1	1. –. 2. Personal activities disorder (11), emotional and mood disorder (6), social activities disorder (3). 3. Excessive use (6), loss/suffer (6), attached to (4), impaired social relations (4). 4. –.
2. Persia: Mohammadsalehi et al. (2015)	College students (medical sciences)	254	3	55.8	
3. Jordan: Ahmad et al. (2015)	University students	587	4	52.7	
4. Lebanon: Hawi (2013)	Middle and High school students	817	1	40.6	

similar results, this adds support to the claim that culture influences IAT behaviours. We selected three countries in which IAT factor analyses had been conducted previously and which are substantially diverse in geographic region, socioeconomic status and culture: USA (Midwest region), Spain (Barcelona) and Colombia (Ibagué).

Why USA, Spain and Colombia?

Each of the countries used in this study is special in Internet use research; the USA is one of the top three countries in the world as regards Internet penetration, Colombia has Internet use rates that are representative of all of South America as its Internet penetration rates are exactly at the average level of all Latin American countries (Economic Commission for Latin America and the Caribbean, 2017), and Spain is representative of European Internet use because its penetration rates are exactly at the average of all European countries ("Netherlands Leads Europe," 2018). We conducted IAT factor analyses for a sample of university students in each country to see if the results would be similar to the results of the factor analysis study previously done in that country. We used university students because the previous studies were conducted with university samples (The previous Colombian study was conducted with a general populations sample, however the average age was 20.93, and the vast majority of participants were university-age).

Methods

Participants

The participants were 1,516 university students from 3 universities, one in each country, who filled out an online questionnaire. After dropping the incomplete responses, 451 were left from the USA, 467 from Spain and 355 from Colombia. The American participants were 64.9% female, the Spanish participants were females 79.2% female and the Colombian students were 64.2% female. The mean age of American students was 19.59 (SD = 1.43; range 18-30), the mean age of Spanish students was 21.45 (SD = 2.41; range 18-30), and the mean age of Colombian student was 19.95 (SD = 2.00; range 18-30). The Spanish participants were slightly older than the other two groups ($F=111.05$; $p<.001$).

Measures

Internet Addiction Test (Young, 1998): a 20-item self-report questionnaire based on the DSM-IV criteria for pathological gambling. Respondents are asked to rate items on a 5-point Likert scale covering the degree to which their Internet use affects their daily routine, social life, productivity, sleeping pattern, and feelings. The minimum score is 20 and the maximum is 100. The higher the score, the greater the problems caused by their use of the Internet. Young suggested that a score ranging from

20 to 39 is a typical online user who has no problems with their Internet usage. A score ranging from 40 to 69 signifies frequent problems due to Internet usage. Finally, a score ranging from 70 to 100 signifies that the Internet is causing significant problems for the user. The IAT was designed as a unidimensional instrument, however, subsequent studies have found between one and six factors (see Moon et al. 2018). In online applications, reliability varies between 0.83 and 0.91 (Korkeila, Karlaas, Jääskeläinen, Vahlberg & Taiminen, 2010; Barke, Nyenhuis & Kröner-Herwig; Jelenchik, Becker & Moreno, 2012). The reliability (Cronbach's Alpha) for the present study was .91.

Procedure

In the universities in Spain and Colombia, students were emailed by the researchers requesting participation in the study, and participants were recruited via the Subject Pool website in the United States university (used by students to find and participate in research projects). Participants who chose to complete the study clicked the link provided to them either from the email or the Subject Pool website (USA) and were redirected to the questionnaires on the web host Qualtrics. When a participant accessed the questionnaire, they were presented with a document explaining the study and were asked to provide their informed consent in order to continue. No identifying information was collected from the participants and their responses were encoded as a set of random numbers and letters. IP numbers were not tracked. Some data collected were not related to the Internet focus of the current study and will therefore be presented elsewhere.

Data Analysis

Principal components analysis with Varimax rotation was used for factor extraction. Prior to exploratory factor analysis, data were inspected to ensure items were significantly correlated, using Bartlett's Test of Sphericity. In addition, in order to evaluate whether items shared sufficient variance to justify factor extraction, KMO's Test of Sampling Adequacy was used. Factor loadings resulting from the Varimax rotation were evaluated using the threshold of 0.40. If an item loads on more than one factor, then it is bonded with the factor with the highest loading unless there is a compelling reason to attach it to another factor in order to improve factor interpretability. The IAT factor structure that emerged from exploratory factor analysis was verified using confirmatory factorial analysis (CFA Least Square, which is applicable when data do not meet the assumption of multivariate normality, was selected as the procedure for estimation). Model fit was evaluated based on the comparative fit index (CFI), Tucker-Lewis index (TLI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR). CFI and TLI > .90, RMSEA < .08 and SRMR <

.1 typically reflect acceptable fit, and CFI and TLI > .95, RMSEA < .06 and SRMR < .08 indicate excellent fit (Brown, 2006). In addition, descriptive and correlational analyses were performed. To test country and sex differences in the study, a bifactorial (sex by country) analysis of variance (General Linear Model procedure) was performed. When main effects were significant, post-hoc comparisons (with Bonferroni adjustment for multiple comparisons) were computed. SPSS 19.0 was used for descriptive statistics, General Linear Model and exploratory factor analysis. EQS 6.1 (Bentler, 2006) was used for CFA.

Results

Descriptive analysis

In the total sample, 72% of respondents showed scores ranging from 20 to 39, meaning no problems with their Internet usage. 27% scored from 40 to 69, meaning frequent problems due to Internet usage, and 1% scored from 70 to 100, for whom the Internet may be a significant problem. Regarding country differences, Spanish participants showed lower scores on the IAT (Mean = 33.50; DT = 9.44) than USA participants (Mean = 36.82; DT = 10.82) and Colombian participants (Mean = 36.70; DT = 11.05). Differences were statistically significant ($F = 12.55$; $p = .000$).

Factor Analysis

The KMO's Test of Sampling Adequacy was .94 and Bartlett's Test of Sphericity ($\chi^2 = 9490.9$) was significant ($P = .000$), indicating that the IAT items were appropriate for a factor analysis. For both USA and Spain, this criterion resulted in a three-factor solution whereas in the case of Colombia there were two underlying factors. Table 1 shows the factor loadings of the items for the USA, Spain, and Colombia respectively.

For the USA, the three factors explained 51.91% of the variance (see Table 1). Factor 1 (twelve items) accounted for 25.65 % of the variance and appeared to measure psychological conflict. Factor 2 (five items) accounted for 16.67% of the variance and appeared to measure inability to control use. Factor 3 (three items) accounted for 9.66% of the variance and appeared to measure social and work dysfunctions. The fit of this model was excellent (CFI= .985; TLI= .983, RMSEA= .027; SRMR= .042). For Spain, the three factors explained 46.68% of the variance. Factor 1 (7 items) accounted for 18.16% of the variance and measured social/work dysfunctions and difficulties with time management. Factor 2 (8 items) accounted for 15.55 % of variance and measured psychological conflicts related to Internet use. Factor 3 (4 items) accounted for the 13.14% of variance and measured affective reaction. Item 14 did not charge at any factor. The fit of this model was excellent (CFI= .989; TLI= .987, RMSEA= .023; SRMR=

.040). For Colombia, the two factors explained 54.7% of the variance. Factor 1 (11 items) accounted for 30.72% of variance and measured psychological conflicts. Factor 2 (8 items) accounted for 23.97% of variance and measured inability to control Internet use. Item 7 didn't charge at any factor. The fit of this model was acceptable (CFI= .978; TLI= .975, RMSEA= .033; SRMR= .049).

In Summary

Below we have included the simplified and full name of the factors for each country:

• **USA:**

- **Factor 1:** Emotional Need (Satisfaction of Emotional Needs and Dependence): 3, 4, 5, 9, 10, 11, 12, 13, 15, 18, 19, 20.
- **Factor 2:** Loss of Control (Inability to Control use and Neglect of Important Activities): 1, 2, 14, 16, 17.
- **Factor 3:** Neglect of Duty (Neglect of Duties in Favour of the Internet): 6, 7, 8.

• **Spain:**

- **Factor 1:** Loss of Control (Inability to Control Use and Neglect of Duties): 1, 2, 6, 7, 8, 16, 17.
- **Factor 2:** Emotional Need (Satisfaction of Emotional Needs): 3, 4, 9, 10, 13, 18, 19, 20.
- **Factor 3:** Dependence: 5, 11, 12, 15.

• **Colombia:**

- **Factor 1:** Emotional Need (Satisfaction of Emotional Needs and Dependence): 3, 4, 9, 10, 11, 12, 13, 15, 18, 19, 20.
- **Factor 2:** Loss of Control (Inability to Control use and Neglect of Duties): 1, 2, 5, 6, 8, 14, 16, 17.

Discussion

Comparing the IAT factor analyses

When we compare our findings to the previous IAT factor analyses in the same countries, we see many similarities. We found three factors in the US sample: 1. Satisfaction of Emotional Needs and Dependence, 2. Inability to Control Use and Neglect of Important Activities and 3. Neglect of Duties in Favour of the Internet. The previous IAT factor analysis in the US (Jelenchick, Becker & Moreno., 2012) found two factors, titled 1. "Dependent Use" and 2. "Excessive use." When we compare our findings to theirs, we find that both studies have an identical Factor 1 and very similar Factor 2 (all the items from our study's Factor 2 were included in Jelenchick's Factor 2). The main difference was that the three additional items in Jelenchick's Factor 2 appeared as a separate Factor in our study – those items that related to neglect of work or studies in favour of the Internet. The shared items in the Emotional Need factor relate to dependence on the Internet for positive affect and preference for the Internet over reality. The shared items in the Loss of Control factor

Table 2. *Factor analysis of the IAT in the three countries.*

	USA			Spain			Colombia	
	1	2	3	1	2	3	1	2
Q1	-.013	.709	.342	.584	-.050	.398	.039	.767
Q2	.182	.569	.380	.725	.170	.260	.299	.731
Q3	.561	-.068	.355	.022	.435	-.001	.569	.131
Q4	.522	.090	.080	.193	.474	.120	.629	.303
Q5	.626	.146	.118	.250	.264	.464	.277	.673
Q6	.301	.336	.600	.707	.278	.081	.540	.555
Q7	-.087	.167	.661	.466	-.035	.260	.225	.253
Q8	.347	.232	.657	.725	.247	.006	.482	.612
Q9	.595	.139	.204	.207	.615	.177	.651	.349
Q10	.407	.349	.346	.165	.502	.286	.679	.356
Q11	.588	.403	.029	.245	.190	.649	.667	.368
Q12	.566	.425	-.050	.095	.083	.701	.626	.436
Q13	.697	.084	.016	.173	.538	.408	.713	.223
Q14	.246	.647	.104	.357	.353	.305	.355	.587
Q15	.732	.389	-.024	.215	.249	.715	.700	.377
Q16	.154	.806	.102	.680	.210	.251	.283	.707
Q17	.254	.688	.203	.655	.330	.112	.374	.651
Q18	.709	.194	.152	.407	.514	.123	.571	.488
Q19	.669	.225	.192	.100	.765	.099	.796	.211
Q20	.772	.093	.084	.114	.554	.450	.812	.222

relate to inability to control time online and prioritization of Internet time over other tasks.

We found three factors in our Spanish sample as well: 1. Inability to Control Use and Neglect of Duties, 2. Satisfaction of Emotional Needs, and 3. Dependence. The previous IAT factor analysis in Spain (Fernández-Villa et al., 2015) found two factors titled: 1. “Emotional Investment” and 2. “Performance and Time Management.” When we compare our results to theirs, we again see similarities. Nearly all of the items in our Factor 2 were included in Fernández-Villa et al.’s Factor 1, although their Factor 1 had an additional 4 items, 3 of which composed our Factor 3. Additionally, our Factor 1 was almost identical to Fernández-Villa et al.’s Factor 2. Although the two factors are in switched positions for the two studies, their similarities are important to note; as in the US sample, one factor common in both studies was centered around psychological/emotional problems and the other common factor was centered around loss of control/time management problems. The shared items in the Emotional Need factor primarily related to dependence on the Internet for positive affect. The shared items in the Loss of Control factor related to inability to

control time online and neglect of important duties in favor of the Internet.

We found two factors in our Colombian sample: 1. Satisfaction of Emotional Needs and Dependence, and 2. Inability to Control use and Neglect of Duties. The previous IAT factor analysis in Colombia (Puerta-Cortés, Carbonell & Chamorro., 2012) found three factors, titled 1. “Consequences of Internet use,” 2. “Cognitive-Emotional Dimension” and 3. “Time control.” Once again, when we compare our findings to theirs, we see many similarities. Puerta-Cortés’ Factor 2 and our Factor 1 are nearly identical, with only one item difference. Puerta-Cortés’ Factor 1 also shares a majority of its items with our Factor 2. The shared items in the Emotional Need factor were nearly the same as those in the US sample, related to dependence on the Internet for positive affect and preference for the Internet over reality. The shared items in the Loss of Control factor related to excessive time spent online and neglect of important duties in favour of the Internet.

Considering that all of our IAT factor analysis replications showed very similar findings to the previous studies conducted in those countries, our hypothesis was supported - since within-country replication of IAT factor analyses are similar whereas between-country analyses around the world often differ, it appears that culture has an influence over how problematic Internet use manifests. We must therefore keep culture in mind when we research Internet use and we should conduct further research on how culture influences Internet behaviours. However, it is also important to note that in all three countries we studied, we found the same two fundamental categories present, indicating a universal pattern that underlies problematic Internet use.

The Shared Factors and Implications for IA Research

All of our samples and the studies we compared them to contained one of their top two factors focused on loss of control/time management problems and the other of the top two factors focused on emotional/psychological problems, although these factors manifested somewhat differently between countries. This finding confirms the finding from Moon et al.’s meta-analysis (2018) which determined that when considering only the studies that strictly follow the factor analysis guidelines, the IAT most likely has one or two real factors. Two items in the Loss of Control factor were shared among all six studies: questions 1 and 2. Six items in the Emotional Need factor were shared among all six studies: questions 3, 9, 10, 13, 19 and 20.

The Italian studies all showed these same two factors and so did the Korean studies (despite the fact that Lee et al. (2012) found four factors and Sung et al. (2014) found three). Therefore, we can conclude that although there are differences in the IAT factor analysis findings

around the world with factors ranging from 1-5 in the most recent meta-analysis (Moon et al., 2018), there are usually two primary factors that emerge: one related to emotional problems/dependence and another related to loss of control/time management problems regarding the Internet. Future diagnosis and treatment efforts should focus on these two factors if more detailed information is not available about the specific population being studied. Additionally, considering the plausibility of a two factor structure, future studies using modern statistical analysis, such as Exploratory Structural Equation Modeling (ESEM; Asparouhov & Muthén, 2009), that allows for the possibility of cross-loadings (i.e., that an item can be an indicator of two latent factors), should be used to test the structure and the cross-cultural invariance of the IAT.

On the topic of the disputed existence of Internet Addiction as a disorder, judging from the two most common factors identified in the IAT, it appears that there are two primary underlying components of problematic Internet use – impulse control problems and the presence of unsatisfied emotional needs that the Internet is employed to satisfy. It would appear that the comorbidity of these two components manifests as problematic Internet use in the modern technological age. With this in mind, it may be more beneficial from a diagnostic and treatment perspective to focus on these two cognitive-emotional components rather than on “Internet Addiction” as a single construct, which continues to be a somewhat vague concept with various interpretations.

As seen from the factor analyses conducted around the world, although the IAT may have been designed as a unidimensional measure, this unidimensionality has not been proven. Therefore, perhaps Internet Addiction should also not be considered as a single construct, but rather problematic Internet behaviours should be viewed as the modern-day manifestation of a combination of cognitive-emotional disorders (Starcevic, 2010) that manifested in different ways before the existence of the Internet, but maintain the same basic constructs independently of it. As “Internet Addiction” has been difficult to describe psychometrically due to the instability in diagnostic measures, since problematic Internet use presents differently in people around the world, and since clinical cases of Internet addicts are scarce, perhaps there is insufficient support for the diagnosis of Internet “addiction” at this time. It may benefit the prevention, diagnosis and treatment of those suffering from problematic Internet use more if research explores what cognitive-emotional profiles are susceptible to Internet use problems and why, what motivations problematic users have for their use, and what benefits people receive from their Internet use which reinforces it so much that it leads to its prioritization over other aspects of daily life (Grande, Martínez & Fernández, 2019; Kardefelt-Winther, 2014).

Limitations

This study is not without limitations. Firstly, the IAT is a self-report measure which means results may not be fully accurate, as respondents often have a mistaken perception of their own Internet behaviours. Secondly, in all samples the participants were university students, which means caution should be taken when generalizing results to a more diverse population. Third, as factorial invariance has not been verified, conclusions about differences between countries must be taken with caution. There exists the possibility that the factorial structure of the IAT may not be comparable across countries because there is not a common structure.

Regarding the comparative analysis of Moon et al.’s IAT meta-analysis (2018), this paper did not aim to analyze the statistical procedures associated with each study included in that paper, therefore some of the differences found between or within countries could be attributed to different statistical procedures used, not culture.

One must also take into account how the passage of time may have affected the effectiveness of the IAT to measure problems with Internet use. The IAT was developed in 1998 before the extensive use of the Internet around the world. These past 22 years of development have probably affected the relevance of the questionnaire and the importance of certain items. Therefore, it would benefit the literature on this subject if the IAT, being the most popular questionnaire in the field, was updated to better reflect Internet behaviours that are popular and problematic today.

Conclusion

The findings of our three factor analysis studies, in the USA, Spain and Colombia, showed similar results as the previous findings in those same regions. In the USA we found 3 factors: 1) Emotional Need (Satisfaction of Emotional Needs and Dependence), 2) Loss of Control (Inability to Control use and Neglect of Important Activities) and 3) Neglect of Duty (Neglect of Duties in Favour of the Internet). In Spain we also found 3 factors: 1) Loss of Control (Inability to Control Use and Neglect of Duties), 2) Emotional Need (Satisfaction of Emotional Needs), and 3) Dependence. And in Colombia we found 2 factors: 1) Emotional Need (Satisfaction of Emotional Needs and Dependence), and 2) Loss of Control (Inability to Control Use and Neglect of Duties). Spanish participants were found to have the lowest IAT scores among the three countries studied, consistent with a previous study by Laconi et al. (2018).

All factor analyses contained a factor related to emotional/psychological problems and another factor related to loss of control/time management problems, thereby suggesting that impulse control problems and

unfulfilled emotional needs are the most important components in the development of problematic Internet use around the world. We therefore suggest a move away from the addiction framework in problematic Internet use research, which puts the focus on the Internet as a kind of addiction-causing entity like a drug, and instead shift the focus onto the motivations and gratifications of Internet users when engaging with the Internet, and re-conceptualizing PIU as the technological age's manifestation of an interaction between impulse-control problems and unfulfilled emotional needs.

Conflict of interests

The authors declare no conflict of interest.

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Behavioral and neuroimmune characterization of resilience to social stress: Rewarding effects of cocaine

Caracterización conductual y neuroinmune de la resiliencia al estrés social: Efectos reforzantes de la cocaína

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Abstract

Preclinical studies have shown that social stress increases vulnerability to the reinforcing effects of cocaine. However, the results are not always homogeneous, revealing a subpopulation that does not show a preference for cocaine. Thus, the main aim of the present study was to characterize the behavioral profile of resilient mice to the stress-induced rewarding effects of cocaine using an animal model of repeated social defeat stress (SD). To this end, male adult mice of the C57/BL6 strain were exposed to SD and, three weeks later, assessed using the Conditioned Place Preference paradigm induced by an ineffective dose of cocaine (1mg/kg). Afterwards, the striatal levels of interleukin 6 were measured, as social stress usually induces a neuroinflammatory response. Control mice did not develop CPP, while defeated mice did overall develop a preference for the drug-paired compartment. Based on the conditioning score that they exhibited, the SD sample was subdivided into resilient (did not develop preference) and susceptible mice (developed preference). During the SD sessions, resilient animals showed less flight and submission behaviors than susceptible mice and they presented attack behaviors towards the residents, thereby showing their resistance to being defeated. There were no differences in the neuroinflammatory response, probably due to the long time elapsed after the last SD session. These results suggest that an active coping style to social stress may be decisive in protecting the individual from developing an addiction.

Keywords: Resilience; cocaine; social stress; coping; interleukin 6.

Resumen

Numerosos estudios preclínicos han demostrado que el estrés social incrementa la vulnerabilidad a los efectos reforzantes de la cocaína. Sin embargo, los resultados obtenidos no son homogéneos, observándose siempre una subpoblación que no muestra dicho incremento. Utilizando el modelo de derrota social (DS) repetida en ratones, en este trabajo hemos querido caracterizar conductualmente a los ratones resilientes al incremento de los efectos reforzantes de la cocaína inducido por el estrés social. Utilizamos ratones adultos macho de la cepa C57/BL6 a los que sometimos al protocolo de DS repetida y tres semanas más tarde, realizamos el Condicionamiento de Preferencia de Lugar (CPL) inducido por una dosis no efectiva de cocaína (1mg/kg). Una vez finalizado este procedimiento se midieron los niveles estriatales de interleucina 6, ya que el estrés social produce una respuesta de neuroinflamación. No se observó CPL en los ratones controles, pero los animales derrotados tomados en conjunto desarrollaron preferencia. Sin embargo, esta muestra se pudo dividir en ratones resilientes (no desarrollaron preferencia) y susceptibles (presentaron CPL). Durante las derrotas sociales, los animales resilientes pasaron menos tiempo en las conductas de huida y sumisión que los catalogados como susceptible y presentaron conductas de ataque hacia el ratón residente, manifestando por tanto resistencia a ser derrotados. No se observaron diferencias en la respuesta de neuroinflamación, probablemente debido al largo periodo de tiempo transcurrido desde la última derrota social. Nuestros resultados sugieren que un estilo de afrontamiento activo al estrés social va a ser determinante en la protección del sujeto a desarrollar un trastorno por uso de drogas.

Palabras clave: Resiliencia; cocaína; estrés social; afrontamiento; interleucina 6.

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Exposure to stress is an environmental factor which has been directly related to the onset of psychiatric disorders such as depression, anxiety or substance abuse disorders. However, not all subjects are equally vulnerable to the consequences of stress (Krishnan et al., 2007; Lutter et al., 2008). Recent years have seen a great increase in the study of the phenomenon of stress resistance. Resilience is defined as the ability of individuals to maintain adaptive psychological and physical functioning, and to avoid the occurrence of mental illness when exposed to chronic or high intensity stress (Charney, 2004), with the mechanisms responsible for resilience promoting an appropriate and non-pathological response to stress (Chmitorz et al., 2018). In recent years, researchers have begun to identify the psychological and biological characteristics of individuals resistant to social stress (Pfau & Russo, 2015). For example, there are a number of behaviors and psychological traits, such as cognitive flexibility, active coping, optimism, or the feeling of belonging to a group, which can favor a resilient response in humans (Wood & Bhatnagar, 2015; Laird, Krause, Funes & Lavretsky, 2019). However, most of these studies have focused on resilience to the development of depression, anxiety or post-traumatic stress disorder (Russo, Murrough, Han, Charney & Nestler, 2012; Krishnan, 2014; Finnell & Wood, 2016), with very few studies assessing resilience to escalating drug use.

Most preclinical studies on stress resilience use the repeated or chronic model of social defeat (SD). This model has great ethological and translational relevance since the most common form of stress experienced by humans originates in their social environment. This model is based on the resident-intruder paradigm, in which a male (intruder) animal is introduced into the territory of another (resident), who will confront and dominate the first (Miczek, Yap & Covington, 2008; Chaouloff, 2013). Numerous studies have shown that repeated SD increases the use of cocaine and alcohol (Miczek et al., 2008; Burke & Miczek, 2014; Rodríguez-Arias et al., 2016, 2017; Montagud-Romero et al., 2016a; Ferrer-Pérez et al., 2018a). This increase has been associated with a neuroinflammatory response since defeated animals have shown an increase in inflammation markers such as cytokines or chemokines, greater blood-brain barrier permeability as well as activation of the microglia (Rodríguez-Arias et al., 2017, 2018; Ferrer-Pérez et al., 2018a).

As with studies on humans, in most preclinical studies the development of resilience to the development of depression or anxiety has been assessed in mice exposed to repeated SD. In these studies, 24 hours after finishing the final SD, animals are categorized as resilient or susceptible depending on their behavior in a social interaction test. Those maintaining higher social contact time are resilient, while the susceptible show social avoidance (Krishnan et

al., 2007; Russo et al., 2012; Golden, Covington, Berton & Russo, 2011; Henriques-Alves & Queiroz, 2015; Zhan et al., 2018). Some studies have confirmed that among the factors that mediate resilience is a lower neuroinflammatory response in resilient animals (Wang et al., 2018).

These results have led us to propose as a main objective of the present study the characterization of those mice exposed to repeated SD which are resilient to the long-term increase of the rewarding effects of cocaine. To this end, three weeks after the final SD, we carried out the Conditioned Place Preference paradigm (CPP) with a sub-threshold dose of cocaine, a dose which is not effective in control animals but which does induce preference in those socially defeated (Montagud-Romero et al., 2016a, 2016b). Behavioral characterization was carried out by assessing the behavior of animals showing resilience during SD. Finally, once the behavioral procedure was completed, we studied the neuroinflammatory response by measuring the striatal levels of interleukin 6 (IL6).

Material and Methods

Animals

We used 43 adult male mice of the C57BL/6 strain, with 28 as experimental subjects (social defeat) and 15 as a control group (exposed only to exploration). Another 10 male albino mice of the OF1 strain were also used as resident mice in the repeated SD. All mice were purchased from Charles River Laboratories (Barcelona, Spain.). The experimental mice arrived on postnatal day (PND) 21 and were housed in groups of 4 in 26x20x13 cm plastic cages. The 10 OF1 strain mice were housed in isolation for use as residents during repeated SD. The environmental conditions were a temperature of $21 \pm 2^\circ\text{C}$ and a relative humidity of 55%. The mice were kept throughout the procedure in a 12-hour light/dark cycle (8:00-20:00) and with water and pellets *ad libitum*, except during behavioral tests. All procedures for the treatment and care of mice complied with national, regional and local laws and regulations in accordance with international community guidelines, as set out in *European Community Council Directives* (86/609/EEC, 24 November 1986). The study was carried out in the Drug Addiction Psychobiology Research Unit of the Department of Psychobiology, Faculty of Psychology, University of Valencia. It was approved by the Animal Experimentation and Welfare Ethics Committee of the University of Valencia 2017/VSC/PEA/00224-A1507028485045.

Pharmacological treatment

The animals were subjected to drug treatment only during the CPP procedure. Mice in both the control and the experimental group were injected intraperitoneally with a 1 mg/kg dose of cocaine dissolved in 0.9% NaCl

solution. This is considered a sub-threshold dose showing no preference of place in the CPP test with standard mice (Maldonado, Rodríguez-Arias, Castillo, Aguilar & Miñarro, 2006; Vidal-Infer, Aguilar, Miñarro & Rodríguez-Arias, 2012), while mice exposed to repeated SD do develop preference (Rodríguez-Arias et al., 2017).

Sample collection

To obtain samples we followed the procedure of previous studies (Ferrer-Pérez et al., 2018b). Mice were killed by cervical dislocation and subsequently decapitated. Brains were quickly removed and the striatum dissected after the procedure described by Heffner et al. (Heffner, Hartman & Seiden, 1980) and kept on dry ice until stored at -80° C.

Before determining IL-6 levels, the brains were homogenized and prepared following the procedure described by Alfonso-Loeches et al. (2010). The striata were homogenized as 250 mg of tissue/0.5 ml of cold lysis buffer (1% NP-40, 20 mM Tris-HCl, pH 8, 130 mM NaCl, 10 mM NaF, 10 µg/ml aprotinin, 10 µg/ml leupeptin, 40 mM DTT, 1 mM Na₃VO₄ and 10 mM PMSF). Brain homogenates were kept on ice for 30 minutes and centrifuged at a speed of 11.519 x g for 15 minutes, after which the supernatant was collected and protein levels were determined by the Bradford assay (Thermo Fisher, ref: 23227).

Experimental design

Table 1 shows the experimental design of the present study in detail. All mice arrived at the laboratory aged 21 days. After three weeks of adaptation in the animal facility, at PND 47, the four SD sessions began. Three weeks after the final SD, we performed the CPP (three days of pre-conditioning, four days of conditioning and one day of post-conditioning). Finally, after completing the entire experimental procedure, the animals were killed to enable the collection of biological samples.

Apparatus and procedure

Social Defeat

The SD protocol carried out in this study has been previously validated and described in detail (Montagud-Romero et al., 2016a; Rodríguez-Arias et al., 2017; Ferrer-Pérez et al., 2019). Repeated SD consists of four 25-minute sessions at 72-hour intervals, on postnatal days 47, 50, 53 and 56. The repeated SD session consists of three phases. In the first phase, the intruder is introduced into

the resident's cage for ten minutes, where it is protected from the attacks, but not threat, of the resident by means of a wire partition. In the second phase, the partition is removed and confrontation is allowed for five minutes. In the third and last phase, the partition is replaced for a further ten minutes.

The repeated SD sessions were recorded with a video camera to enable assessment of the intruder animal's flight, submission and attack behaviors, and the resident's threat and attack behaviors. In the repeated SD with the 15 control mice, a procedure similar to that described above was used, but without the presence of the resident mouse. After completing the paradigm, the analysis of the encounters was carried out using a computer program with which the time spent performing different behaviors can be recorded (Martínez, Miñarro & Simón, 1991).

Conditioned Place Preference (CPP)

CPP is a model based on classical or Pavlovian learning to assess the conditioned reward induced by different stimuli (Bardo & Bevin, 2000; Tzschentke, 2007). It has been widely used to study the reward effects of conditioned addictive drugs (Aguilar, Rodríguez-Arias & Miñarro, 2009; Yap et al., 2015; Rodríguez-Arias et al., 2016; Blanco-Gandía et al. 2017) since contextual stimuli can acquire secondary appetitive properties when combined with a primary enhancer (Tzschentke, 2007).

For CPP, we used 12 identical plexiglas cages with two compartments of equal size (30.7 cm long by 31.5 cm wide by 34.5 cm high), separated by a central gray area (13.8 cm long by 31.5 cm wide by 34.5 cm high). The compartments have different color walls (white vs black) and different floor texture (smooth in the black compartment and rough for the white). Animals are trained to associate one specific environment with the effect of the drug administered, and the other compartment with saline solution (García-Pardo, Rodríguez-Arias, Miñarro & Aguilar, 2017). A guillotine door separates each compartment from the central compartment. Each of the conditioning compartments has four photoelectric cells, while the central zone has six, to allow the position of the animal and the crossings from one compartment to the other to be recorded. The equipment is controlled by two IBM PC computers running MONPRE 2z software (CIBERTEC, SA, España).

CPP comprises three phases, carried out during the dark cycle and following an 'unbiased' procedure in terms of the spontaneous initial preference (Manzanedo, Aguilar,

Table 1. *Experimental Design.*

	Social Defeat/Exploration					CPP (1mg/kg cocaine)			Sample collection
	1th	2th	3th	4th	3 weeks	Pre-C test	Conditioning	Post-C test	
PND	47	50	53	56		76 - 78	79 - 82	83	84

Rodríguez-Arias & Miñarro, 2001). During the first phase or pre-conditioning (Pre-C), the mice had free access to both compartments of the apparatus for 15 minutes (900s) each day for 3 days. On the third day, the time each animal spent in each compartment was recorded for 900s. Animals showing strong aversion (less than 33% of the session time) or strong preference (more than 67%) for any compartment were excluded from the procedure. In the present experiment, a total of two animals were excluded for not meeting the established criteria. Compartment allocation was counterbalanced. One of the compartments was chosen for association with cocaine in such a way that, within each group, half the animals received the cocaine in the least preferred place and the other half in the most preferred, and compartment color was also balanced. There should be no significant differences in the time that animals spend in the compartment associated with the drug or vehicle in the pre-conditioning phase. This measure is of great importance for the experimental procedure as it helps to avoid any preference bias before starting the experiment.

In the second phase (conditioning), the animals were conditioned with 1 mg/kg of cocaine through four associations with the compartment allocated after Pre-C. It has been observed that 1 mg/kg is a sub-threshold dose, i.e., a dose that does not lead to the acquisition of CPP, unless other variables such as stress or behavioral traits are manipulated (Vidal-Infer et al., 2012; Arenas et al., 2014; Montagud-Romero et al., 2014; Rodríguez-Arias et al., 2016; Blanco-Gandía, Montagud-Romero, Aguilar, Rodríguez-Arias & Miñarro, 2018). The animals received two injections (cocaine and vehicle) each day: a saline administration before being confined to the non-associated compartment for 30 minutes, and after an interval of four hours they received cocaine before being confined to the compartment associated with the drug for 30 min. The central area was not used during conditioning and access to it was blocked by guillotine doors.

During the third phase, post-conditioning (Post-C), on the 8th day of the procedure, the guillotine doors separating both compartments were removed and the time that the mice spent in each compartment, without any treatment, was recorded for 900s. The difference in seconds between the time that the animals remained in the compartment associated with the drug during the Post-C test and the time they spent during the Pre-C test is a measure of the degree of conditioning induced by the drug (*Conditioning Score*). If this difference is positive, then the drug has induced a preference for the drug-paired compartment, while the opposite indicates the induction of an aversion. Once CPP was completed, the defeated animals were divided into resilient or susceptible. Those who exhibited no increase in preference for the cocaine-

associated compartment were considered resilient and those whose preference did increase were susceptible.

ELISA IL-6 assay

To determine the concentration of IL-6 in the striatum, we use a mouse IL-6 ELISA kit from Abcam (Ref: ab100712) and followed the manufacturer's instructions. To determine absorbance, we use an iMark microplate reader (Bio-RAD) controlled by Microplate Manager 6.2 software. The optical density was read at 450 nm and the final results were calculated using a standard curve, expressed as pg/mg for tissue samples. The sensitivity of the test is <2 pg/mg. All samples were analyzed in duplicate.

Data analysis

To confirm the effect of repeated SD on CPP, univariate ANOVA was performed on the *Conditioning Score* data with the inter-subject variable 'Stress' with two levels: Exploration and Social Defeat. A K-means cluster analysis was performed using the *Conditioning Score* values to separate the animals into Resilient and Susceptible subgroups. After this division, we performed a new univariate analysis with the three level inter-subject variable 'Group' (Exploration, SD Susceptible and SD Resilient). The same analysis was applied to the striatal levels of IL-6 data. The results obtained in the ethological analysis of SD were analyzed using a two-way ANOVA with the two level inter-subject variable 'Group' (Resilient and Susceptible), and the intra-subject variable 'Defeat' of 2 levels: SD1 (first session) and SD4 (fourth session of social defeat). Post-hoc analyses were performed using the Bonferroni fit test, taking $p < 0.05$, $p < 0.01$ and $p < 0.001$ as significance intervals. The Pearson correlation coefficient was also calculated to determine possible relationships between the Flight variable and *Conditioning Score* of all animals performing repeated SD.

Results

Only susceptible animals develop CPP

Regarding the CPP *Conditioning Score* (Figure 1a), the ANOVA showed a significant effect for the Stress variable [$F(1,36) = 7.147$; $p < 0.05$], indicating that defeated animals spent significantly more time in the drug-associated compartment than non-stressed animals ($p < 0.05$).

Animals were classified as Resilient and Susceptible using K-means cluster analysis [$F(1,24) = 37.748$; $p < 0.001$]. When the group of defeated animals was divided into Resilient and Susceptible subgroups (Figure 1b), ANOVA showed a significant effect for the Group variable [$F(2,38) = 23.289$; $p < 0.001$]. Susceptible animals spent significantly more time in the drug-associated compartment compared to the other two groups ($p < 0.001$ in both cases). Figure 1c shows the individual scores of the three experimental

Conditioned Place Preference induced by 1 mg/kg of cocaine

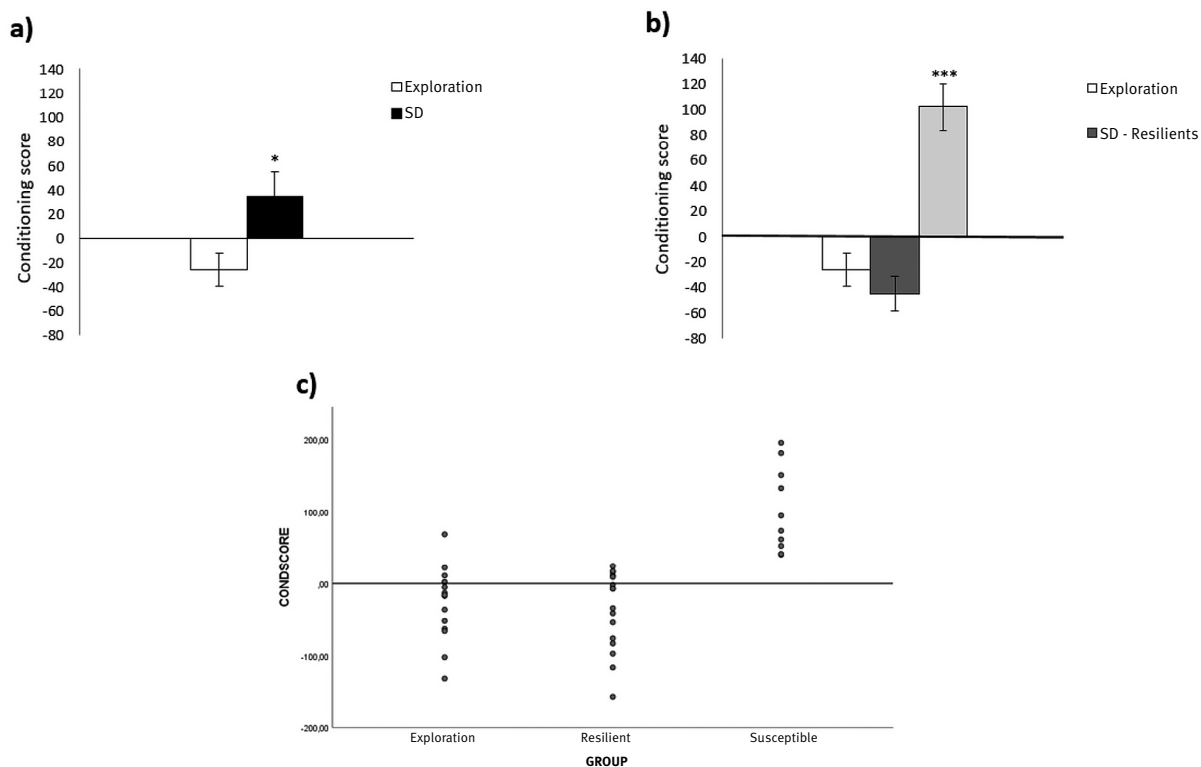


Figure 1. Effect of repeated SD on CPP acquisition induced by 1 mg / kg of cocaine in male C57/BL6 mice. The bars represent the difference in time (s) spent in the compartment associated with the drug before and after the conditioning sessions (*conditioning score*). (a) Treatment groups: Exploration and repeated SD. (b) After Post-C, the defeated animals were divided into Resilient and Susceptible subgroups according to their level of conditioning. * $p < 0.05$, significant difference compared to Exploration group. *** $p < 0.001$, significant difference compared to Exploration and SD-Resilient group. (c) Individual values of the *Conditioning Score* of the Exploration, Resilient and Susceptible groups.

groups performed by a simple distribution of the *Conditioning Score* data.

Resilient mice show a coping response to stress during SD

Table 2 shows the data relating to the behavior of the defeated mice during the first and fourth SD. In terms of Flight, ANOVA showed a significant effect for the Group variable [$F(1,24) = 16.578$; $p < 0.001$] given the significantly

less time SD-Resilient group animals spent behaving in this way ($p < 0.001$). With respect to Submission, ANOVA showed a significant effect for the interaction of Defeat x Stress variables [$F(1,24) = 4.163$; $p < 0.05$], with resilient animals spending less time behaving submissively during the first repeated SD session in comparison to susceptible animals ($p < 0.05$).

The presence of attack behavior by intruders against residents was also assessed. We only observed a trend in

Table 2. Results of repeated SD on intruders.

Resilient	Flight	Lat. Flight	Submission	Lat. submission	Attack	Lat. attack
SD1	32 ± 3***	15 ± 10	22 ± 6*	56 ± 6	3 ± 2	228 ± 33
SD4	32 ± 3***	3 ± 3	26 ± 7	89 ± 7	0 ± 0	300 ± 0
Susceptible	Flight	Lat. Flight	Submission	Lat. submission	Attack	Lat. attack
SD1	47 ± 7	6 ± 3	34 ± 8+	51 ± 8	1 ± 1	271 ± 30
SD4	51 ± 8	4 ± 8	12 ± 4	99 ± 4	0 ± 0	300 ± 0

Note. Behavior assessed during SD. Data presented as mean values in seconds ± SEM. * $p < 0.05$, *** $p < 0.001$ differences with respect to Susceptibles. + $p < 0.05$ differences with respect to SD4 (group-defeat effect).

the variable Defeat [$F(1,24) = 3.023$; $p = 0.095$], which tells us that intruders attacked more in the first SD session. We observed that, compared to 10% of Susceptibles, 25% of the animals classified as Resilient attacked their resident in the first repeated SD. No intruder animals attacked in the fourth repeated SD.

Finally, we assessed the relationship between the Flight behavior shown by all intruders by adding the first and

fourth meeting of the repeated SD and their *Conditioning Score* in the CPP to see if the time spent behaving in these ways could be an indicator of conditioning which would occur later (Figure 2). A significant Pearson correlation coefficient was only obtained between the time in Flight mode and the *Conditioning Score* ($r = 0.241$, $p < 0.05$). That is to say, the longer flight behavior continued during the

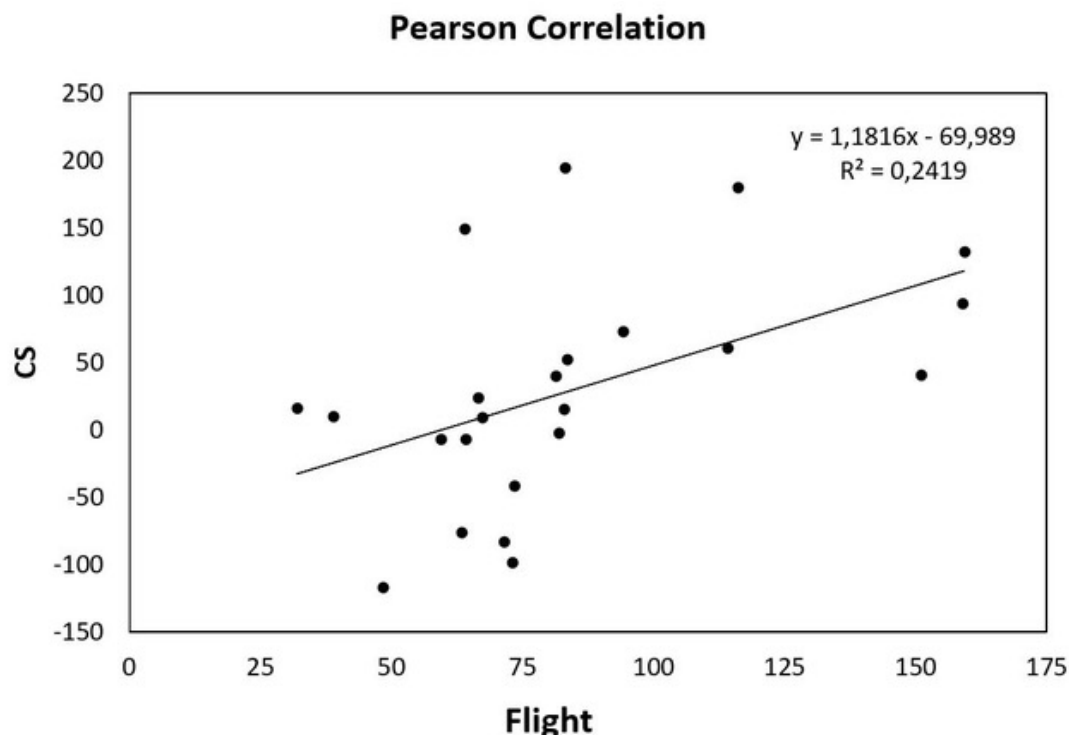


Figure 2. Regression plot for the Pearson correlation between flight during repeated SD and *Conditioning Score* (CS). The trend line represents the linear regression of data ($y = 1.1816x - 58.989$; $r^2 = 0.2419$).

SD encounters, the greater the preference for the drug in CPP.

Regarding Threat by residents (Table 3), the ANOVA yields an effect for Defeat [$F(1,24) = 6.535$; $p < 0.05$], indicating that residents threatened more in SD1 than in

Table 3. Results of repeated SD on residents.

Resident vs Resilient animals	Threat	Lat. threat	Attack	Lat. attack
SD1	36 ± 5#	10 ± 4	26 ± 5	4 ± 15
SD4	28 ± 5	4 ± 1	22 ± 3	4 ± 1
Resident vs Susceptible animals	Threat	Lat. threat	Attack	Lat. attack
SD1	36 ± 7#	6 ± 2	29 ± 9	37 ± 29
SD4	21 ± 4	8 ± 3	33 ± 4	3 ± 1

Note. Social interaction of Residents during the intruder-resident paradigm to induce SD. Data presented as mean values in seconds ± SEM. Differentiation between Residents attacking what were later categorized as Resilients and Susceptibles. # $p < 0.05$ with respect to SD4 (defeat effect).

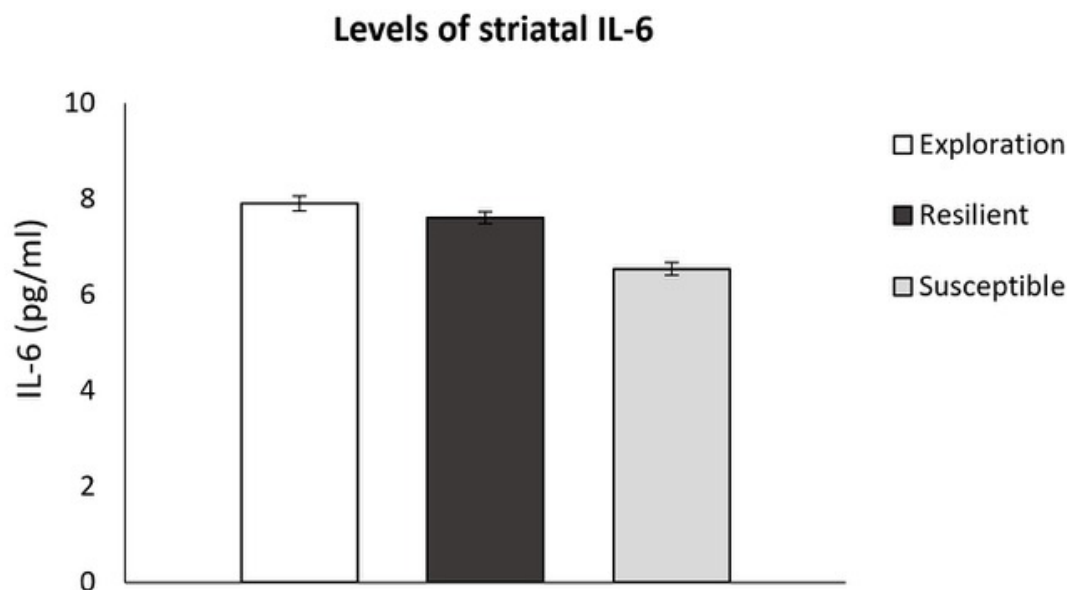


Figure 3. Striatal levels of IL-6. Effect of repeated SD on IL-6 levels in male C57/BL6 mice, taking into account the subdivision into resilient and susceptible. Data are shown as means $\pm$ S.E.M. (pg/ml).

SD4 ($p < 0.05$). However, there are no significant differences in the Group variable, implying that both Resilient and Susceptible were exposed to the same stress.

Striatal levels of IL6

The ANOVA for striatal levels of IL-6 (Figure 3) yielded no significant differences.

Discussion

The results of the present study confirm that repeated SD increases the rewarding effects of cocaine in CPP, but we have also demonstrated for the first time that the results obtained in stressed animals are not homogeneous. In defeated animals we can distinguish a susceptible population which has developed CPP with a non-effective dose of cocaine. However, there are also some defeated animals which behave like unstressed animals, that is, they are resilient without not developing CPP, although perhaps the most interesting result is that coping with SD is different in both types of animals. Resilients exhibit lower levels of flight and submissive behavior when facing the aggressor during SD. Flight behavior correlates positively with the analyzed results of CPP, i.e., the stronger the flight behavior, the more the animal will develop a preference for cocaine. Therefore, an active coping response, with less flight and submission during a social stressor, reduces sensitization to the rewarding effects of cocaine. These resilient mice also show attack behaviors against the resident, manifesting resistance to defeat, something that is not observed in any of the susceptible animals. The changes in IL-6 levels do

not differ between stressed or control animals, and no difference is observed between those that are resilient or susceptible. This may be because our study was carried out three weeks after the final SD.

Resilience and susceptibility to increased cocaine reinforcing effects

Our results confirm that the experience of repeated SD during adulthood induces a long-term increase in the conditioned rewarding effects of a sub-threshold dose of cocaine (1 mg/kg) since we assessed this three weeks after the final repeated SD. The CPP paradigm is widely used to assess the conditioned effects of drugs (Aguilar et al., 2009) and reflects their secondary motivational properties, as well as their potential for abuse (Tzschentke, 2007). Exposure to repeated SD may thus induce a long-term increase in the motivational value of cocaine, thereby increasing its potential for abuse in stressed subjects. Our results confirm numerous studies showing that SD in adolescent and adult mice increases the rewarding effects of cocaine using CPP (Arenas et al., 2016; Montagud-Romero et al., 2016a; Rodríguez-Arias et al., 2015, 2017; Ferrer-Pérez et al., 2018a), or self-administration of cocaine (Boyson, Miguel, Quadros, DeBold & Miczek, 2011; Holly et al., 2016; Newman, Leonard, Arena, Almeida & Miczek, 2018; Arena, Covington, Herbert, DeBold & Miczek, 2019).

This study actually goes further and shows that although as a whole in our population of defeated mice they all develop preference with a sub-threshold dose of cocaine, we can distinguish two types of subjects. Resilient mice, despite being stressed, do not respond to the conditioned

rewarding effects of cocaine (CPP). Conversely, susceptible animals do develop increased preference for the cocaine-associated compartment. Although there is a great deal of evidence linking stress to the development of addictive behaviors (Lüthi & Lüscher, 2014; Polter & Kauer, 2014; Gold, Machado-Vieira & Pavlatou, 2015), it has also been shown that there are subjects who develop good psychosocial competence in high-risk conditions such as child abuse or adverse socioeconomic status (McGloin & Widom, 2001; Hjemdal, Friberg & Stiles, 2012; Brody et al., 2013). However, there are practically no studies with animal models assessing the phenomenon of resilience to the development of vulnerability to drug use after exposure to a social stressor. A recent study using exposure to the smell of a predator as a stress model classified its mice as resilient and susceptible based on the presence of anxiety in the cruciform raised labyrinth and avoidance of the context associated with the smell (Brodnik, Double, España & Jaskiw, 2017). This study observed that susceptible mice showed increased motor and dopaminergic effects of cocaine as well as a greater motivation to self-administer this drug. These effects were not seen in resilient animals, although in both types of mice an increase in cocaine-induced DA release was observed.

Different coping with social stress in resilient and susceptible animals

Repeated SD is a naturalistic model of social stress which mimics real-life situations and therefore has great ecological and ethological validity (Tornatzky & Miczek, 1993). Some recent research, using animal models of social stress, have observed that coping strategies are associated with resilience or vulnerability to stress (Wood et al., 2015; Chen et al. 2015, Finnell et al., 2017; Pearson-Leary et al., 2017). However, these studies classify animals as resilient or susceptible based on social behavior and anxiety shown by animals on the day after the final SD (Russo et al., 2012; Krishnan, 2014; Finnell & Wood, 2016). In these studies, resilient mice do not present anhedonia (Delgado et al., 2011), social avoidance (Krishnan et al., 2007; Golden et al., 2011; Henriques-Alves & Queiroz, 2015) or avoidance at the smell of a predator (Brodnik et al., 2017). To date, no studies have characterized animals resilient to the increased rewarding effects of drugs of abuse and, therefore, it is not known whether different stress coping strategies influence the sensitivity to such rewarding effects. What we do know is that mice showing no anxiety behavior or avoidance at the smell of a predator have neurochemical adaptations that specifically affect the function of the DA system and could therefore modify the rewarding efficacy of cocaine (Brodnik et al., 2017).

The ethological study of behavior during the social defeats showed firstly that there were no differences in the behavior of the resident animals towards intruders,

whether resilient or susceptible. That is, all were exposed to the same level of stress. However, we did observe that the mice which would later be classified as resilient exhibited less flight behavior compared to the susceptible mice. In addition, we observed a positive correlation between flight behavior and the increase in the conditioned rewarding effects of cocaine in the CPP. The less the animals flee, the lower the rewarding effect produced by cocaine. Likewise, resilient animals also showed less submissive behavior during the first SD, although we no longer observed differences between resilient and susceptible animals in the fourth SD. Resilient mice, experiencing that their coping behaviors do not reduce the intensity of the attack, exhibit a behavioral adaptation. The flexibility of coping strategies has been associated with indicators of emotional resilience, such as reduced HHA axis reactivity and increased neuroplasticity (Hawley et al., 2010, Lambert et al., 2014). Our results therefore indicate that active coping and adequate adaptation reduce the rewarding effects of cocaine. Supporting our results, other studies have also confirmed that mice which do not have passive coping strategies such as flight show less anhedonia (Wood et al., 2015), less anxiety and greater social interaction (Duclot, Hollis, Darcy & Kabbaj, 2011; Hollis, Duclot, Gunjan & Kabbaj, 2011; Kumar et al., 2014). Resilient animals also exhibited attack behaviors against residents during the first confrontation, this active coping strategy having been associated with defeat resistance (Finnell & Wood, 2016).

In short, resilient animals develop an active stress coping strategy, since they attack the resident and take longer to accept they have been defeated. This resistance can cause the resilient to experience SD less intensely than the susceptible animals do. It has been observed that mice employing active coping behaviors during SD evidence lower plasma corticosterone levels, greater capacity for noradrenergic response during stress and greater sympathetic activity in response to defeat (Wood, Walker, Valentino & Bhatnagar, 2010; Gómez-Lázaro et al., 2011; Pérez-Tejada et al., 2013). This type of response is very adaptive, since it allows the response to stress to be limited (Koolhaas et al., 2011). Another factor which can explain the development of resilience is the feeling of control during SD, since the resilient mice do not flee from the aggressor and even exhibit attack behaviors. Interestingly, cocaine use is only increased in intruder mice, but not in residents which initiate the attack, although in both types of animals there is a hormonal response to stress (Covington & Miczek, 2001, 2005; Covington et al., 2005; Boyson et al., 2014). The resident mouse maintains control of the encounter, which may exert a protective effect on the stress response of the hypothalamus-pituitary-adrenal axis (Boyson et al., 2014). Therefore, our resilient animals may experience a certain level of control of the stress situation.

Conversely, the susceptible animals showed passive confrontation, accepting defeat with more time in flight and submission and without presenting any aggressive behavior towards the resident. This passive coping during SD has previously been associated with the onset of anxiety and depression (Wood et al., 2010, Chen et al., 2015, Pearson-Leary et al., 2017).

Neuroinflammation response after repeated SD

In the 1990s, the so-called neuroinflammatory theory of depression was proposed (for example, Maes et al., 2009), based on the increase in inflammatory mediators in patients with depression. There are currently numerous studies demonstrating the role of the immune system in the vulnerability to the development of mental illness (Réus et al., 2015; Menard, Pfau, Hodes & Russo, 2017). It is also believed that substance use disorder is related to changes in the activity of the immune system (Clark, Wiley & Bradberry, 2013; Cui, Shurtleff & Harris, 2014). Both clinical and preclinical studies have shown that psychostimulants such as cocaine activate central and peripheral components of the immune system (Clark et al., 2013; Araos et al., 2015; Moreira et al., 2016). More recently it has also been shown that social stress triggers an activation of the immune system, increasing peripheral levels of cytokines, activating microglia or even increasing the permeability of the blood brain barrier (Pfau & Russo, 2016; Rodríguez-Arias et al., 2017, 2018; Ferrer-Pérez et al., 2018a).

It has described that after SD, susceptible mice which develop social isolation and anxiety show higher levels of IL-6 than resilient animals (Hodes, Ménard & Russo, 2016). However, our results do not confirm this lower inflammatory response in resilient animals. IL-6 levels were not higher in defeated animals compared to controls, and no differences were observed between resilient and susceptible mice. The discrepancy in the results may be mainly due to the fact that in the study by Hodes et al. (2016), the measurement of IL-6 was carried out 24 hours after the final SD, while in our study it was done at the end of the entire procedure, when more than a month had passed since the final repeated SD. Similarly, we had previously demonstrated that after CPP, increases in striatal levels of IL-6 in defeated animals were no longer observed (Ferrer-Pérez et al., 2018a). Since the characterization of animals as resilient or susceptible requires the development of CPP, our experimental design involves making measurements at least four weeks after the final SD. Our results therefore indicate that one month after the final SD there are no differences in the neuroinflammatory response.

Animal models are a very powerful tool, but we must be cautious when transferring the results to human behavior. We can extrapolate from the SD model to situations of psychological or social stress to which we are exposed for

much of our lives. Our results allow the identification of some behavioral characteristics which appear in animals resistant to this SD and which can act as a protective factor against the development of drug addiction. Active but flexible coping stands out as the most relevant behavioral characteristic of resilient subjects. The study of behavioral or pharmacological strategies underlying resilience will allow us to reduce vulnerability to SUD induced by social stress.

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Conflict of interests

The authors declare no conflict of interest.

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Trait and ability emotional intelligence as factors associated with cannabis use in adolescence

Inteligencia emocional rasgo y habilidad como factores asociados al consumo de cannabis en la adolescencia

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Abstract

Many international organisms have warned of the increased consumption of cannabis and its extensive use by adolescents. This study is one of the first with the aim of analyzing the role of ability and trait emotional intelligence, based on the model of Mayer and Salovey, with regards to the consumption of cannabis by adolescents. The study participants were 799 Spanish nationals aged 12 to 16. They were administered a self-report on trait emotional intelligence (EI), a test of maximum EI performance and were asked about their habits relating to cannabis consumption. This cross-sectional study used a quantitative, correlational methodology. The main results obtained from the regression analysis once gender, age and context of residence were controlled for, revealed negative associations between the factors of understanding and emotional repair of trait EI and the cannabis consumption variables, in contrast to emotional attention. On the other hand, with regards to ability EI, the factors of perception and facilitation were inversely associated with cannabis consumption in adolescents. The results suggest that both trait and ability EI are complementary constructs that help to explain cannabis consumption during this life stage. These findings offer empirical evidence that may help guide clinical and educational interventions focused on prevention of consumption during this period.

Key Words: Emotional intelligence; self-report; performance test; cannabis; adolescence.

Resumen

Diversos organismos internacionales alertan sobre el incremento de consumo de cannabis y de su uso extendido entre los adolescentes. El presente estudio ha sido uno de los primeros con el objetivo de analizar el papel de la inteligencia emocional rasgo y habilidad, basada en el modelo de Mayer y Salovey, en relación al consumo de cannabis en adolescentes. En este estudio participaron 799 jóvenes españoles con edades comprendidas entre los 12 y los 16 años. Se administró un autoinforme de inteligencia emocional (IE) rasgo, un test de rendimiento máximo de IE y se preguntó sobre los hábitos relacionados con el consumo de cannabis. Este estudio de tipo transversal se llevó a cabo a través de una metodología de corte cuantitativo y de tipo correlacional. Los principales resultados obtenidos mediante los análisis de regresión una vez controlados el género, la edad y el contexto de centro, revelaron asociaciones negativas entre los factores de comprensión y reparación emocional de la IE rasgo y las variables de consumo de cannabis, al contrario que la atención emocional. Por otro lado, en relación con la IE habilidad, los factores de percepción y facilitación se asociaron de manera inversa al consumo de cannabis en los adolescentes. Los resultados de este estudio sugieren que tanto la IE rasgo como la IE habilidad son constructos complementarios que ayudan a explicar el consumo de cannabis. Estos hallazgos proporcionan evidencias empíricas que podrían orientar intervenciones clínicas y educativas enfocadas a la prevención del consumo en esta etapa.

Palabras clave: Inteligencia emocional; autoinforme; test de rendimiento máximo; cannabis; adolescencia.

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According to the World Drug Report (2018), the use of cannabis is on the increase, and excepting alcohol and tobacco it is the most widely used drug worldwide by young people and adolescents. It is estimated that about 17.2 million (14.1%) of young Europeans aged between 15 and 34 consumed cannabis in the previous year (European Monitoring Centre for Drugs and Drug Addiction, 2018). As regards Spain, 31.1% of adolescents between 14 and 18 claim to have tried it once, 26.3% used it during the previous year and of these, 13.3% reported problematic levels of use (Plan Nacional Sobre Drogas, 2018). Likewise, according to the Spanish survey on drug use in secondary school students (ESTUDES 2016-2018; Plan Nacional Sobre Drogas, 2018), cannabis use is more widespread among males, and the proportion of general consumption increases progressively with age. Longitudinal research has highlighted peer group use of cannabis as one of the main risk factors for adolescent use (Creemers et al., 2010; von Sydow, Lieb, Pfister, Höfler & Wittchen, 2002). Furthermore, the quantity and frequency of cannabis use has been associated with the appearance of mental disorders, abuse and dependence among adolescents and young adults (Degenhardt et al., 2013; von Sydow et al., 2002). Similar studies warn that those who begin cannabis use at an early age are not only more susceptible to consuming other illegal substances and developing a pattern of risky alcohol consumption (Díaz, Busto & Caamaño, 2018; Rial et al., 2018), but also have a greater probability of getting involved in behaviours related to problematic gambling (Míguez & Becoña, 2015), presenting school and mental health problems, as well as committing suicide (Anglin et al., 2012; Silins et al., 2014).

Several investigations have revealed that emotional intelligence (EI), understood as the ability to recognize, understand and regulate one's own emotions and those of others, discriminate between them and use the information as a guide for thoughts and actions (Mayer & Salovey, 1997), is a predictor of well-being and better adaptive functioning in adolescence (Gascó, Badenes & Plumed, 2018; Resurrección, Salguero & Ruiz-Aranda, 2014). The literature reflects the important role that EI plays in relation to various areas of relevance such as mental, psychological and psychosomatic health in both adults and adolescents (Balluerka, Gorostiaga, Alonso-Arbiol & Aritzeta, 2016; Davis & Humphrey, 2012; Martins, Ramalho & Morin, 2010). Nevertheless, adolescence remains a less studied stage, and one which poses an important challenge for research and clinical and educational progress.

The scientific literature currently supports the distinction of two EI constructs which can be differentiated on the basis of the measurement method used to operationalize it (Petrides, 2011). Trait EI refers to the self-perception of a series of emotional skills assessed through self-reports.

Ability EI, on the other hand, is the ability to respond correctly to various emotional tasks by means of maximum performance tests. The first domain belongs to the field of personality while the second refers to cognitive ability and the relevant literature has thus developed independently. While self-report measures of EI rely on the subject's perception of their own emotional abilities, the model proposed by Mayer et al. (1997) stresses the importance of using maximum performance measures to assess the real ability of the person, thus following the traditional methodology used to measure cognitive intelligences (Brackett & Salovey, 2006; Mayer, Salovey & Caruso, 2008).

In their review of EI and addictive substance use, Kun and Demetrovics (2010) analysed 36 studies which, for the most part, measured EI by proven methods. The data obtained in this research support the idea that low levels of trait and ability EI are related to more problematic use of alcohol, tobacco and illegal substances in adults, university students and adolescents. More specifically, the results showed that the components of the perception and regulation of emotions played a key role in understanding the use of addictive substances and addictions. However, it should be noted that most studies used a global index of EI and did not provide information on the impact of each factor individually, which would have helped to focus clinical and educational interventions. In addition, self-report measures studying only the role of trait EI were used in a large number of the studies. It is for this reason that the study authors recommended using joint measures of trait and ability EI for a more precise understanding of this problem. Likewise, very little research is carried out in the adolescent population and there are hardly any studies attempting to relate EI to cannabis use in particular.

The findings of the research assessing the relationship between cannabis use and trait EI through the self-report Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey & Palfai, 1995) are detailed below. Limonero, Tomás-Sábado and Fernández-Castro (2006) observed how the perceived ability of university students to regulate negative emotional states was inversely associated with habitual use of cannabis and tobacco. University students with greater perceived ability to clearly understand their emotional states similarly reported lower cannabis use (Limonero et al., 2006; Limonero, Gómez-Romero, Fernández-Castro & Tomás-Sábado, 2013). Limonero et al. (2013) also found that emotional attention along with alcohol abuse were the main factors associated with cannabis abuse. The authors concluded that young people who worry too much about their emotional state and lack adequate resources to regulate them as a mechanism are prone to excessive alcohol use, which facilitates cannabis abuse. In a study with adult patients using cannabis by medical prescription, Boden, Gross, Babson and Bonn-Miller (2013) found that a lower perceived ability to understand emotional

states resulted in ineffective emotional regulation, which increased cannabis abuse and dependence. Furthermore, Ruíz-Aranda et al. (2010) found that adolescents who had not used cannabis had a greater perceived ability to regulate negative emotional states and prolong positive ones than those who claimed to have used it.

In two studies carried out with adult males diagnosed with cannabis dependence and control groups without addiction problems, trait EI was measured with the Emotional Intelligence Scale (EIS; Shutte et al., 1998), adapted by Bhattacharya, Bhattacharya, Dutta and Mandal (2004). In them, significant differences were found between the low total EI score and high alexithymia in the groups with cannabis dependence problems compared to control groups (Nehra, Kumar, Sharma & Nehra, 2013; Nehra et al., 2012). These results concur with the review of studies by Kun et al. (2010), which concluded that the decoding of emotional states is less accurate in people with alcoholism problems, intensive smokers, cannabis users and people with internet addiction. Similarly, the results of research by Claros and Sharma (2012) showed that low scores on the EIS factors of perception, use, understanding and emotional regulation were associated with higher alcohol and marijuana use in school adolescents.

Based on the research which assessed EI as a skill through maximum performance tests, Brackett, Warner and Mayer (2004) analysed the relationship between EI measured with the Mayer-Salovey-Caruso-Emotional Intelligence Test (MSCEIT; Mayer, Salovey & Caruso, 2002a) and the consumption of legal and illegal drugs among university students. The area scores of this test cover two branches each: the experiential area (perception and facilitation), which refers to the ability to access emotional information, recognize it, compare it to other sensations and understand how it influences thinking; and the strategic area (understanding and regulation), referring to the ability to understand and manage the information of emotions, both one's own and those of others, of positive or negative valence, in order to adapt to daily life situations effectively. The results of their study showed significant negative relationships between the scores on the total EI scale, the experiential area and the strategic area with regard to the use of marijuana, illegal drugs, alcohol, and consumption with friends in a sample of university students. Similarly, Trinidad and Johnson (2002) found negative associations between the factors of perception, understanding, emotional regulation and total EI measured on the Multifactor Emotional Intelligence Scale (MEIS; Mayer, Salovey & Caruso, 1997) and alcohol and tobacco use in an adolescent population. The authors concluded that EI was a protective factor against such use which also reduced the influence exerted by the peer group to use.

As can be seen, and despite the importance of the previous findings, most of the research was carried out with clinical

adult and university populations, while studies analysing the implication of EI and cannabis use at the teenage stage are almost non-existent. Likewise, hardly any research has been carried out which combines the assessment of trait and ability EI factors in order to provide a complete understanding of their role in the use of this substance.

Given the concern caused by the excessive use of cannabis at an early age, the present study aims to analyse how the dimensions of trait and ability EI are related to cannabis use variables in adolescents aged 12 to 16.

Based on the results of previous studies, we propose the following working hypothesis: the dimensions of trait and ability EI will be associated significantly and inversely with the dependent variables of cannabis use ("occasional hashish or marijuana use"; "number of days of hashish or marijuana use in the last 12 months"; "weekly number of units used"; "using hashish or marijuana if offered it by a friend"), with the exception of trait EI factor "attention to one's emotions", which will be associated positively and significantly. Both constructs will be complementary explanatory factors in the understanding of this issue.

Method

Type of study

This study presents a cross-sectional design with a quantitative, correlational methodology.

Participants

A total of ten compulsory secondary education centres in the Spanish autonomous community of Cantabria participated in the study. Stratified random sampling was carried out based school ownership (state run or private/charter) and location in rural or urban settings, matching the proportion present in the reference population. It should be noted the 66.6% participation rate of the schools initially selected was due to the high workload some of them were under. The initial sample was 844 participants. Exclusion criteria were being of an age outside the range under study, 12-16 years ($N = 21$), and not having completed the questionnaire by the end of the second session ($N = 24$). The final sample ($N = 799$) represented 94.6% of the initial sample and was made up of schoolchildren aged between 12 and 16 years ($M = 14.49$; $SD = 1.17$) with a gender-balanced distribution (51.8 % female, 48.2% male). Just over half, 51.4%, went to private/charter schools and 48.6% to state run schools, with 64% located in urban and 36% in rural environments.

Instruments

Dependent variables:

- *Cannabis use questionnaire.* We adapted four items of the ESTUDES questionnaire (Plan Nacional Sobre Drogas, 2018). First, subjects were asked about "lifetime use of

hashish or marijuana" (yes/no), as well as whether they would "use hashish or marijuana if offered it by a friend" (yes/no). The following variables were dichotomized according to the median for use in subsequent analyses: "number of days of hashish or marijuana use in the last 12 months" (<40 days; ≥40 days) and "weekly quantity of units" (<10 units; ≥10 units).

Independent variables:

- *Questionnaire of sociodemographic data.* Gender (female/male), age (12-13/14-16) and the school area (urban/rural) were collected.
- *Trait Meta-Mood Scale* (TMMS; Salovey et al., 1995, validated in the Spanish teenage population by Salguero, Fernández-Berrocal, Balluerka and Aritzeta, 2010). This self-report comprises 24 items and provides an indicator of trait emotional intelligence levels. Items are scored on a 5-point Likert scale from "Strongly disagree" (1) to "Strongly agree" (5). It consists of three subscales: attention to feelings is the degree to which people believe they pay attention to their emotions and feelings (e.g., "I pay close attention to feelings"); emotional clarity refers to the degree to which people believe they understand their emotional states (e.g., "I am often wrong about my feelings"); and finally, emotional repair refers to the person's belief in their ability to interrupt and regulate negative emotional states and prolong positive ones (e.g., "although sometimes I feel sad, I usually have an optimistic outlook"). Each subscale consists of 8 items and does not offer a global score. The original self-report has shown a high internal consistency (Cronbach's alpha for Attention = .90, Clarity = .90, Repair = .86). Our study obtained Cronbach alphas of .87 for Attention, .85 for Clarity and .82 for Repair.
- *Botín Foundation's Emotional Intelligence Test for Adolescents* (TIEFBA; Fernández-Berrocal, Ruiz-Aranda, Salguero, Palomera & Extremera, 2011). This self-administered battery for adolescents (12-17 years of age) provides performance measures for each of the four emotional abilities of Mayer and Salovey's theoretical model (1997). The test comprises 143 items presenting emotional situations in eight short cartoons with characters. It provides a total of seven scores: two area, four branch and the total score.

In this study we have used the four branch scores, referring to each of the four EI abilities, with the aim of obtaining more concise results which may help in future interventions. Emotional perception refers to the degree to which people can properly identify their own emotions and those of others, as well as the physiological and cognitive states and sensations involved. It involves the ability to label emotions and provide an appropriate word for each, whether positive such as joy, love or gratitude, or negative such as anger, sadness or envy (e.g., "to what extent do you think Rocío shows each

of the following feelings?"). Emotional facilitation is the ability to access emotions and feelings and to generate them in order to facilitate thinking, cognitive processes or problem solving, among others (e.g., "to what extent will feeling like this help Rocío to check the list of school materials she needs to buy this year?"). Emotional understanding includes the ability to interpret the meaning of complex emotions, for example, those generated in an interpersonal situation, as well as the ability to recognize emotional states transitioning into others and the appearance of simultaneous feelings (e.g., "what might Rocío be thinking to make her feel like this?"). Emotional management includes the ability to regulate one's own emotions and those of others, moderating negative emotions and intensifying positive ones without repressing or exaggerating the information they communicate (e.g., "what could Rocío do to go to school feeling happy?"). The test has demonstrated adequate internal consistency, with Cronbach's alpha values of .86 for Perception, .76 for Facilitation, .76 for Comprehension and .74 for Regulation. Cronbach's alphas obtained in our study were .86 for Perception, .78 for Facilitation, .80 for Comprehension and .76 for Regulation.

Procedure

First, schools were requested in writing to provide the signed authorization of families and informed consent of students. To guarantee anonymity during the process, numerical codes were used in each questionnaire, thus avoiding personal identification of students. A trait EI self-report and a maximum EI performance test were administered, and students were asked about their habits regarding cannabis use. A researcher was present in the classroom during the two non-consecutive 45-minute sessions in which the pen and paper test was performed.

Ethical considerations

This research was carried out in accordance with the principles covered by the Declaration of Helsinki (World Medical Association, 2013). The implementation of the present study's research plan was presented to the University of Cantabria's Doctoral Studies Academic Commission.

Data analysis

For the data analysis process the statistical package SPSS Statistics 24.0 was used. A quantitative, correlational methodology was employed. First, Cronbach's alpha reliability indices were calculated for each of the EI factors assessed. Descriptive analyses and point biserial correlation of the study variables were performed. Subsequently, binomial regression models were constructed based on the factors of trait EI (Emotional Attention, Clarity and

Repair) and ability EI (Emotional Perception, Facilitation, Understanding and Regulation), also controlling for the effects of age, gender and the school setting when observing its association with the dependent variables: “Lifetime use of hashish or marijuana”; “Number of days of hashish or marijuana use in the last 12 months”; “Weekly number of units”; “Use of hashish or marijuana if offered it by a friend”). Likewise, prevalence rates (PR) were obtained with their respective 95% confidence intervals (95% CI) (Espelt, Bosque-Prous & Mari-Dell’Olmo, 2019; Espelt, Mari-Dell’Olmo, Penelo & Bosque-Prous, 2017). In order to synthesize the amount of data, only the final models explaining a higher percentage of variance are presented.

Results

Prevalence of cannabis use in adolescents

Table 1 shows the most significant data regarding the prevalence of cannabis use in the study sample. The first point of interest is that two out of ten adolescents used cannabis. Among these, a majority had done so for forty or more days in the last 12 months (74.9%). Approximately half of the users smoked ten or more joints per week. Likewise, a fifth said they would use cannabis if offered it by friends (20.5%). In relation to sociodemographic variables, it can be seen that 18.3% of women used cannabis at some time, while among men the prevalence was somewhat

higher (26.4%). Regarding the 12-13 age group, 13.9% claimed to have used this substance, with an appreciable increase in use among the 14-16 group (27.3%). In relation to school setting, two out of ten urban school students used cannabis, while this figure was somewhat higher in students from rural schools (28.1%).

Descriptive and correlation analyses between cannabis consumption variables, trait and ability EI

Table 2 shows the descriptive statistics for the EI subscales used in this study, while the results of the correlation analysis between the EI and cannabis use variables are detailed in Table 3. As can be seen, there are significant negative associations between the variables of trait EI and ability EI and cannabis use, except for the attention to feelings that correlated directly and significantly. Specifically, for the “lifetime cannabis use” variable, the highest correlations were found with the factors of emotional perception and facilitation. In relation to “frequency of use last year”, the correlations with the factors of emotional attention and repair stood out. With respect to the “weekly units used” and “use if offered by friends”, the highest correlations were again obtained with emotional perception and facilitation.

In this section, and in order to synthesize the abundance of data, only the four final models which were statistically significant and explained a greater percentage of the criterion variance are presented (Table 4).

Table 1. *Cannabis use prevalences.*

Cannabis	Answer category	Percentage	N
Cannabis use	Yes	22.3	179
	No	77.7	620
Use over previous year	≥ 40 days	74.9	134
	< 40 days	25.1	45
Weekly units	≥ 10	51.4	92
	< 10	48.6	87
Would use it if offered by friends	Yes I would	20.5	161
	No I wouldn't	79.5	638
Use by gender	Female yes	18.3	73
	Female no	81.8	327
	Male yes	26.4	106
	Male no	73.6	293
Use by age	12-13 years yes	13.9	41
	12-13 years no	73.7	255
	14-16 years yes	27.3	137
	14-16 years no	58.9	366
Use by school context	Urban yes	19.6	107
	Urban no	80.4	438
	Rural yes	28.1	71
	Rural no	71.9	183

Table 2. Descriptive variables of trait and ability emotional intelligence depending on use or non-use of cannabis.

Cannabis use		Min/Max	M	MED	SD	CI 95%
TMMS Attention	No	8/40	23.80	23.00	7.20	23.20 / 24.30
	Yes	10/40	28.30	30.00	7.80	27.20 / 29.50
TMMS Clarity	No	8/40	23.70	24.00	7.20	23.10 / 24.30
	Yes	8/40	18.70	16.00	7.10	17.70 / 19.80
TMMS Repair	No	10/40	26.10	26.00	7.00	25.50 / 26.60
	Yes	10/40	20.40	18.00	7.30	19.30 / 21.50
TIEFBA Perception	No	75/129	103.00	105.00	12.40	101.90 / 103.90
	Yes	76/123	90.80	90.20	11.10	89.00 / 92.60
TIEFBA Facilitation	No	72/139	107.20	108.00	14.00	106.00 / 108.40
	Yes	73/123	94.40	94.70	11.80	92.60 / 96.20
TIEFBA Comprehension	No	77/144	106.50	106.40	14.00	105.40 / 107.70
	Yes	74/134	95.30	94.40	13.00	91.90 / 93.30
TIEFBA Regulation	No	70/114	92.60	92.90	8.80	93.30 / 97.30
	Yes	70/111	86.70	84.90	8.00	85.50 / 87.90

Note. TMMS: Trait Meta-Mood Scale; TIEFBA: Botín Foundation's Emotional Intelligence Test for Adolescents. M: mean; MED: median; SD: standard deviation; CI: confidence interval.

Table 3. Point biserial correlation between the variables of trait and ability EI and cannabis use.

	Lifetime	Previous year	Weekly units	Use if offered by friends
1. TMMS - Attention	.25**	.26**	.08	.29**
2. TMMS - Clarity	-.28**	-.23**	-.21**	-.30**
3. TMMS - Repair	-.32**	-.24**	-.10	-.33**
4. TIEFBA - Perception	-.38**	-.17*	-.25**	-.42**
5. TIEFBA - Facilitation	-.37**	-.22**	-.21**	-.34**
6. TIEFBA - Comprehension	-.33**	-.08	-.20**	-.30**
7. TIEFBA - Regulation	-.28**	-.08	-.12	-.27**

Note. TMMS: Trait Meta-Mood Scale; TIEFBA: Botín Foundation's Emotional Intelligence Test for Adolescents.

* = $p < .05$. ** = $p < .01$.

Binomial regression for the calculation of the prevalence rates of cannabis use based on the variables of trait and ability EI, taking into account gender, age and school setting

First, in relation to the model created for the dependent variable "lifetime cannabis use", independent variables of emotional clarity, repair, perception and facilitation, and age entered the equation. Among these, the highest PR were found for the emotional clarity [PR = 0.96; 95% CI (0.92-0.99)] and facilitation [PR = 0.96; 95% CI (0.94-0.97)] factors, these being similar to those of emotional perception [PR = 0.95; 95% CI (0.94-0.97)] and repair [PR = 0.93; 95% CI (0.90-0.97)]. Finally, subjects in the 14-16 group had a prevalence of use 0.73 times higher than that in the 12-13 group. Secondly, when we take "cannabis use per year" as the criterion variable, the independent variables of emotional repair [PR = 0.97; 95% CI (0.96-0.98)] and facilitation [PR = 0.98; 95% CI (0.97-0.99)] entered the equation. For the dependent variable "weekly number of units", emotional clarity [PR = 0.96; 95% CI (0.93-0.99)] and perception [PR = 0.97; 95% CI (0.96-0.98)] entered

the equation. Finally, the independent variables attention, clarity, repair, perception, facilitation and age were part of the equation for the model of the dependent variable "use if offered by friends". Among these, the highest PR were found for the attention [PR = 1.03; 95% CI (1.00-1.07)] and facilitation factors [PR = 0.97; 95% CI (0.95-0.99)], followed by emotional repair [PR = 0.94; 95% CI (0.91-0.98)] and perception [PR = 0.93; 95% CI (0.91-0.95)]. The prevalence of use among subjects in the 14-16 group was 0.65 times higher than among 12-13 group.

Binomial regression of cannabis use based on trait and ability EI for each age group (12-13 and 14-16 years)

As can be seen above (Table 4), the sociodemographic variable age was significant for the "lifetime cannabis use" model, as well as for the "if offered by friends" model. The results were then stratified according to the two age groups for both use variables (Table 5 and 6). First, for the "lifetime cannabis use" model with the 12-13 group, the independent variables repair, perception and facilitation became part of the equation. Among these, the highest PR

Table 4. *Binomial Regression of cannabis use based on trait and ability EI alongside sociodemographic factors.*

	B	SE	Wald	PR	CI 95% of OR
Lifetime use					
TMMS - Clarity	-0.07	0.00	49.52**	0.96	0.92 / 0.99
TMMS - Repair	-0.08	0.00	61.15**	0.93	0.90 / 0.97
TIEFBA - Perception	-0.06	0.00	94.58**	0.95	0.94 / 0.97
TIEFBA - Facilitation	-0.04	0.00	92.12**	0.96	0.94 / 0.97
Gender (F / M)	0.18	0.22	0.42	0.93	0.83 / 1.15
Age (12-13 / 14-16)	0.48	0.24	0.05*	0.73	0.63 / 1.00
Context (R / U)	0.20	0.23	0.39	0.93	0.83 / 1.14
Use over previous year					
TMMS - Repair	-0.02	0.01	8.09**	0.97	0.96 / 0.98
TIEFBA - Facilitation	-0.01	0.00	3.76*	0.98	0.97 / 0.99
Gender (F / M)	-0.25	0.24	1.03	0.32	0.44 / 1.30
Age (12-13 / 14-16)	0.48	0.27	2.61	1.60	0.88 / 2.82
Context (R / U)	0.19	0.30	0.51	1.22	0.70 / 2.26
Weekly units					
TMMS - Clarity	-0.04	0.02	6.84**	0.96	0.93 / 0.99
TIEFBA - Perception	-0.02	0.01	8.31**	0.97	0.96 / 0.98
Gender (F / M)	0.06	0.15	0.15	1.07	0.77 / 1.46
Age (12-13 / 14-16)	0.32	0.20	2.15	1.39	0.90 / 2.14
Context (R / U)	0.03	0.15	0.03	1.03	0.76 / 1.38
Use if offered by friends					
TMMS - Attention	0.08	0.00	51.15**	1.03	1.00 / 1.07
TMMS - Clarity	-0.09	0.00	55.53**	0.96	0.92 / 0.99
TMMS - Reparation	-0.09	0.00	62.89**	0.94	0.91 / 0.98
TIEFBA - Perception	-0.07	0.00	115.33**	0.93	0.91 / 0.95
TIEFBA - Facilitation	-0.04	0.00	67.18**	0.97	0.95 / 0.99
Gender (F / M)	0.09	0.23	0.18	0.96	0.86 / 1.21
Age (12-13 / 14-16)	0.55	0.27	3.92*	0.65	0.53 / 0.99
Context (R / U)	0.08	0.22	0.09	0.97	0.84 / 1.29

Note. TMMS: Trait Meta-Mood Scale; TIEFBA: Botín Foundation's Emotional Intelligence Test for Adolescents; B: coefficient; SE: standard error; PR: prevalence rate; CI: confidence interval.

* = $p < .05$; ** = $p < .01$.

Table 5. *Binomial regression of cannabis use based on trait and ability EI, segmented by cases aged 12 to 13.*

	B	SE	Wald	PR	CI 95% of OR
Lifetime use					
TMMS - Repair	-0.07	0.02	11.64**	0.93	0.89 / 0.97
TIEFBA - Perception	-0.04	0.01	8.39**	0.96	0.93 / 0.99
TIEFBA - Facilitation	-0.02	0.01	4.26*	0.97	0.98 / 0.99
Use if offered by friends					
TMMS - Repair	-0.08	0.03	9.23**	0.92	0.87 / 0.97
TIEFBA - Perception	-0.06	0.01	18.23**	0.94	0.92 / 0.97

Note. TMMS: Trait Meta-Mood Scale; TIEFBA: Botín Foundation's Emotional Intelligence Test for Adolescents; B: coefficient; SE: standard error; PR: prevalence rate; CI: confidence interval.

* = $p < .05$; ** = $p < .01$.

Table 6. Binomial regression of cannabis use based on trait and ability EI, segmented by cases aged 14-15-16.

	B	SE	Wald	PR	CI 95% of OR
Lifetime use					
TMMS - Attention	0.06	0.01	33.32**	1.07	1.04 / 1.09
TMMS - Repair	-0.08	0.01	42.88**	0.93	0.90 / 0.95
TIEFBA - Perception	-0.05	0.00	63.81**	0.95	0.94 / 0.96
TIEFBA - Facilitation	-0.04	0.00	82.40**	0.96	0.95 / 0.97
Use if offered by friends					
TMMS - Attention	0.07	0.01	33.13**	1.07	1.05 / 1.09
TMMS - Clarity	-0.08	0.01	36.18**	0.93	0.90 / 0.95
TIEFBA - Perception	-0.06	0.01	80.95**	0.94	0.92 / 0.96
TIEFBA - Facilitation	-0.04	0.00	56.50**	0.96	0.95 / 0.97

Note. TMMS = Trait Meta-Mood Scale; TIEFBA = Botín Foundation's Emotional Intelligence Test for Adolescents. B = coefficient; SE = standard error; PR = prevalence rate; CI = confidence interval.

* = $p < .05$; ** = $p < .01$.

were found for emotional facilitation factors [PR = 0.97; 95% CI (0.98-0.99)], followed by perception [PR = 0.96; 95% CI (0.93-0.99)] and repair [PR = 0.93; 95% CI (0.89-0.97)]. For the 14-16 model, the independent variables attention, repair, perception and facilitation entered the equation. The highest PR were found for attention [PR = 1.07; 95% CI (1.04-1.09)] and facilitation [PR = 0.96; 95% CI (0.95-0.97)], followed by perception [PR = 0.95; 95% CI (0.94-0.96)] and repair [PR = 0.93; 95% CI (0.90-0.95)]. Secondly, for the model of the dependent variable "if offered by friends", the independent variables repair [PR = 0.92; 95% CI (0.87-0.97)] and perception [PR = 0.94; 95% CI (0.92-0.97)] became part of the equation. Finally, for the 14-16 group, the variables attention, clarity, perception and facilitation entered the equation. Among these, the highest PR were found for attention [PR = 1.07; 95% CI (1.05-1.09)] and facilitation [PR = 0.96; 95% CI (0.95-0.97)], followed by perception [PR = 0.94; 95% CI (0.92-0.96)] and clarity [PR = 0.93; 95% CI (0.90-0.95)].

Discussion

The results yielded by the present study show that the prevalence of cannabis use among schoolchildren generally coincides with the data reported in the last Survey on Drug Use in Secondary School Students (ESTUDES 2016-2018) (Plan Nacional sobre Drogas, 2018); this has important implications at the prevention level and highlights the need for intensive work at the beginning of compulsory secondary education and even in the final years of primary education.

The main objective of this research was to analyse the relationship between trait EI, ability EI and cannabis use in school-age adolescents, taking into account gender, age and the school context. The findings of this study provide clues regarding the role of EI in relation to cannabis use at early ages. Indeed, it is noteworthy that both EI constructs were complementary, explanatory dimensions of this

issue. In this sense, both the components of trait EI and the experiential area of EI, which includes the ability to perceive and use emotions to facilitate decision making and cognitive performance, were associated with cannabis use in adolescents. However, the strategic area referring to the ability to understand the meaning of emotions and use this to achieve a specific objective had no explanatory power for the use of this substance. On the other hand, the influence of emotional attention on use is remarkable as the age of adolescents increases.

Given the data obtained, and in relation to the three factors of trait EI, it can be said that adolescents scoring higher on attention to their own emotions were more likely to use cannabis when offered it among their group of friends. Emotional attention was also one of the most strongly associated with lifetime cannabis use and with use when offered by friends in the 14-16 group. In this context, several studies have indicated how high levels of emotional attention are involved in abuse of alcohol, tobacco and cannabis in adults and adolescents (Limonero et al., 2013; Ruiz-Aranda et al., 2010, Ruíz-Aranda et al., 2006). Research has shown consistently negative associations between the emotional clarity and repair factors regarding anxiety and depression in the adolescent population (Fernández-Berrocal, Alcaide, Extremera & Pizarro, 2006; Extremera & Fernández-Berrocal, 2006; Lombas, Martín-Albo, Valdivia-Salas & Jiménez, 2014). Likewise, while greater clarity and repair have been linked to the appropriate use of stress management strategies (Fernández, Velasco & Campos, 2003; Saklofske, Austin, Galloway & Davidson, 2007), emotional attention has shown positive associations with anxiety, depression and maladjusted coping strategies such as ruminative thinking in young people (Extremera & Fernández-Berrocal, 2006; Lombas et al., 2014; Saklofske et al., 2007). Thus, while the tendency to focus attention on our own emotional states allows us to follow the process of our emotions, this may not be adaptive on some

occasions. High levels of attention to emotional states could lead to an increase in rumination and unpleasant moods (Ruíz-Aranda et al., 2006). If adolescents focus a great deal of attention on their feelings without being able to clarify what they feel at any moment or to regulate their emotions internally, they are more likely to decide to use cannabis in order to mitigate aversive emotional states. Because the search for personal identity, the departure from family values and the need for group acceptance are developmental characteristics which are accentuated with age (Sussman, Unger & Dent, 2004), this could explain the fact that emotional attention becomes a facilitator of cannabis use and its use in the presence of peers among the older age group (14 to 16 years old).

On the other hand, low levels of trait EI emotional clarity and repair were negatively associated with lifetime cannabis use and with a higher likelihood of smoking it with friends. Similarly, lower perceived ability to clearly understand emotional states was linked to higher weekly use of cannabis. Likewise, it was found that lower perceived capacity to repair negative moods was related to higher frequency of use during the previous year. Once results were stratified by age group, it was observed that the perceived ability to repair negative emotional states was inversely related to lifetime use in both age groups, as well as to use if offered it by friends in the 12-13 age group. At the same time, less emotional clarity was associated with greater use on being offered it by friends in the 14-16 group. The findings of this study are in line with those of previous studies in which a relationship between low scores on emotional repair and clarity and the use of this substance was found. It is worth mentioning that only some studies have thus far analysed the separate components of trait EI in young people and adolescents. However, the few carried out have shown that lower capacity to understand and regulate emotional states is associated with higher addictive substance use in the adolescent and university population (Limonero et al., 2006; Limonero et al., 2013; Ruíz-Aranda et al., 2010; Ruíz-Aranda, Fernández-Berrocal, Cabello & Extremera, 2006). Furthermore, peer group pressure is one of the factors most strongly present at the beginning of drug use, as well as in abuse situations (Golpe, Isorna, Barreiro, Braña & Rial, 2017; Teunissen et al., 2016). The results yielded by our research support the idea that adolescents with greater issues in understanding and regulating emotions could have problems in identifying peer-group pressure and managing differences between their motivations and those of others.

With regard to the four branches or factors of ability EI, the models were mostly obtained with emotional perception and facilitation, which together make up the experiential area of EI. The experiential area of EI is characterized by the ability to perceive and use emotions, thereby facilitating the decision-making and cognitive performance of adolescents (Fernández-Berrocal et al., 2011). In this study,

both emotional perception and facilitation were negatively associated with lifetime cannabis use and using it when offered cannabis in a group of friends.

Likewise, the emotional facilitation ability was negatively related to the frequency of use in the previous year, just as emotional perception was with levels of weekly use. These EI abilities were also the most influential when stratifying the results by age group. Here, emotional perception was negatively associated with both lifetime use of cannabis and use on being offered it by friends in both age groups. The emotional facilitation ability meanwhile was inversely related to lifetime use in both age groups, as well as to use on being offered it by friends in the 14-16 group. These findings are consistent with those of Brackett et al. (2004), whose research observed negative associations between the experiential branch of ability EI, cannabis use, illegal drugs, alcohol and shared use among groups of friends in university students. In their study with adolescents, Trinidad et al. (2002) also found that those with greater capacity to perceive, understand and regulate their emotional states reported lower use of tobacco and alcohol.

Despite the importance that emotional understanding and management have when interpreting emotions and regulating them, these components of ability EI were not explanatory of cannabis use variables when trait EI was taken into account. It is worth pointing out that although emotional understanding and management skills were not significant in the models proposed when taking into account trait EI, they did correlate inversely with some of the cannabis use variables. This fact not only demonstrates the relevance of knowing and processing emotional information but also of knowing how to use it to prevent risky behaviours related to cannabis use at an early age.

The results obtained in this study extend the previous evidence regarding the relationships between emotional variables and behaviours linked to cannabis use among young people (Brackett et al., 2004; Kun et al. 2010; Limonero et al., 2006; Limonero et al., 2013; Ruíz-Aranda et al., 2010). It may be concluded that those adolescents possessing a greater repertoire of abilities for perceiving the emotions of others and attending to their own in a moderate way, and with the ability to use emotional information to facilitate cognition and make use of strategies to understand and repair their own negative emotional states, are less likely to use cannabis. Young people with these skills are better able to manage their emotions adaptively and may not need to use other types of external regulators to deal with key life events at this stage. In this sense, given that the abilities included in EI can be learned and improved by avoiding health-risk behaviours (Mayer et al., 2008), we consider that these results could guide the design of clinical and educational interventions aimed at preventing the appearance of problems involving psycho-social imbalance in adolescence such as drug use, in particular cannabis.

Our results must be interpreted in the context of certain methodological limitations. It should be noted that a more heterogeneous sample would be desirable, incorporating samples from other communities in order to generalize results. Finally, it is important to remember the cross-sectional nature of the study. Future work should continue to corroborate the results found here through prospective designs which allow inference of causal relationships between the variables studied. Despite these limitations, this research provides additional information on the relationship between EI and cannabis use at the earliest stage of adolescence (12-16 years), which has hardly been studied. Likewise, since research combining the assessment of the constructs of trait and ability EI is scarce, this study provides a more complete understanding of their role on cannabis use at an early age.

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Conflicts of interests

The authors declare no conflicts of interest.

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Systematic review of universal family prevention programs: Analysis in terms of efficacy, retention and adherence

Revisión sistemática de programas de prevención familiar universal: Análisis en términos de eficacia, retención y adherencia

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Abstract

Adherence is an important aspect of the effectiveness of family interventions for universal drug prevention. Some approaches suggest adherence assessments should be improved because they are partial and do not take into account all dimensions. The objective of the study is to analyze adherence and retention measures used in family intervention programs for the prevention of substance use in young people aged 10-14 years. To this end, the literature was reviewed on universal programs which have obtained good preventive results. The information sources consulted are: PubMed, PsycINFO (EBSCO), PsycArticles (EBSCO), Social Work abstracts (EBSCO), CINAHL (EBSCO) SocIndex (EBSCO), Scopus, Academic Search Premier (EBSCO), SCIC-ISOC, Cochrane Database of Systematic Reviews, ERIC, ScienceDirect, Web of Science, Project Cork, Researchgate, and consultation with experts. The search results show 21 studies belonging to 6 family programs: Strengthening Families Program 10-14, Parents Who Care, Family Check-Up, Linking Lives Health, Prevention of Alcohol use in Students, and Örebro Prevention Program. The studies analyzed provide little information on the different elements involved in adherence. Retention and differential attribution are the data that appear most frequently, while other aspects such as active participation do not appear in the studies. The results are discussed and recommendations are made to improve the evaluation of adherence and retention in family prevention programs.

Keywords: Adherence; retention; family-based program; prevention; universal.

Resumen

La adherencia es un aspecto importante para la eficacia de las intervenciones familiares de prevención universal de drogas. Algunas aproximaciones sugieren mejorar las evaluaciones sobre adherencia, ya que resultan parciales y no tienen en cuenta todas sus dimensiones. El objetivo del estudio es analizar las medidas de adherencia y retención utilizadas en los programas de intervención familiar para la prevención del consumo en jóvenes de 10-14 años. Para ello se revisa la literatura sobre programas universales que han obtenido buenos resultados preventivos. Las fuentes de información consultadas son: PubMed, PsycINFO (EBSCO), PsycArticles (EBSCO), Social Work abstracts (EBSCO), CINAHL (EBSCO) SocIndex (EBSCO), Scopus, Academic Search Premier (EBSCO), SCIC-ISOC, Cochrane Database of Systematic Reviews, ERIC, ScienceDirect, Web of Science, Project Cork, Researchgate y consulta expertos. Los resultados de la búsqueda muestran 21 estudios que pertenecen a 6 programas familiares: Strengthening Families Programme 10-14, Parents Who Care, Family Check-Up, Linking Lives Health, Prevention of Alcohol use in Students y Örebro Prevention Program. Los estudios analizados aportan poca información sobre los diferentes elementos involucrados en la adherencia. La retención y la atribución diferencial son los datos que aparecen con mayor frecuencia, mientras que otros aspectos como la participación activa no aparecen en los estudios. Se discuten los resultados y se realizan recomendaciones para mejorar la evaluación de la adherencia y retención en los programas de prevención familiar.

Palabras clave: Adherencia; retención; programas familiares; prevención; universal.

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Given the increasing prevalence of drug use among the adolescent population, there is a need for family-based preventive interventions (Rial et al., 2019; Teixidó-Compañó et al., 2019). Probably one of the most important factors at individual and family levels to ensure sufficient levels of efficacy in preventive programs is adherence (Gottfredson et al., 2015). The concept of treatment adherence as a variable affecting the efficacy of preventive or psychosocial interventions has not yet been clearly defined (or not at least, as much as it has been in the field of health) and it is complicated to differentiate it from other constructs like retention (García del Castillo, García del Castillo-López & López-Sánchez, 2014; Gearing, Townsend, Elkins, El-Bassel & Osterberg, 2014). Retention is understood as the set of measures affecting the level of intervention attendance. In contrast, adherence to psychosocial treatments is considered more broadly to include elements such as the program's ability to make participants feel part of the intervention, and covers session attendance, active participation, and compliance with program guidelines (Gearing et al., 2014).

One of the reasons why preventive interventions do not achieve the results expected has to do with the difficulty of obtaining high levels of commitment and attendance from families (Al-Halabi-Díaz & Errasti, 2009; Axford, Lehtonen, Tobin, Kaoukji & Berry, 2012; Errasti et al., 2009). Improved adherence is a matter of concern to those responsible at technical and policy levels as it poses a threat to the validity and efficacy of interventions (Axford et al., 2012; Byrnes, Miller, Aalborg, Plasencia & Keagy, 2010; Gearing et al., 2014; Negreiros, 2013; Spoth & Redmond, 2002). Recent reviews of evidence-based programs do not address retention and adherence (Lloret, Espada, Cabrera & Burkhart, 2013). Several studies, however, suggest important implications for preventive outcomes (Al-Halabi-Díaz & Errasti, 2009; Gearing et al., 2014). For example, it is known that the trainers or technicians implementing the interventions and providing preventive content influence participant adherence. In this case, adherence is understood as loyalty to content, and this is related to participant satisfaction, compliance with intervention guidelines, and implementation quality (Byrnes et al., 2010; Orte, Ballester, Amer & Vives, 2014; Sexton & Turner, 2010). Programs with good results in process evaluations have higher adherence rates (Haavelmann et al., 2013), which improves the potential for prevention in health, quality of life, motivation, both for participants and professionals, and the efficient use of resources (Gyll, Spoth & Cornish, 2012).

The lack of adherence to preventive programs leads to a reduction in the expected results as well as having effects on other participants, who could thus partially lose motivation. Therefore, it not only affects the participating subjects, but

also the program as a whole, reducing its credibility (Aarons, Hurlburt & Horwitz, 2011; Allen, Linnan & Emmons, 2012; Segrott et al., 2017). Besides leading to worse preventive results, non-adherence represents an unproductive use of resources aimed at prevention and may actually increase the problem given the lack of necessary care (Gearing et al., 2014). In recent years, some research has been published which aims to address related elements, such as barriers to participation and the involvement of families in preventive programs (Al-Halabi-Díaz & Errasti, 2009; Negreiros, 2013; Negreiros, Ballester, Valero, Carmo & da Gama, 2019). For example, adherence to universal preventive programs can be affected by phenomena such as the self-selection of the most motivated families, those with the best family functioning, leading to the exclusion in greater proportion of families with higher levels of risk (Rosenman, Goates & Hill, 2012).

How do we measure adherence to preventive treatment?

Based on the results of recent reviews on psychosocial interventions, we can understand adherence as a construct consisting of several measures which may be categorized as: 1) session attendance measures; 2) measures of active participation during the session; and 3) measures of task completion between sessions (Gearing et al., 2014). The different levels of participation and involvement vary throughout the intervention process, and to analyze them it is necessary to specify moments for assessment and concrete indicators (Bamberger, Coatsworth, Fosco & Ram, 2014). Currently, session attendance (retention) is one of the most frequent measures (Gearing et al., 2014), while measures of participants' behavioral and attitudinal aspects have received less attention (Bamberger et al., 2014). Measuring adherence based only on retention or attendance is insufficient, so it is necessary to complement this with other measures, such as recruitment, the level of intervention compliance, active and committed participation, or the application of motivational strategies.

The study of preventive adherence is important in explaining and improving a program's ability to produce behavioral changes (Gearing et al., 2014); however, there is a lack of consensus and systematization regarding how it should be investigated. The main objective of this research is therefore to explore how adherence and retention are reported and assessed in family universal prevention programs which are considered effective. The analysis of adherence measures provides an assessment standard and allows the detection of aspects which may be missing or in need of improvement and which contribute to the consolidation of the concept of adherence in universal prevention programs. To this end, we have carried out a systematic review of the literature and analyzed different aspects related to the adherence of the programs found.

Method

Inclusion and exclusion

To select the studies, inclusion and exclusion criteria were established, following the recommendations of Sánchez-Meca and Botella (2015) for carrying out systematic reviews and meta-analyses to provide an element of quality assurance in selection. The inclusion criteria applied were publications in scientific journals between 2007 and 2019, in Spanish or English, on evidence-based universal family prevention programs aimed at young people between 10 and 14 years of age. Similarly, they also had to report on the results in terms of substance use prevention (alcohol, tobacco or illicit drugs). Studies without a control group, of single cases, without clearly defined family component, or lacking data were excluded.

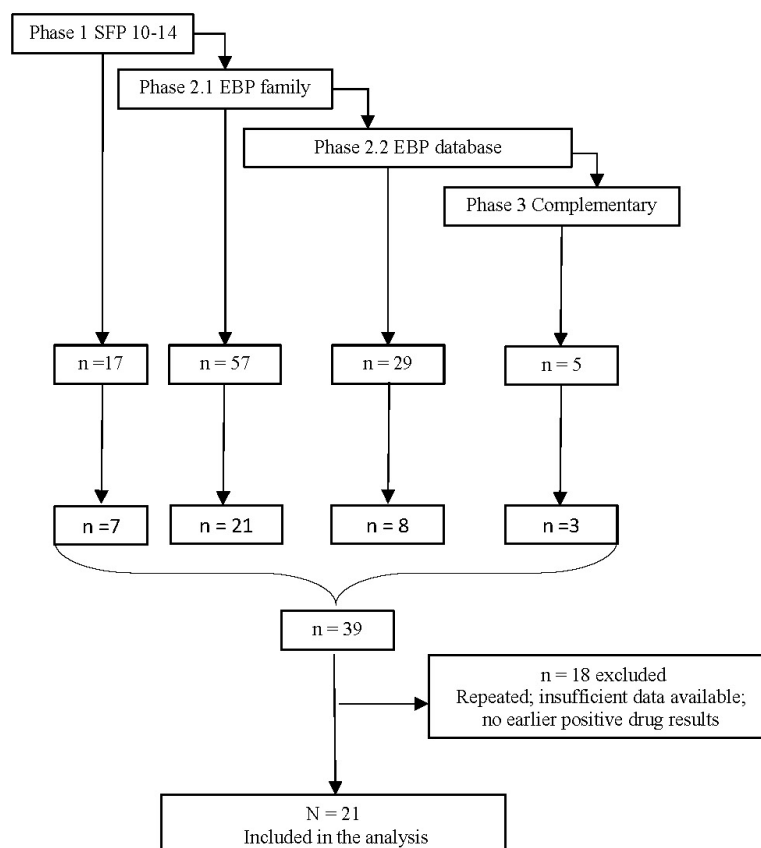
Search strategy

This systematic literature review was carried out between February 2018 and February 2019. The following databases were consulted: *PubMed*, *PsycINFO* (EBSCO), *PsycArticles* (EBSCO), *Social Work abstracts* (EBSCO), *CINAHL* (EBSCO), *SocIndex* (EBSCO), *Scopus*, *Academic Search Premier* (EBSCO), *SCIC-ISOC*, *Cochrane Database of Systematic Reviews*, *ERIC*,

ScienceDirect, *Web of Science* and *Project Cork*. The search was carried out in parallel by two of the study authors based on the PRISMA (Urrútia & Bonfill, 2010) protocol for preparing systematic reviews.

During the first phase, the search was focused on European experiences regarding the adaptation of the *Strengthening Families Program* (SFP) which had obtained positive drug prevention results. The key words used were: *Strengthening Families Program*, *SFP*, *10-14*. We found 17 articles, of which only 7 met the inclusion criteria (see Figure 1).

Given the low number of studies with results on the universal SFP, it was decided to broaden the search in a second phase to include the other universal family prevention programs by consulting the same databases. The key words were: *prevention*, *universal*, *program*, *intervention*, *family-based*. As a result of this search, 57 articles were found and 21 were selected (see Figure 1). In this phase, the reference portals of Evidence-Based Practices (EBP) were also consulted: *Blueprints* (University of Colorado, Boulder), *Xchange* (European Monitoring Center for Drugs and Drug Addiction, EMCDDA) and *SAMHSA* (Substance Abuse and Mental Health Services Administration). Eight articles were selected from EBP databases. The search was



Note. Source: Prepared by the authors.

Figure 1. Search phases and study selection flowchart.

supplemented in the third phase by directly contacting ten authors and leading experts in the field of prevention through the *ResearchGate* portal for academic dissemination and by email. A total of 39 articles were analyzed in depth, of which 18 were excluded for various reasons (see Figure 1). Twenty-one studies were finally included in the review.

Analysis procedure

Once the 21 articles were selected, analysis was systematized by generating a table with the main descriptive characteristics of the articles (see Table 1). Second, data was collected on the effects or outcomes of prevention (see Table 2). In order to organize the data on longitudinal retention, it was necessary to group them according to the months at which follow-up assessment was carried out (see Tables 2 and 3). Retention scores were classified on finishing the intervention (post), at follow-ups of less than 12 months, follow-ups between 12 and 24 months, and follow-ups over 24 months.

Results

The 21 studies analyzed correspond to a total of 6 universal family prevention programs: *Strengthening Families Programme 10-14* (SFP 10-14), *Parents Who Care, Family Check-Up* (FCU), *Linking Lives Health, Prevention of Alcohol use in Students* (PAS), and *Örebro Prevention Program* (ÖPP) (see Table 1).

All of the studies analyzed presented some information regarding program retention or attrition. However, there was a lack of information on active participation or monitoring and the application of intervention guidelines. Regarding methodological quality, it is worth noting that of the total number of studies analyzed, 18 are randomized studies and 3 are quasi-experimental. Furthermore, they all include a control group and longitudinal assessment (see Table 1).

Taking into account only the data of the intervention groups, the following retention means were found: 86.1% at post-intervention, 78.9% for follow-ups under 12 months, 80.81% for follow-ups between 12 and 24 months, and 72% for follow-ups over 24 months (see Table 2). Table 3 shows the data regarding control-group retention. We found retention means of 90.7% post-intervention, 87.6% for follow-ups under 12 months, 78.1% for follow-ups between 12 and 24 months, and 70.5% for follow-ups over 24 months. The longest follow-up times were up to 21 years (Spath, Trudeau, Shin & Redmond, 2008a; Spath, Trudeau, Shin, Randall & Mason, 2018), and the shortest follow-ups three months (Coombes, Allen & Foxcroft, 2012). Some of the studies also report measures of retention depending on the treatment modality, as is the case with the comparisons by Koning et al. (2009), Spath et al. (2008a), and Spath, Randall, Trudeau, Shin and Redmond (2008b). Some

studies report data separately for families, parents and young people, although this practice is not widespread, and most offer data on caregivers (parents), young people or families as a whole.

The lowest retention levels were found in the longest periods of longitudinal follow-up (more than 24 months), especially in the comparison groups (Koning et al., 2009; Koning, van den Eijnden, Verdurmen, Engels & Vollebergh, 2011, 2013; Spath et al., 2008ab; Verdurmen, Koning, Vollebergh, van den Eijnden & Engels, 2014) (see Table 3).

With regard to program recruitment capacity, only some studies (Coombes et al., 2012; Haggerty, Skinner, MacKenzie & Catalano, 2007) report data to calculate this, and they show participation percentages with reference to the number of sessions attended. For example, Coombes et al. indicate that in 2012, 98% attended 5 or more sessions, 86% attended 6 or more sessions, and 66% attended 7 sessions. Similarly, Haggerty et al. (2007) point out that the average number of telephone sessions completed by parents was 9.6 and attendance in the face-to-face modality was an average of 4.6 sessions. In general, we found no assessment regarding the degree of in-session involvement or participation.

Almost all studies assessed differential attrition, finding differences between groups and between baseline conditions. What stands out is the differential probability of dropping out of the program during follow-up when young people use alcohol and other substances at baseline (Baldus et al., 2016; Bodin & Strandberg, 2011; Koning et al., 2011; Koutakis, Stattin & Kerr, 2008; Spath et al., 2008b), when parents are indulgent (Koutakis et al., 2008) or there is a perception of risk, although the latter two are contradictory (Bröning et al., 2017; Spath et al., 2008a). The other studies examined attrition in relation to retention rates at each follow-up (Guilamo-Ramos et al., 2010; Haggerty et al., 2007; Haggerty, Skinner, Catalano, Abbott & Crutchfield, 2015; Koning et al., 2009, 2011, 2013; Verdurmen et al., 2014).

Regarding factors related to the improvement of adherence and retention (see Table 4), we found that 4 of the 21 studies (19%) (Coombes et al., 2012; Haggerty et al., 2007, 2015; Riesch et al., 2011) mention providing help and means to promote program attendance (childcare services, transport tickets, mutually agreed hours, etc.). As regards incentives, 7 of the 21 studies (33.3%) (Baldus et al., 2016; Coombes et al., 2012; Haggerty et al., 2007, 2015; Riesch et al., 2011; Stormshak et al., 2011; Van Ryzin, Stormshak & Dishion, 2012) report incentives in the form of finance, benefits or various educational resources. Other aspects worth highlighting are individualized follow-ups, reminders and telephone calls to encourage participation. Of the 21 studies, 8 (38%) report that they used such strategies during the program. In relation to instructor

Table 1. *Descriptive data and main study results.*

Program name	Study aim	Sample	Intervention	Design	Main results
SFP 10-14 Baldus et al. 2016	Evaluate the effects of the German version of the SFP.	SFP=147 Control=145	7 weekly sessions and 4 follow-up sessions.	Group-randomized trial with longitudinal analysis.	Positive results of SFP in lifetime prevalence in the 18-month follow-up.
SFP 10-14 Bröning et al. 2017	Verify the moderating risk hypothesis.	SFP=147 Control=145	7 weekly sessions and 4 follow-up sessions.	Group-randomized trial with longitudinal analysis.	Small effects in high-risk children in favor of SFP for tobacco, alcohol and cannabis withdrawal.
SFP 10-14 Coombes et al. 2012	Examine the UK version of SFP 10-14.	SFP: Parents: 26 Young people: 34 Control: Parents: 27 Young people: 35	7 weekly sessions and 4 follow-up sessions.	Ensayo aleatorizado por grupos con análisis longitudinal.	-
SFP 10-14 Foxcroft et al. 2017	Assess the effectiveness of the SFP adaptation.	SFP= 223 Control= 229	7 weekly sessions and 4 follow-up sessions, without homework.	Group-randomized trial with longitudinal analysis.	No impact at 12 or 24 months follow-up on the results of substance abuse.
SFP 10-14 Riesch et al. 2011	Examine the effects by dose received.	SFP=86 Control=81	7 weekly sessions without follow-up sessions.	Group-randomized trial with longitudinal analysis.	Good participation in full program. Contrary to expectations, the participants receiving partial intervention had low levels of consumption and no changes were observed at the end.
SFP10-14 Skärstrand et al. 2013	Report on the effects of the Swedish version of SFP 10-14.	SFP=71 Control= 216	12 sessions in two parts (reinforcement sessions optional in second part).	Group-randomized trial with longitudinal analysis.	No significant differences in alcohol, tobacco, and illicit drug use.
SFP 10-14 Spath et al. 2008a; 2018.	Summarize the results of two universal prevention projects.	Study 1 SFP=238 PDFY ² =221 Study 2 SFP=137 LST=646	Study 1 SFP 7 weekly sessions and 4 follow-up sessions. PDFY 5 2-hour sessions focused on substance use risk and protection factors, including family management, parent-child bonding, and communication. Study 2 SFP 7 weekly sessions and 4 LST ³ 15 sessions of 40-45-minutes taught in class by teachers, with 5 follow-up sessions.	Group-randomized trial with longitudinal analysis.	Study 1 Participants in the 12th grade ISFP intervention condition reported significantly less narcotic abuse, and PDFY participants reported less abuse than controls, which was marginally significant; less lifetime narcotic abuse and barbiturate abuse than controls, but PDFY was not significantly different. Study 2 In the 11th grade assessment, significantly fewer LST + SFP 10-14 participants reported using nonprescription medications over their lifetime than controls; in 12th grade assessment, the difference between LST + SFP 10-14 participants and controls was marginally significant.
SFP 10-14 Spath et al. 2008b	Examine the moderate risk hypothesis.	SFP+LST= 543 LST=622 Control= 489	SFP 7 weekly sessions and 4 LST 15 sessions of 40-45-minutes taught by teachers in class, with 5 follow-up sessions.	Group-randomized trial with longitudinal analysis.	Significant effects of 12th grade intervention on the substance initiation index, onset of drunkenness, smoking onset and marijuana onset. High-risk group showed lower level of problematic use in all variables than the control risk group, with an exceptional frequency of drunkenness.

Parents Who Care Haggerty et al. 2007	Assess the impact of the intervention.	PWC (African-American; AA)=163 PWC (European-American; EA)=168 PWC (in PA group)=118 PWC (self-administered SA)=107 Control=106	Format administered by parents and adolescents: Seven sessions (2 to 2.5h/session). Self-Administered with Telephone Support (SA): video and video book activities during 10 weeks, with 62 key activities and 4 hours of additional training in telephone protocols.	Experimental design (2x3x4); baseline, follow-up at 12 and 24 months.	Statistically significant effects of interventions were detected in three of the outcomes examined: Favorable attitudes on substance use, initiation of substance use or sex, and violent behavior.
PWC⁴ Haggerty et al. 2015	Assess the long-term effects of the Staying Connected with Your Teen in different forms of administration.	PWC (African-American; AA)=163 PWC (European-American; EA)=168 PWC (in PA group)=118 PWC (self-administered SA)=107 Control=106	Format administered by parents and adolescents: Seven sessions (2 to 2.5 h/session). Self-Administered with Telephone Support (SA): Video and video book activities during 10 weeks, with 62 key activities and 4 hours of additional training in telephone protocols.	Experimental design (2x3x4); 6-year follow-up.	The overall significant effect of PA intervention on family stressors and frequency of drug use for blacks and whites is an important finding. These findings add evidence to the potential of relatively brief family interventions to influence outcomes years later. Direct effect of BP status on both family stressors and frequency of drug use 6 years after the intervention for young black and white people. Here, we examine only frequency of drug use.
FCU⁵ Van Ryzin et al. 2011	Assess the impact of FCU on adolescent behavior problems for 4 years (including transition to high school).	FCU= 385 Control= 207	Universal intervention (information on parenting), selected intervention (interview across three sessions, assessment and feedback using motivational interview principles) and additional support (each curriculum for parents).	Group-randomized trial. 4-year follow-up.	Lower rates of alcohol consumption. Effect size calculations were not appropriate for count-based data such as drinking.
FCU Stormshak et al. 2011	Assess the impact and effectiveness of FCU and related intervention services to reduce risky health behaviors and promote social adjustment among middle schoolers.	FCU= 385 Control= 207	Universal intervention (information on parenting), selected intervention (interview across three sessions, assessment and feedback using motivational interview principles) and additional support (each curriculum for parents).	Group-randomized trial. 4-year follow-up.	Reduced increase of alcohol, tobacco, and marijuana use among high schoolers. Order of effect sizes: Smoking, drinking, marijuana use.
FCU Fosco et al. 2013	Explore the association between effort control and other key behavioral outcomes.	FCU= 385 Control= 207	Universal intervention (information on parenting), selected intervention (interview across three sessions, assessment and feedback using motivational interview principles) and additional support (each curriculum for parents).	Group-randomized trial. 4-year follow-up.	Reduced risk of growth and use of alcohol, tobacco, and marijuana up to eighth grade. Self-regulation was linked to slower growth in smoking, drinking, and marijuana use in middle school years.
LLH⁶ Guilamo-Ramos et al. 2010	Assess the effectiveness of a complementary parent-based component to a school intervention to prevent cigarette smoking among Africans.	TNT ⁷ plus parent = 695 Control= 691	2 sessions with parents, 2 booster sessions and 2 booster calls.	Group-randomized trial. 15-month post-intervention follow-up.	Likelihood of smoking cigarettes reduced by 42% for teens in the complementary parental condition compared to the TNT-only condition.

ÖPP* Bodin et al. 2011	Assess effectiveness.	1752 7th grade students (13–16 years) and 1314 parents.	Six short teacher and parent meetings: (20 minutes).	Quasi-experimental using controls paired with a pre-post, intent-to-treat design. Group randomized trial, with schools randomized to ÖPP or no intervention. Follow up at 12 and 30 months.	Significant reduction in drinking at 12 months, but this result was not maintained at 30 months.
ÖPP Koutakis et al. 2008	Assess effectiveness.	900 students (13-16 years) and their parents.	Parents received information by mail and during the six school meetings.	Quasi-experimental using controls paired with a pre-post, intent-to-treat design. Longitudinal follow-up at 2.5 years.	Involving parents proved to be an effective way to reduce underage drinking and crime.
PAS* Koning et al. 2009	Compare the prevention program based on parental intervention and student intervention.	Intervention with parents=689 Intervention students=771 Combination= 380 Control=779	Parental intervention (1 session); o student intervention (4 digital sessions); or both interventions combined.	Group-randomized trial. Follow-up at 10 and 22 months.	Follow-up 1: The combined student-parent intervention showed significant effects on excessive weekly drinking, weekly drinking, and frequency of drinking. Follow-up 2: The results were replicated, except for the effects on weekly alcohol use.
PAS Koning et al. 2011	Assessing the effects of the Dutch version of the ÖPP.	13–16 years Final sample (n)= 2937	(1) Six short sessions (20 minutes) with parents and (2) four digital lessons with students; (3) interventions 1 and 2 combined; and (4) the regular curriculum as a control condition.	Quasi-experimental. Follow-up at 34 months.	At 34 months follow-up, significant effects of combined PAS intervention (parents and students). Onset of excessive weekly drinking and weekly drinking was significantly reduced by 12.4% and 10.5%, respectively, in adolescents. No effects from separate interventions were found.
PAS Koning et al. 2013	Analyze the effectiveness of the PAS.	Parent intervention = 254 Student intervention = 291 Combined intervention = 193 Control= 326	Parental intervention (1 session); o student intervention (4 digital sessions); or both interventions combined.	Group-randomized trial. Follow-up at 50 months.	Combined intervention reduced prevalence of excessive weekend drinking and the amount of drinking in general.
PAS Verdurmen et al. 2004	Examine the impact and differential effects of moderators.	Parent intervention = 608 Student intervention = 675 Combined intervention = 812 Control= 935	Parental intervention (1 session); o student intervention (4 digital sessions); or both interventions combined.	Group-randomized trial. Follow-up at 22 months.	Combined intervention delayed onset of weekly drinking in the general adolescent population, and was particularly effective in delaying the onset of weekly excessive drinking in a higher-risk subsample.

Note. Source: Prepared by the authors.

1 Strengthening Families Programme. 2 Preparing for the Drug Free Years. 3 Life Skills Training. 4 Parents Who Care. 5 Family Check-Up. 6 Linking Lives Health. 7 Towards No Tobacco. 8 Örebro Prevention Programme. 9 Prevention of Alcohol use in Students.

Table 2. *Intervention group retention measures and retention percentages.*

Program	References	Post	Follow ups		
			Under 12 months	12 - 24 months	Over 24 months
SFP 10-14	Baldus et al. 2016; Bröning et al. 2017	Families: 139 (94.5%)	6 months Families: 136 (92.5%)	18 months Families: 135 (91.8%)	
	Coombes et al. 2012	Parents: 23 (88.4%) Young people: 24 (70.5%)	3 months Parents: 23 (88.4%) Young people: 21 (61.7%)		
	Foxcroft et al. 2017			12 months Families: 203 (69%) 24 months Families: 160 (52%)	
	Riesch et al. 2011	Families: 66 (76.7%)	6 months Families: 66 (76.7%)		
	Skärstrand et al. 2013			12 months Young people: 320 (95.5%) 24 months Young people: 288 (87.8%)	48 months Young people: 283 (86.2%)
	Spoth et al. 2008a; Spoth et al. 2018 Study 1	SFP: 188 (78.9%) PDFY: 177 (80%)		12 months SFP: 161 (67.6%) PDFY: 155 (70%) 24 months SFP: 152 (63.8%) PDFY: 145 (65.6%)	32 months SFP: 152 (63.8%) PDFY: 144 (65.1%) 72 months SFP: 151 (63.8%) 48 months SFP: 151 (63.4%) PDFY: 149 (67.4%) At 21 years SFP: 170 (71.4%) PDFY: 152 (68.7%)
	Spoth et al. 2008a; Spoth et al. 2008b Study 2	SFP+LST: 546 young people (94.7%) LST: 615 young people (95.2%)		12 months SFP+LST: 557 young people (96.7%) LST: 554 young people (85.7%) 24 months SFP+LST: 552 (95.8%) LST: 532 (82.3%)	32 months SFP+LST: 516 (89.5%) LST: 474 (67.1%) 48 months SFP+LST: 444 (77.1%) LST: 425 (65.7%)
PWC	Haggerty et al. 2007 2015.	SA: 102 (96.2%) PA: 107 (90.6%)		12 months SA: 100 families (94.3%) PA: 107 families (90.6%) 24 months SA: 93 families (87.7%) PA: 109 families (92.3%)	
FCU	Van Ryzin et al. 2012; Stormshak et al. 2011; Fosco et al. 2013.		287 families (74.3%)		
LLV	Guilamo-Ramos et al. 2010			15 months 554 families (79.2%)	
ÖPP	Bodin et al. 2011			12 months 835 young people (93.5%)	30 months 798 young people (87.1%)
	Koutakis et al. 2008			12 months 317 young people (80.6%) 256 parents (75.5%) 24 months 339 young people (86.2%) 264 parents (77.8%)	
PAS	Koning et al. 2009 2011 2013; Verdurmen et al. 2014	689 parents (86%) 771 young people (81.8%) 698 combined (85.9%)	10 months 655 parents (81.7%) 730 young people (77.4%) 639 combined (78.6%)	22 months 608 parents (75.9%) 675 young people (71.6%) 588 combined (72.4%)	
		<i>M=86.1</i>	<i>M=78.9</i>	<i>M=80.81</i>	<i>M=72</i>

Note. Source: Prepared by the authors.

Table 3. Comparison group retention measures and retention percentages.

Program	References	Post	Follow ups		
			Under 12 months	12 - 24 months	Over 24 months
SFP 10-14	Baldus et al. 2016 Bröning et al. 2017	Families: 137 (94.4%)	6 months Families: 132 (91%)	18 months Families: 127 (87.5%)	
	Coombes et al. 2012	Parents: 27 (100%) Young people: 35 (100%)	3 months Parents: 27 (100%) Young people: 35 (100%)		
	Foxcroft et al. 2017			12 months Families: 178 (78%) 24 months Families: 146 (65%)	
	Riesch et al. 2011	Families: 66 (81.4%)	6 months Families: 59 (72.8%)		
	Skärstrand et al. 2013			12 months Young people: 188 (97.4%) 24 months Young people: 177 (91.7%)	48 months Young people: 164 (84.9%)
	Spoth et al. 2008a Spoth et al. 2019 Study 1	Families: 186 (89.4%)		12 months Families: 156 (75%) 24 months Families: 141 (67.7%) 32 months Families: 151 (72.5%)	48 months Families: 157 (75.4%) 72 months Families: 157 (75.4%) At 21 years Families: 161 (77.4%)
	Spoth et al. 2008ab Study 2	Young people: 491 (78.5%)		12 months Young people: 479 (76.6%) 24 months Young people: 460 (73.6%)	32 months Young people: 452 (72.3%) 48 months Young people: 343 (54.8%)
PWC	Haggerty et al. 2007 2015.	Families: 105 (99%)		12 months 99 families (93.3%) 24 months 101 families (95.2%)	
FCU	Van Ryzin et al. 2012; Stormshak et al. 2011; Fosco et al. 2013.		172 families (83%)		
LLV	Guilamo-Ramos et al. 2010			15 months 542 families (78.4%)	
ÖPP	Bodin et al. 2011			12 months 778 young people (92.8%)	30 months 750 young people (87.3%)
	Koutakis et al. 2008			12 months 336 young people (80.3%) 268 parents (85.8%) 24 months 366 young people (87.5%)	
PAS	Koning et al. 2009 2011 2013; Verdurmen et al. 2014	779 controls (83.3%)	10 months 747 controls (79.8%)	22 months 699 controls (74.7%)	34 months 677 controls (72.4%) 50 months 326 controls (34.8%)
		<i>M= 90.7</i>	<i>M=87.6</i>	<i>M= 78.1</i>	<i>M=70.5</i>

Note. Source: Prepared by the authors.

training, all programs report carrying out specific training, with the exception of two studies that make no reference to the training of professionals (Koning et al., 2011; Van Ryzin et al., 2012). Training ranges from three and a half hours in length (Verdurmen et al., 2014), to several days (Coombes et al., 2012; Koutakis et al., 2008), and up to one week (Fosco, Frank, Stormshak & Dishion, 2013; Stormshak et al., 2011). However, none of the studies, except that of Coombes et al. (2012), refers to the characteristics that the instructor must have to make participants feel part of the program and promote adherence. In addition, it was found that 15 studies work with structured and manualized content (71.4%), with some materials being adapted (Bröning et al., 2017; Foxcroft, Callen, Davies & Okulicz-Kozaryn, 2017; Koning et al., 2009; Skärstrand, Sundell & Andréasson, 2014). Regarding venue, all of the studies were implemented in the school environment, with only some of the comparison modalities carried out in other contexts (Haggerty et al., 2007, 2015; Riesch et al., 2011).

Discussion and conclusions

The effective universal family prevention programs analyzed show good retention capacity, in both the short and long term, and also meet the highest standards of methodological quality (randomized studies, control groups, and longitudinal follow-ups). However, the analysis of preventive efficacy requires the study of different levels of adherence in terms of session attendance and involvement within between sessions (Gearing et al., 2014). In general terms, it appears that there is no standard procedure to report these aspects (Bamberger et al., 2014; Gearing et al., 2014).

Regarding the data on adherence from attendance figures, the programs analyzed mostly provide session attendance measures, reporting high retention rates in longitudinal follow-ups, especially in the experimental groups. However, these data are not disaggregated by type of participant (caregivers, young people, or families) or by treatment modality (face-to-face, online, etc.), which

Table 4. *Factors related to improving adherence and retention.*

Program	Reference	Attendance aid	Financial and other incentives	Snacks	Telephone reminders	Instructor training	Manual
SFP 10-14	Baldus et al. 2016		x	x		x	x
	Bröning et al. 2017			x		x	x adapted
	Coombes et al. 2012	x	x	x	x	3 days	x
	Foxcroft et al. 2017					X	x adapted
	Riesch et al. 2011	x	x	x	x	X	
	Skärstrand et al. 2013					x (trainer and support)	x adapted
	Spoth et al. 2008a Spoth et al. 2019					x	
	Spoth et al. 2008b					3 days	x
PWC	Haggerty et al. 2007	x	x		x	20h	x
	Haggerty et al. 2015	x	x		x	x	x
FCU	Van Ryzin et al. 2012		x	x			x
	Stormshak et al. 2011		x	x		1 week and follow-ups	x
	Fosco et al. 2013					1 week and follow-ups	x
LLV	Guilamo-Ramos et al. 2010				x		x
ÖPP	Bodin et al. 2011					x	
	Koutakis et al. 2008					2 days	
PAS	Koning et al. 2009				x	x	x adapted from ÖPP
	Koning et al. 2011, 2013				x	x	
	Verdurmen et al. 2014				x	x (4 50-min sessions)	
	Koning et al. 2011						

Note. Source: Prepared by the authors.

also does not allow the analysis of program recruitment capacity (few of them provide information on the number of invitations or sample available for recruitment).

The use of differential attribution measures is more widespread and provides relevant information for studying adherence, especially in the experimental groups. These results can be useful for improving the understanding of elements such as self-selection (Bröning et al., 2017; Rosenman et al., 2012; Spoth et al., 2008a) or like previous drug use (Baldus et al., 2016; Bodin et al., 2011; Koning et al., 2011; Koutakis et al., 2008; Spoth et al., 2008b), in terms of predicting early program dropout, especially in universal prevention.

The record of attendance is the most frequent measure because it is easy to collect and is usually done at the end of the intervention, so it is not very useful for introducing improvements or changes during program implementation (Gearing et al., 2014). While the same level of attendance to sessions could be observed, it was with different adherence patterns reflecting different results (Ballester, Valero, Orte & Amer, 2018).

Other measures, such as the quality of participation or the performance of prescribed tasks, are more difficult to assess and are therefore less frequently observed (Bamberger et al., 2014; Gearing et al., 2014). Quality of participation could be assessed by having external observers or trainers themselves register the quality of the contributions made to the session or the emotional

bond between professional and participants. This could also be done by the participants themselves. To assess the monitoring of behavioral guidelines with the aim of consolidating learning and generalizing it to participants' natural context or daily life, audits of tasks carried out can be implemented in the form of checklists, diaries or other tangible products (Gearing et al., 2014).

Non-adherence affects the efficacy of interventions and reduces the potential impact of universal family prevention programs (Bamberger et al., 2014; García-del-Castillo et al., 2014), especially when the program's participation requirement is high (Negreiros, 2013), or when the perception of risk is low, as is the case with universal prevention (Bröning et al., 2017; Rosenman et al., 2012).

Among the main limitations of the study, we can highlight the impossibility of performing a meta-analysis due to the small sample sizes of the studies and the lack of information to make calculation of effect sizes possible. Another important limitation has to do with specific content since only universal family prevention programs which show positive results in reducing drug use were analyzed.

Regarding future recommendations, it should be noted that differences are observed when providing information on the inclusion of elements or factors which the literature recognizes as improving or increasing adherence and retention, such as loyalty to content, use of standardized manuals, incentives or snacks, instructor training, removal of logistical barriers, or reminders and participation

Table 5. *Recommendations for improving adherence.*

Recruitment	- Involvement of institutions recognized by families and dissemination of programs through them. - Collaboration with recognized people or community leaders. - Involvement of technicians and mediators who already work with families, for example, organizing information sessions with these technicians. - Collaboration of parents involved in previous applications in information sessions for recruitment. - Presentation of the programs highlighting their benefits. - Ensure the time lapse between briefing and first session is minimal.
Retention	- Implement the programs in controlled environments, accessible and non-stigmatized spaces. - Hold sessions with families at appropriate times and of reasonable length. - Offer guarantees of confidentiality and session privacy. - Organize family follow-up between sessions to ensure their participation and attendance. - Offer support services to families for the care of smaller children not participating in the program.
Implementation	- Suitable training of trainers in content, leadership skills and group dynamics. - Adhesion/adherence to the program structure, content and methodology. - Training sessions to reinforce trainers. - Training team stability throughout the application. - Creation of a pleasant environment for the development of sessions with families. - Integrating parents' ideas. - Promoting active listening. - Encouragement of interaction and participation to guarantee everyone learns. - Promote mutual support between families, highlighting strengths of the group. - Implementation of reminder sessions to reinforce learning. - Encourage and ensure that families implement program practice on a daily basis. - Respond to participants' own concerns, needs and difficulties.

Note. Source: Prepared by the authors based on PNSD (2016) and Negreiros et al. (2019).

monitoring (Al-Halabi-Diaz & Errasti, 2009; Byrnes et al., 2010; Haavelmann et al., 2013; Kumpfer, 2008; Negreiros et al., 2019; Sexton & Turner, 2010; Orte et al., 2014). For this reason, it is recommended that those programs which include any of these measures report the necessary data on the number of follow-ups or telephone reminders, the number of attendance aids, incentives, instructor training, etc., in order to assess their impact on the results, adherence and participation (Schwalbe & Gearing, 2012).

In addition, the literature indicates that adherence increases if the program is stimulating and meets the subjective needs of the participants; therefore, it must be based on proven dynamics and processes (Gearing et al., 2014; Plan Nacional Sobre Drogas, 2016). Given that commitment and involvement in the program is a dynamic factor which changes over time (Bamberger et al., 2014), the level of participation needs to be measured across the different sessions and also between sessions (Gearing et al., 2014).

Following the recommendations for future studies presented in the Plan Nacional sobre Drogas (2016) and the results of similar reviews (in Negreiros et al., 2019), we propose some actions to achieve the adherence of families participating in the programs. These recommendations go beyond adherence as face-to-face participation and include proposals for good practice related to attracting or recruiting families, as well as aspects of program implementation (see Table 5).

There are many reasons for seeking to improve adherence to preventive programs and the way this construct is reported. The main practical contribution of this review is the provision of a framework of reference for good practice and a guide for establishing a standard for the assessment of adherence to universal family prevention programs.

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Conflict of interests

The authors declare that there is no conflict of interest.

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Apps for smoking cessation through Cognitive Behavioural Therapy. A review

Apps para dejar de fumar mediante Terapia Cognitivo Conductual. Una revisión sistemática

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Abstract

Smoking is a health and economic problem that is difficult to eradicate. Nicotine addicts also often suffer from psychological problems such as depression and anxiety. The recommended treatment according to clinical practice guidelines (CPG) is Cognitive Behavioural therapy (CBT), alone or combined with medication. Currently, health-related apps (m Health) enable wider availability and access to this treatment. The objectives of this study are to carry out a review of the smoking cessation apps that apply CBT and to describe the techniques used by them. Following the PRISMA framework, the databases EBSCOhost, Cochrane, Web of Science and Scopus were searched for publications between 2010-2019. Four hundred fifteen studies were found and, after applying the inclusion and exclusion criteria, only five articles were eligible for systematic review. Only three apps were identified as using CBT, and the techniques most commonly used were the recording of smoking history, progress visualised through graphics, psycho-educational videos, motivation, social support through social media, and elements of gamification to reinforce adherence and abstinence behaviour. The results recommend the inclusion of smoking behaviour analysis in these types of apps, as not all of them do so, as well as an interface between the health professionals and the users to provide a personalised treatment.

Key Words: Smoking cessation; Cognitive Behavioural Therapy; mobile applications.

Resumen

El tabaquismo constituye un problema sanitario y económico de difícil erradicación. Las personas más dependientes a la nicotina suelen presentar, además, problemas psicopatológicos como depresión y ansiedad. Según las Guías de Práctica Clínica (GPC), el tratamiento recomendado para abandonar el hábito es la Terapia Cognitivo Conductual (TCC), sola o combinada con medicación. Actualmente, las aplicaciones móviles (*App*) en salud (*mHealth*) permiten un acceso masivo y económico a este tratamiento. El objetivo de este trabajo consiste en llevar a cabo una revisión bibliográfica de las *Apps* para dejar de fumar que apliquen TCC y describir las técnicas implementadas. En el marco del protocolo PRISMA, la búsqueda se ciñó al periodo 2010-19 y se realizó en las bases de datos: EBSCOhost, Cochrane, Web of Science y Scopus. Se hallaron un total de 415 trabajos, de los cuales, tras aplicar los criterios de inclusión/exclusión, solo 5 artículos fueron objeto de revisión. Únicamente se identificaron 3 *Apps* (en inglés) que incluyeran TCC y, las técnicas más utilizadas fueron: el registro de cigarrillos, la visualización del progreso mediante gráficas, videos psicoeducativos, la motivación, el apoyo social mediante redes sociales y elementos de gamificación para reforzar la adherencia y la conducta de abstinencia. Los resultados sugieren incluir en este tipo de *Apps* el análisis de la conducta de fumar, ya que no todas lo hacen, así como una interfaz que comunique el personal sanitario con el usuario y pueda proporcionar un tratamiento personalizado.

Palabras clave: Dejar de fumar; Terapia Cognitivo Conductual; aplicaciones móviles.

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According to the World Health Organization (WHO), tobacco causes the death of half of its users. It is estimated that in 2030 there will be more than 7 million tobacco-related deaths per year (OMS, 2019). In Spain, the percentage of daily smokers over the age of 15 is over 22% of the population (ENSE, 2017). The adolescent population aged aged between 17 and 18 has seen an increase in smoking (Leal-López, Sánchez-Queija & Moreno, 2019). Moreover, tobacco is one of the few drugs that harms not only smokers but also the people around them.

In economic terms, smoking imposes a heavy financial burden worldwide, especially in Europe and North America, where the tobacco epidemic is more advanced. In the United Kingdom, the British national health system (NHS) estimated annual health costs generated by smoking at £2.6 billion (UK Government, 2015). Globally, the cost of smoking-related health problems in 2012 rose by 5.7%, excluding indirect costs due to lost productivity (Goodchild, Nargis & Tursan d'Espaignet, 2018). Nor does this figure include the cost of passive smoking, responsible for about 600,000 deaths per year (Öberg, Jaakkola, Woodward, Peruga & Prüss-Ustün, 2011).

In addition to being a serious health and economic problem, smoking is a difficult addiction to eradicate given dependence it generates at physiological, psychological and social levels. Withdrawal also has several consequences: craving symptoms despite the desire and attempts not to smoke, psychoactive effects of the substance on the brain and behavioural impairment due to nicotine reinforcement (Camarelles et al., 2009). Regarding the above effects, it should be noted that people with greater nicotine dependence frequently present psychopathological problems (anxiety, depression, stress, etc.), a fact that makes detoxification treatments more complex (Becona et al., 2014). In the case of depression, a linear relationship has been found between the severity of use and the severity of depression symptoms (Jiménez-Treviño et al., 2019).

Treatments included in the Clinical Practice Guidelines (CPG) for smoking cessation include the pharmacological (Nicotine Substitute Therapy, Bupropion or Varenicline), the behavioural (Cognitive Behavioural Therapy, CBT) or a combination of both in more complex cases (Fiore et al., 2008; NICE, 2018).

The CBT described in these programs focuses primarily on the analysis of smoking behaviour in order to develop alternative behaviours to help the smoker deal more effectively with risk situations related to the habit; this has proven effective in maintaining abstinence (Deiches, Baker, Lanza & Piper, 2013). CBT programs are described as multicomponent therapies since they incorporate different techniques, such as psychoeducation, cognitive restructuring, problem solving, relaxation and social support, among others, around a cessation strategy

(Alonso-Pérez et al., 2014; Becoña, Míguez, Fernandez del Río & López, 2010; Raich et al., 2015). The need to attend to a large population and the expense generated by this health problem mean that treatments which have proven effective have to be provided not only face-to-face but also in a different format, for example, through the use of information and communication technologies (ICT). ICTs and specifically mobile phone health applications, mHealth, can offer low-cost alternatives. In addition, such apps offer their users a series of benefits missing in other formats, such as accessibility to treatments, immediate and real-time attention to smoking behaviour and withdrawal symptoms, flexibility with regard to time, progress monitoring, personalized feedback, motivational support and complementarity regarding improved communication with health professionals (Kazdin, 2015; Kreps & Neuhauser, 2010; Do et al., 2018; Whittaker, McRobbie, Bullen, Rodgers & Gu, 2016). These advantages are reflected in the growth of these applications on the market (Haskins, Lesperance, Gibbons & Boudreaux, 2017) and the number of monthly downloads to quit smoking (Hartmann-Boyce, Stead, Cahill & Lancaster, 2013). However, there are also some drawbacks to consider: technical problems (app software issues), data security, patient privacy, handling of the device by the healthcare professional, or user distrust of this type of method (Luxton, Mccann, Bush, Mishkind & Reger, 2011).

Despite the large number of apps and downloads, the scientific community reports that it is necessary to study the effectiveness of the treatments they offer because the vast majority of mHealth apps do not follow the guidelines set by the CPG (Abroms, Lee Westmaas, Bontemps-Jones, Ramani & Mellerson, 2013; Gulati & Hinds, 2018; Haskins et al., 2017; Thomas, Abramson, Bonevski & George, 2017) the most popular apps were identified (n=47 for the iPhone and n=51 for the Android), nor do they incorporate therapies of proven efficacy, such as CBT (Heather, Haffe, Peele & Rho, 2016; Nijhof, Bleijenberg, Uiterwaal, Kimpfen & Putte, 2012).

Given the above, we ask whether there are mobile applications for quitting smoking which include CBT as a treatment. To answer this question, our aims are the following: 1) Identify mobile phone smoking cessation applications which include CBT, and 2) Describe the CBT techniques used by these applications.

Method

A literature review was performed using the keywords: *Smoking Cessation, mHealth, mobile application, Smartphone, Cognitive Behavioural Therapy*, which were combined with the classic Boolean operators (OR, AND) and phrase search using (") and truncation (*). Articles were selected which contained the descriptors in key terms in the title,

abstract and keyword fields in the period between 2010 and August 2019. The databases consulted were: EBScOhost (PsycINFO, CINAHL, Psycarticles, Psychology and Behavioural Sciences Collection), Cochrane (PubMed, EMBASE), Web Of Science (Medline, Scielo) and Scopus. The entire review process followed the PRISMA protocol recommendations (Liberati, Altman, Tetzlaff & Al, 2009).

The inclusion criteria were: 1) appearance of any of the search terms in the title, abstract or keyword, 2) study participants aged over 18 and 3) publications in English or Spanish. Studies carried out on samples with mental pathology or pregnant women, and studies dealing with simultaneous addictions (e.g., alcohol and tobacco, marijuana and tobacco...) were excluded.

The Mendeley reference manager was used to eliminate duplicates. The title and abstract were read to verify that they met the inclusion criteria, and those that did not were discarded. The full texts of those selected were subsequently obtained to be evaluated in their entirety.

Results

A total of 415 studies were found in the search: 16 in Scopus, 5 in EBSCOhost, 316 in Cochrane Library and 78 Web of Science. Figure 1 shows the article selection

flowchart. After eliminating those that did not meet the inclusion criteria, a total of 6 studies remained, which were subjected to exhaustive analysis. A further study was finally eliminated because it did not describe a specific app but only a CBT technique.

One of the main observations in this review is the existence of a large number of mobile applications aiming to help smokers to quit, with at least 400 available apps identified for both Android and iPhone operating systems (Regmi, Kassim, Ahmad & Tuah, 2017). However, examples of mHealth found to incorporate CBT are scarce. Moreover, it is important to note that, despite the large number of applications available (Apps Store and Play Store) to treat smoking, none have been proven effective in studies, nor are they supported by health workers (Haskins et al., 2017).

Three smoking cessation apps incorporating CBT are mentioned in the five articles selected: *SmartQuit* (Heffner, Vilardaga, Mercer, Kientz & Bricker, 2015), *Smoke Mind* (Alsharif & Philip, 2015a, 2015b) and *Quit Genius* (Lin et al., 2018; Tudor-Sfetea et al., 2018) are extracted. Following an exhaustive analysis of the studies selected, useful information in line with our research aims was extracted from each (Table 1).

The first study presents the *SmartQuit* app (Heffner et al., 2015), designed in Seattle by one of the co-authors Dr.

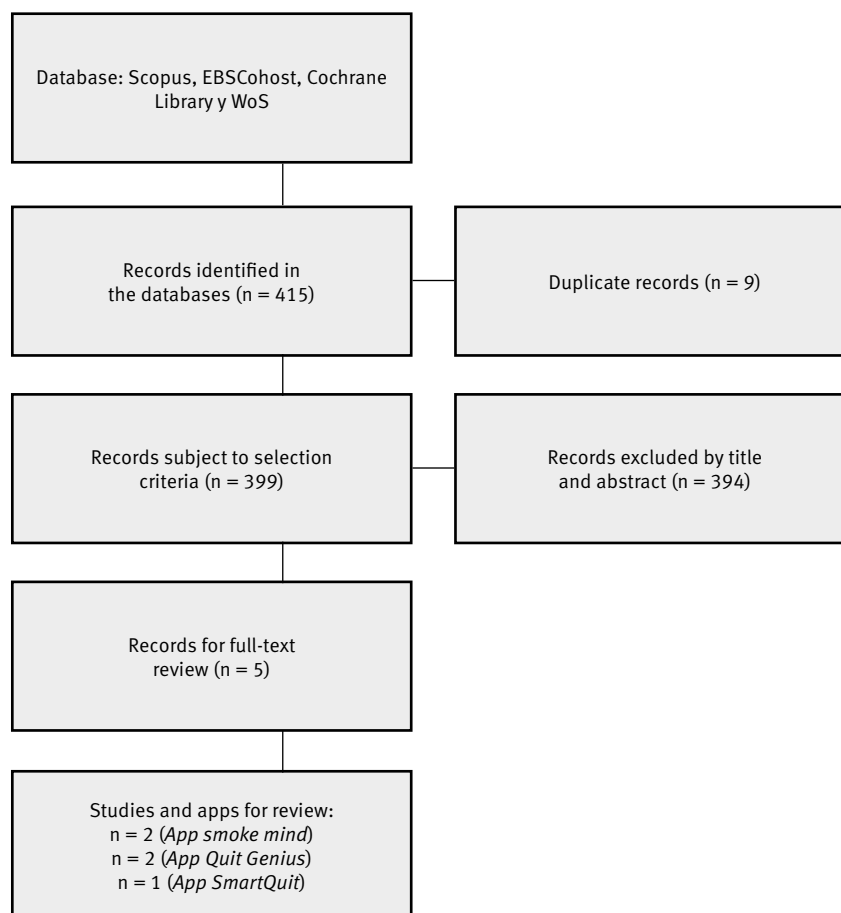


Figure 1. Flowchart of the study selection.

Bricker (Fred Hutchinson Cancer Research Center). It is limited to English-speaking users with Apple-type devices and involves an 8-week treatment based on Acceptance and Commitment Therapy (ACT), combined with CBT techniques. Sixty days after using the app, of a total of 41 available functions the ten most used were assessed. Results indicate that eight were CBT (see Table 1), with a statistically significant relationship found between the function “viewing the quit plan” and smoking cessation. This function prompts activities such as: set quit date, give reasons why you want to quit smoking (supported by images), agree on the behavioural strategy to reduce smoking and indicate whether medication will be used for support. Users can also check their smoking habits, monthly costs and select people in their circle who will support them during the process of quitting.

The two studies focussing on the *Smoke Mind* app were published in 2015 by the same authors, Alsharif and Philip. The first study presents a proposal to design an application

on a treatment model which combines CBT with *mHealth* (Alsharif & Philip, 2015a). The app has 3 modules: smoking cessation management module, interactive module (with an interface for professionals to intervene in the treatment) and CBT module. The CBT functions focus on identifying risk situations (situations in which the user smoked and in which he or she must now abstain) and working on them to modify behaviour. To this end, they incorporate techniques such as: cognitive restructuring, problem solving, training in coping skills and relaxation among others (see Table 1). These techniques are explained in educational videos, tutorials and/or messages. In addition, *Smoke Mind* has a daily record of the user's carbon monoxide (CO), measured using a cooximeter provided for the patients. After taking the measurement, they record it manually on the app, which sends the information to the centre. If CO increases, the CBT therapist asks the user for a behaviour analysis (I think, feel and act) and offers immediate feedback.

Table 1. Results of the articles analysed.

Author (Year)	Objectives	Design/Sample/Measures	App name/Characteristics	CBT components	Results
Heffner, et al. (2015)	(1) Specify the 10 most used functions of the app to quit smoking. (2) Determine which are the predictors of tobacco cessation.	Descriptive analysis (post hoc). N = 76 Sex = 54%(M) Age (m/sd) = (41.8/11.9) Online questionnaire about online app aspects.	App: <i>Smart Quit</i> Characteristics: Combines ACT and CBT.	- Self-report of behaviour with feedback (follow-ups and progress). - Goal setting (quit plan). - Positive reinforcement (gamification elements). - Social support (sharing progress).	(1) Only 8 of the 10 functions are CBT; see quit plan, smoking behaviour follow-up, see progress calendar, see sharing page, see progress table, see places follow-ups, see badges earned and notepad. (2) Best predictor of smoking cessation, see quit plan ($p = 0.03$). OR = 11.1, 95% CI = 1.3-94.2. Predictor of failure, see follow-up $p < 0.04$, OR = 0.11, 95% CI (0.1-0.9).
Alsharif & Philip (2015)	Propose a model that includes CBT and mobile smoking cessation technology.	Describing contents with regard to the objectives set.	App: <i>Smoke Mind</i> Characteristics: Web portal for healthcare professionals. Remote monitoring Communication channel with CBT therapist.	Direct and personal feedback from health professionals. - Behaviour graphics. - Emotional support. - Behaviour analysis (thinking, feeling, acting). - Psychoeducation (videos). - Train skills. - Relaxation. - Problem solving. - Motivational messages. - Social support.	The proposed model consists of: - mHealth platform. - Support system based on data mining techniques to provide optimal information management.
Alsharif & Philip (2015)	Discover opinions regarding the preferences of smokers and health professionals in the use of the smoking cessation app and its functions.	Descriptive study. N = 52 Sex = 71%(M) Women = 29% Age = 18-54 Questionnaire based on concepts of use of the app and semi-structured interview.	App: <i>Smoke Mind</i> (same characteristics as previous study)	(same characteristics as previous study)	User Preferences: - Progress graphics (90%). - Alerts, notifications (57.6%). - Informative videos, educational material, feedback from doctors and ex-smokers (88.4%). - Telephone helpline (77%). - Continue using the app after treatment (73%). Preferences of the professionals: - Interaction with hospital. - Ability to update follow-ups. - Ability to attend to individual problems.

The second study involving the *Smoke Mind* application (Alsharif & Philip, 2015b) aims to assess the opinions of users and health professionals regarding the app as a method of quitting smoking, as well as its functions. For this purpose, a sample of 52 users was interviewed, mostly university and health personnel (3 doctors and 5 social

workers). The results indicate that 100% of users value getting the smoking cessation treatment through the app positively, highlighting some preferences (see Table 1). In addition, the healthcare staff see the ability to intervene in the treatment and interact with the patient to address the problems individually as an important benefit.

Table 1 (cont.). *Results of the articles analysed.*

Author (Year)	Objetives	Design/Sample/Measures	App name/Characteristics	CBT components	Results
Tudor-Sfetea et al. (2018)	(1) Identify opinions regarding two apps as a method to quit smoking and their functions: (<i>Smokefree</i> (no CBT) and <i>Quit Genius</i> (with CBT)). (2) Identify the opinions of the users of the apps regarding the results.	Short-term qualitative longitudinal study. Semi-structured interview. N = 15 university students. Sex = 13(M). Age(m) = 25.07	App: <i>Quit Genius</i> (TCC) Treatment duration = 8 weeks (4 stages and 39 steps). Assessment aspects, after 1 week of use: - App functions. General functions - App design. - Interactivity. - Information contents (information style, commitment, quality). - App usability. - Effects of the app. - Improvements of the app.	- Log behaviour (cigarette log). - Motivational messages. - Educational information (about consequences of smoking). - Psychoeducation (on CBT). - Personalized relationship. - Help identify triggers of smoking behaviour. - Imagined exposure (critical situations). - Relaxation. - Problem solving. - Gamification elements. - Social support (peer community).	(1) Report positively regarding the app as a method, as well as its functions and design. (2) Regarding their opinions of results: - Reduced the number of cigarettes per day (53%). - Increased motivation to quit smoking (53%). - Expressed their desire to continue using the app (67%). - Would recommend the app to others (73%).
Lin et al. (2018)	(1) Explore the progress function of the CBT program. (2) Examine the gamification elements of the app design, regarding the constructs empowerment, well-being and inspiration. (3) Explore the association of the constructs empowerment, well-being and inspiration with quitting smoking or reducing the number of cigarettes smoked. (4) Identify and describe the possible facilitators and barriers arising from the app's design elements.	Qualitative longitudinal study. N = 190 Age(m) = 36 Sex = 52.6%(F) Online interview Scales adapted to measure items: Hedonic wellbeing, empowerment, inspiration and anxiety.	App: <i>Quit Genius</i> (same characteristics as previous study)	(same characteristics as previous study)	(1) 69 quit smoking, 121 did not quit smoking (59.6% reduced the number of cigarettes). - Completing the treatment is predictive of: High empowerment ($p < 0.01$; beta = 0.27), inspiration ($p = 0.02$; beta = 0.18) and well-being ($p = 0.06$; beta = 0.14). - Finishing the program is not a predictor of smoking cessation. (2) The gamification elements of the app increase empowerment and are predictors of smoking cessation. (3) Predictors of smoking cessation probability with app: - Wellness ($p = 0.01$; beta = 0.54), - Empowerment ($p < 0.05$; beta = 0.47) and - Inspiration ($p = 0.05$; beta = -0.48). - The improvements in well-being increase the probability of smoking cessation by 1.72. - Predictors of reducing the number of cigarettes: - Empowerment ($p < 0.01$; beta = 0.18) - Inspiration ($p < 0.05$; beta = 0.11) Positive correlation between: - Empowerment - well-being 75% ($p < 0.01$), inspiration - empowerment 79% ($p < 0.01$), inspiration - Well-being 66% ($p < 0.01$). (4) Impact of design variables on psychological variables.

The last two articles reviewed analyze *Quit Genius* (Lin et al., 2018; Tudor-Sfetea et al., 2018), in which the CBT treatment is spread across 4 stages and divided into 39 steps. In addition, it features a personalized application involving self-reflection on smoking behaviour, recording the number of cigarettes smoked, psychoeducation (video and audio format), the development of coping strategies, interactive exercises (motivation, relaxation, fun and stress management) and troubleshooting techniques. It also has gamification elements to reinforce tobacco abstinence behaviour in an imagined journey with achievements, progress bars, monitoring, achievement badges and a calculator that shows financial savings by cutting down on smoking. The first study by Lin et al. (2018) sets out to explore in the app the role of CBT treatment and the elements of gamification on psychological components such as empowerment (intrinsic motivation), well-being and inspiration, among others. They also evaluate the effectiveness of these elements on smoking cessation or reduction of cigarettes. The data under study are collected through the application itself and an online interview with the user at the end of the treatment. Results indicate that performing the complete CBT treatment is a predictor of improvements in the constructs of well-being, inspiration and empowerment. A regression analysis shows well-being to be a predictor of smoking cessation, while the increase in inspiration is a predictor of remaining a smoker but with a 34% probability of reducing the number of cigarettes per day. Empowerment is also linked to a decrease in the number of cigarettes. The impact of the app's design elements on the increase in these variables is highlighted, and the elements of gamification are seen to increase the user's empowerment, predicting the ability to quit.

The study by Tudor-Sfetea et al. (2018) assessed users' opinions regarding the app, evaluating the application and the method to help quit smoking, as well as its functions and its possible influence on behavioural changes. Data were obtained through interviews with 15 university students, who offered a positive assessment both of functions and use of the app as a method to quit smoking. The results of this study show that the smoking behaviour diary is valued positively and understood as a technique which increases motivation for quitting and decreasing cigarette consumption. The elements of gamification were also assessed very positively.

All five studies describe the CBT techniques implemented by the apps, but only one of them details the development of the application and its operation (Alsharif & Philip, 2015a). Table 2 summarizes the basic techniques of CBT interventions and those described in the studies of the apps reviewed. The main CBT techniques implemented by the three applications are: cigarette log, visualization of progress through graphics, psychoeducation (through educational videos, tutorials and/or text), motivation

(through videos, motivational messages), social support (through the use of social networks), the possibility of a combined treatment with medication, and adding gamification elements to reinforce abstinence behaviour and/or use of the app.

Discussion

The main objective of this study was to investigate the existence of possible mobile applications to quit smoking and describe their main functions, especially those involving techniques and/or procedures implicit in CBT. Three applications were found: *SmartQuit*, *Smoke Mind* and *Quit Genius*, although none of the studies analysing their use fully describe the techniques and information included in the apps. To bridge this gap, we tried downloading the applications, consulting the websites and even contacting the authors of the studies reviewed, but even so, it was difficult to resolve some of the questions regarding functionality and information offered by the applications.

Furthermore, the studies reviewed are based on small and non-representative samples of the general population, making it difficult to extrapolate the results. The sample in the study by Tudor-Sfetea et al. (2018) consisted of 15 university students, and in that of Alsharif and Philip (2015b) 52 smokers, mostly also university students. Both studies were of a descriptive and observational design, while the two on the *Quit Genius* app were qualitative longitudinal studies. These types of design do not allow causal associations to be made between the variables studied in the treatment and the results obtained (quitting smoking or reducing the number of cigarettes). Likewise, in terms of the scientific rigor of the published sources, it is noteworthy that while the studies on the *Quit Genius* app came from journals of high scientific impact, the same is not true of the studies involving the other two apps; one of them (*Smoke Mind*), was even published in proceedings of congresses.

Although CBT is reasonably well applied in the three apps, *SmartQuit* and *Quit Genius* combine it with other therapeutic approaches, such as ACT, considered a third-generation therapy, and mindfulness techniques, respectively. Face-to-face studies incorporating other techniques into CBT programs, such as behavioural activation, have evidenced improvements in the depressive symptoms related to smoking relapse (Martínez-Vispo et al., 2019). However, no evidence is available to assess the combined effect of these therapies or techniques in the apps reviewed. On the other hand, the analysis of smoking behaviour (thinking, feeling, acting) as an essential technique in CBT is well represented in the *Smoke Mind* and *Quit Genius Apps*, but it cannot be firmly stated that it is applied in the case of *SmartQuit*. In the latter, the objective of which is to develop skills to accept the triggers of smoking behaviour, the ACT approach carries more weight.

Table 2. CBT components used in the mobile apps reviewed.

CBT	SmartQuit	Smoke Mind	Quit Genius
Questionnaire assessment: Nicotine dependence		x	
Questionnaire assessment: Motivation to quit smoking			x
Interview regarding history of smoking (habits)	x	x	x
Psychoeducation about addictive behaviour and CBT		x	X*
Information about tobacco, craving, health consequences		X*	x
Self-report of the number of cigarettes smoked	x	x	x
Analysis of smoking behaviour: (I think, feel and do)		x	x
Quit plan: Reduction techniques. Gradual reduction of nicotine and tar intake	x	x	x
Quit plan: Quit date (eliminate all cigarettes on that date)			
Motivational exercises: Advantages and disadvantages of quitting smoking, reasons to quit	x	X*	x
Feedback on efforts: Graphic representation of consumption	x	x	x
Control of anxiety, stress: Training in relaxation techniques and deep breathing		x	x
Control triggers: Places, people and activities where user smoked and will now remain abstinent		x	x
Social support: Exercise of social commitment with people nearby or peers	x	x	x
Coping strategies to generate alternative behaviours to maintain abstinence and to deal with nicotine withdrawal symptoms		x	x
Problem solving technique		x	
Cognitive restructuring: Information on identifying and changing thinking		x	x
Self-instructions			
Behavioural test: Expose yourself to situations where you used to smoke without smoking			
Development of cigarette rejection techniques: Fog bank technique, broken record			
Cooximetry (measuring CO in exhaled air)		x	x
Considers combined treatment with medication	x	x	x

Note. CBT: Cognitive-Behavioural Therapy, CO: Carbon Monoxide. X *: The type of information is not clearly specified.

Knowing that CBT treatment must include smokers' awareness and information in the behaviour analysis of situations in which they smoke or smoked, understood as critical situations for relapse, we believe that *mHealth* can help identify and record these. It is even recommended that the apps themselves notify the user of this function to make sure smokers are attentive to their progress (Naughton, 2016) but evidence is lacking in how these strategies can be effectively promoted. Unlike most traditional methods of delivering behavioral support, mobile phones can in principle deliver automated support, including lapse prevention strategy recommendations, Just-In-Time (JIT). From this perspective, we consider that *Smoke Mind* provides the user with most control over this analysis. An interface for healthcare staff provides the CBT therapist with the ability to help the smoker perform the analysis in real time, thereby receiving personalized attention. Thus, the interface can facilitate app-based CBT, and furthermore enables interaction with the assigned health personnel, better monitoring, and access to the health system for smokers who want to quit smoking.

Contacts with health personnel, such as "*Quitlines*", in distance therapies have proven effective, albeit with the drawback, according to some authors (Stead, Koilpillai & Lancaster, 2015), that they are underused by smokers.

This problem matches the results of the study by Alsharif and Philip (2015b) especially in the Arabian Gulf region. However, very few studies to date have addressed the use of smart mobile health technologies for smoking cessation in the region. This paper proposes a smart mobile health solution tailored to assist with smoking cessation in the Arabian Gulf, and in particular in the Kingdom of Saudi Arabia (KSA, in which they report that despite the possibility of contacting health professionals through the mobile application, more than 70% of the sample never did so. The study on *SmartQuit* (Heffner et al., 2015) also refers to problems of underutilization of the app's available functions. In order to solve the above problems and achieve a more active user response, it is advisable to incorporate the notifications or warnings of the device itself (Naughton, 2016) and include gamification elements in *mHealth* (Edwards et al., 2016) because adherence to treatment and follow-up after cessation can be strengthened through play (Andújar-Espinosa, Salinero-González, Castilla-Martínez, Castillo-Quintanilla, Ibañez-Meléndez & Hu-Yang, 2018). Both strategies are included in the apps reviewed and were positively valued by their users. (Lin et al., 2018; Tudor-Sfetea et al., 2018).

Despite the scientific and applied importance of measuring the efficacy of smoking treatment through

assessments which may be made objective, such as the reduction of depressive symptoms, anxiety symptoms, craving, and the number of cigarettes, and of course quitting smoking, most of these studies employ semi-structured interviews about the opinions regarding app use, either by users or health staff. Thus, the studies base their assessments on a) the opinions of users and professionals (Alsharif & Philip, 2015a, 2015b), b) the app functions most commonly used as cessation predictors in the study by Heffner et al. (2015), or c) the prediction of quitting given the strengthening of psychological constructs (empowerment, well-being and inspiration) (Lin et al., 2018). In order to improve the quality of evidence, several additional sources would be necessary: assessments before and after use of the app, objective tests (co-oximetry, nicotine in saliva...) and/or information that may be provided by people close to the user or by health personnel; none of the above sources of objectivity and triangulation were included in any of the studies reviewed.

A further important limitation found in the studies reviewed is related to the fact that the opinions recorded are assessed very shortly after the use of the app: either before finishing the treatment (Alsharif & Philip, 2015b; Heffner et al., 2015; Tudor-Sfetea et al. 2018) or right at the end of the treatment (Lin et al., 2018). There is scientific evidence that relapse percentages of smokers are high, from the first month after withdrawal, decreasing at 3 months, 6 months and 12 months of follow-up in smoking cessation treatments (Minami et al., 2018) few outpatient mental health treatment facilities offer smoking cessation services. In this paper, we describe the development of a smartphone-assisted mindfulness smoking cessation intervention with contingency management (SMI-CM). Given this issue, follow-ups should be carried out with longer-term objective assessments in smokers who maintain abstinence after app use.

In conclusion, the review has highlighted the existence of a small number of smoking cessation applications which include CBT. The apps identified have important limitations: they offer low levels of detail as to the information regarding the techniques they perform in their CBT program; although they explain some of the procedures they use, they should detail how, and the sequence and the frequency with which they are used. This would facilitate the standardization of the program. Moreover, they do not focus the study on analysing smoking behaviour, and in general they do not refer to achieved levels of abstinence by not including sufficiently efficient procedures to measure the effectiveness of the tool. Given the above, and in order to construct new smoking cessation apps, the use of notifications and warnings is recommended, as well as gamification elements which reinforce the performance of the proposed activities, so that treatment adherence and subsequent change of behaviour can be strengthened. For

functions requiring more interaction, such as behaviour analysis, the inclusion of an interface to facilitate this is recommended, in addition to customizing treatments. In this way, the app would become an instrument of support for the smoker. The inclusion of objective measurement procedures such as the use of a cooximeter and/or information regarding the user's social network would be necessary to increase the reliability of both the process and the result of the instrument's application. Finally, it is recommended that applications are developed which allow the user to choose their language to participate in *mHealth*, and which, through simplicity of design, present a user-friendly and straightforward procedure, so that neither cultural level nor the technological skills required generate a user gap.

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Conflict of interests

The authors declare no conflict of interest in any aspect of this investigation.

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The world should not revolve around Cronbach's alpha $\geq .70$

El mundo no debería girar alrededor del alfa de Cronbach $\geq .70$

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The alpha coefficient (α) is one of the most widely used for estimating reliability and is normally understood as a measure of internal consistency; that is, the degree of interrelation between items (Cortina, 1993). However, it was also considered to be a measure of homogeneity, a concept reflecting the one-dimensionality of items; this confusion was actually generated by Cronbach himself (1951) by using the terms interchangeably in his seminal article. Nevertheless, Cho and Kim (2015) indicate that α is a function of the interrelation of items with the number of items (see equation 1), so the number of items is a factor which affects the α coefficient (Murphy & Davidshofer, 2004). Thus, an article recently published in the journal *Adicciones* used the α coefficient to create a scale with 38 items, and noted that the limited reliability obtained in the study was due to the low number of items (Benito et al., 2019). It therefore appears necessary to reflect on the use of $\alpha \geq .70$ in studies on addictions.

$$\alpha = \frac{K}{K-1} \left[1 - \frac{\sum S_i^2}{S_T^2} \right] \quad \text{Equation (1)}$$

The α coefficient ranges from 0 to 1, and values $\geq .70$ are considered acceptable (Cicchetti, 1994). This recommendation stems from Nunnally's proposal (1978) and is used as the cut-off criterion in 44% of articles (Lance, Butts & Michels, 2006). However, a careful review of Nunnally (1978) reveals that the recommendation applied to preliminary research and that the value was not attributed to the α coefficient itself, but to a measure of general reliability. In addition, a meta-analytic study

showed that the average value of α is .77 and that this changes depending on the subject area in which it is applied (Peterson, 1994). It is therefore rather simplistic to make decisions based on a single value, and it is necessary to incorporate the inter-item correlation matrix, its mean and standard error (Cortina, 1993; see Equation 2).

$$\frac{DE_r}{\left[\left(\frac{1}{2} * k * k[k-1]\right) - 1\right]^{1/2}} \quad \text{Equation (2)}$$

To demonstrate the sensitivity of α to the number of items, the R program was used to simulate data, generating scales from 3 to 12 items in a one-dimensional structure, following a normal distribution (Mean = 0, SD = 1) with mean inter-item correlations of 0.10, 0.15, 0.20 and 0.25, reflecting little variability between the items, and with sample sizes of 50, 100, 250, 500 and 1000. Thus, 200 (10 x 4 x 5) simulation conditions were generated, with 1000 repetitions for each condition, giving a total of 200,000 simulated data sets (see <https://osf.io/fngte/>).

The results showed that α increases with an increasing number of items, despite the fact that the inter-item correlations had little variability; $\alpha \geq 0.70$ was found on scales with 7 or more items in samples of 50 or higher and with inter-item correlations of 0.15 (see Figure 1). These findings confirm the hypothesis that the number of items has an impact on the α coefficient, a factor which must be taken into account in interpreting the data to ensure that internal consistency is actually measured as a product of the variability of item scores rather than seen as a function of the increase in their number.

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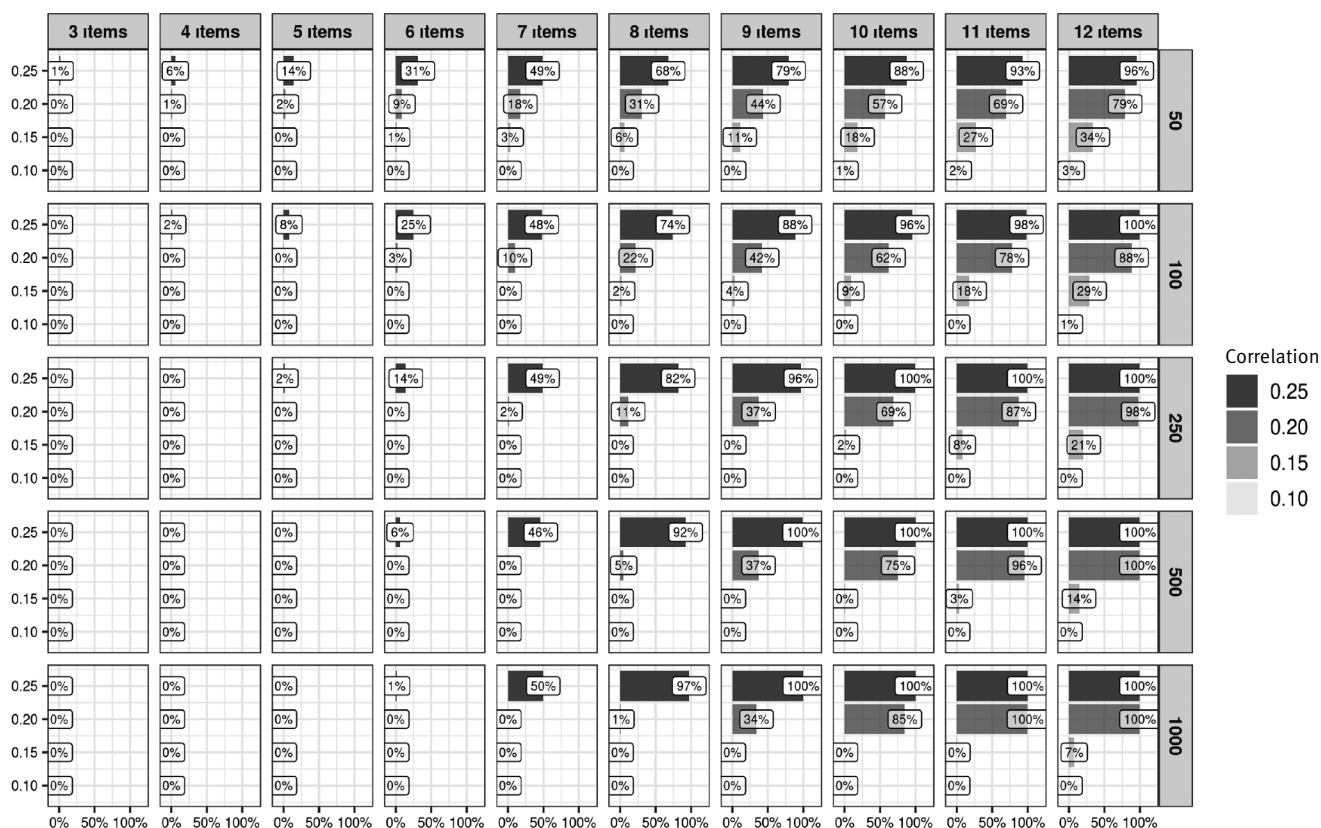


Figure 1. Percentage of cases with α coefficients $\geq .70$ with different numbers of items, sample sizes and inter-item correlations.

Thus, α should be interpreted as the amount of common variability that can be attributed to the factor depending on the number of scale items. An α of .79 would therefore indicate that 79% of the variability of the items is due to the consistency (or coherence) of the responses of a group of people, in a measurement instrument comprising a certain number of items.

These results serve as an invitation to researchers to explore other ways of estimating reliability, such as the omega coefficient by means of factor models from classical test theory, or the information function from item response theory (Ventura-León, 2019), which can all be calculated with free access programs such as R, Factor, Jamovi and/or JASP. Furthermore, in conditions of non-tau-equivalence, multidimensionality, or the presence of correlated errors, reliability estimates of α are problematic (Raykov & Marcoulides, 2019), and since the α preconditions are difficult to find in real situations, this coefficient is falling out of use as an indicator of reliability (Peters, 2014). However, this does not indicate that the α is malfunctioning.

In conclusion, it does not appear to make sense to use a continuous measurement ranging from 0 to 1 as the product of α if in the end the interpretation is dichotomized as “Not Acceptable” or “Acceptable” on being below or above a value such as .70. Instead, indicating that a test has reliable scores requires reporting the inter-item correlation matrix,

its mean, its standard deviation, the number of items, and previous or meta-analytical studies to account for the research context (Peterson, 1994) because relying solely on a value without the dataset is like looking at the tree without seeing the forest.

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Population impact of reducing alcohol positive expectations on risky consumption and heavy episodic drinking among young people

Impacto en la población de la reducción de expectativas positivas sobre consumo de riesgo e intensivo de alcohol en jóvenes

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Expectations regarding alcohol consumption are the implicit or explicit beliefs that a person has on the consequences of his/her own consumption. Despite referring to the consequences of self-consumption, Miller et al. remind us that a person's expectations regarding alcohol use are created even before the actual consumption has started (Miller, Smith & Goldman, 1990), probably generated from observation and deeply influenced by cultural norms. Having positive expectations regarding alcohol use has been related to higher levels of alcohol consumption, and the maintenance of them, while the opposite effect has been found for negative expectations (Carey, 1995; Linden, Lau-Barraco & Millettich, 2014).

Expectancies regarding alcohol use have also been related to the age of onset (Janssen, Treloar, Merrill & Jackson, 2018), variable of high interest, related itself to alcohol consumption during youth and even to negative consequences of this consumption.

We are conducting a cohort study of 12 years follow-up among university students (Compostela Cohort, Spain) since 2005 to identify predictors and prevalence of alcohol consumption among university students (N = 1,382). This study was approved by the Bioethics Committee of the

Universidade de Santiago de Compostela. The Compostela Cohort study has showed that some people start college not having consumed alcohol while others already practice Risky Consumption (RC) or Heavy Episodic Drinking (HED). Also, among the Compostela Cohort students, the expectations of alcohol consumption at 17-18 years of age enabled us to predict their consumption patterns and trends, even for the 9year follow-up. Taking into account these results, we aim to determine the impact of reducing alcohol positive expectations on RC and HED.

RC (dichotomous variable generated from AUDIT score) and HED (dichotomous variable generated from the third AUDIT question) (Varela, Carrera, Rial, Braña & Osorio, 2006) were measured, such as other factors associated with alcohol use (educational level and alcohol use of parents, age of onset of use and expectations about alcohol use, among others). Regarding expectations about alcohol use: students were required to rank 7 positive and 7 negative expectations about the effects of alcohol (Defensor del Menor de la Comunidad de Madrid, 2002). Taking the number of positive and negative expectations into account, a score ranging from 0 to 14 was generated (0 being the maximum of negative expectancies and 14 the maximum of positive expectancies). Scores were divided into tertiles.

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In order to determine the impact of reducing alcohol positive expectations on RC and HED, we carried out new analysis to calculate the population attributable fractions (PAF) for both variables. The population attributable fraction allows us to calculate the burden of expectations in the practice of RC and HED in university students, and therefore, what effect would reducing these expectations have on both drinking patterns. We used the formula proposed by Morgenstern and Bursic (1982), because it allows to perform calculations based on effects adjusted for other variables and therefore with less bias. Moreover, this formula goes beyond a classical calculation assuming that the risk factor will disappear from the population under study, allowing estimations of the reduction of these behaviors in scenarios in which the distribution of the risk factor under study and object of the intervention changes, with lower exposure in the population but without disappearing. Therefore, it provides calculations that are more applicable to reality. Further details regarding this method are reported by Caamano-Isorna, Adkins, Aliev, Moure-Rodríguez and Dick, 2020. We considered adjusted relative risks for alcohol positive expectations, prevalence rates of consumption, and proportion of drinkers of each level of expectations from Moure-Rodríguez et al. 2016.

The PAFs for the alcohol high-positive expectations in RC and HED were respectively 64.6% and 56.7% in fema-

les and 49.4% and 48.0% in males. Taken into account that it would be unrealistic to assume that all young people reduce completely their alcohol positive expectations, we also calculated the proportion of RC and HED that would be removed if adolescents reduced partially their alcohol expectations (Figure 1). As a result, we obtained representative figures of the effect that population interventions would have for a reduction of positive expectations among young people with different levels of effectiveness. These calculations are of great interest for decision-making in public health and their use is increasingly common as they allow us to translate theoretical approximations into reality.

It is known that youth change their expectations regarding alcohol use throughout adolescence, increasing the positive expectations as they grow older (Copeland, Proctor, Terlecki, Kulesza & Williamson, 2014). Our results suggest that with interventions focused on avoiding this increase in positive expectations and working on the maintenance of negative expectations from an early age, we could considerably reduce these risky behaviors among university students.

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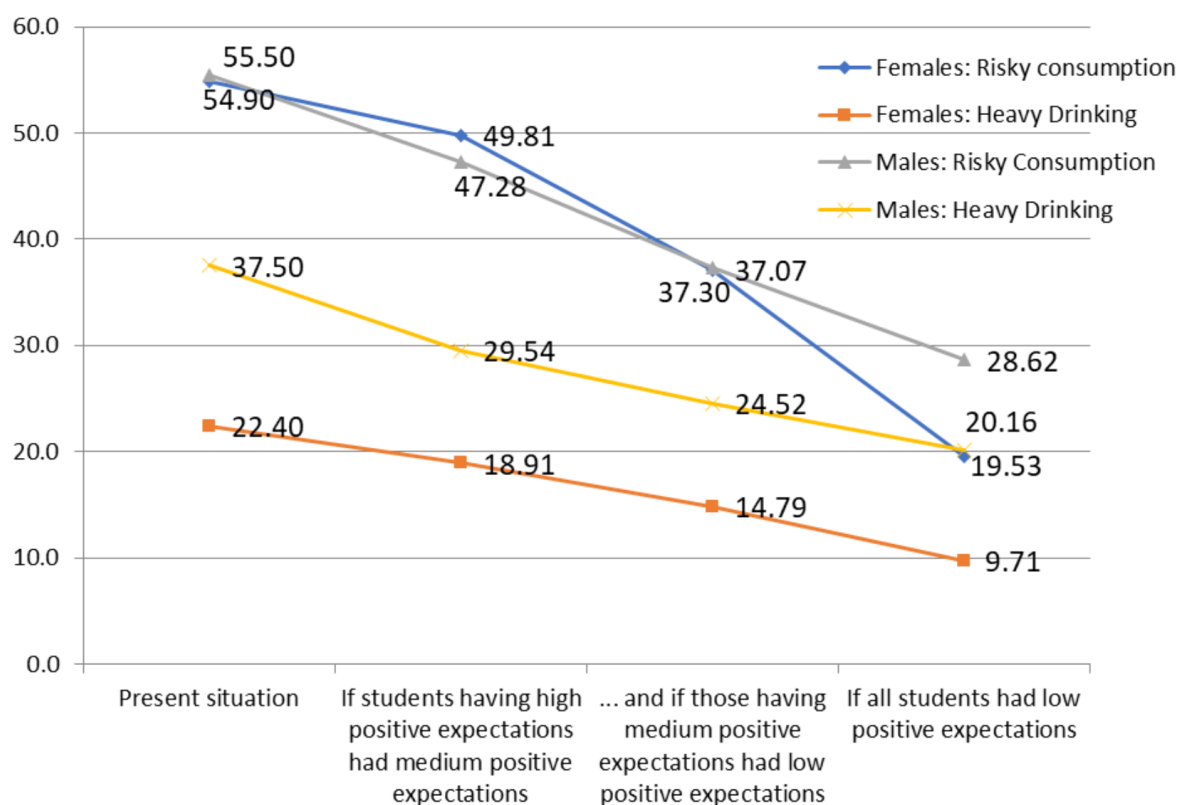


Figure 1. Estimated impact of reducing alcohol positive expectations on the prevalence (%) of Risky consumption and Heavy episodic drinking.

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Conflict of interests

Authors declare they have no conflicts of interest.

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Cannabinoid hyperemesis syndrome versus cyclic vomiting syndrome

Hiperemesis por cannabis vs vómitos cíclicos

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Cannabinoid hyperemesis syndrome (CHS) is still relatively unknown among Spanish clinicians of any specialty, a situation highlighted in studies such as that by Ochoa-Mangado and Madoz-Gúrpide (2021), and to which we would like to contribute other aspects for consideration.

In 2016, CHS was included in the classification of functional digestive disorders (Rome IV Classification), added to the group of functional gastrointestinal disorders, section B3 (nausea and vomiting disorders), together with cyclic vomiting syndrome (CVS). CHS essentially differs from CVS in that the latter is normally associated with frequent migraines, concomitant psychiatric pathology, rapid gastric emptying, and the absence of cannabis use. However, up to 30% of patients diagnosed with CVS have been observed by some authors to use cannabis, potentially due to its antiemetic properties (Drossman & Hasler, 2016; Spiller, Künzler & Caduff, 2019).

The prevalence of CHS in Spain could be around 18% among chronic cannabis users (Narváez et al., 2016), while recent calculations in the USA indicate that it could reach 33% in problem users (Habboushe, Rubin, Liu & Hoffman, 2018). According to EDADES 2019/20, the presence of problematic cannabis use between the ages of

15 and 64 years is 1.9%, or approximately 590,000 people (Delegación del Gobierno para Plan Nacional sobre Drogas., 2021). To this pool of potential patients at risk of presenting CHS we must add the increase in the potency of currently used cannabis varieties, as well as increases in the use of synthetic cannabinoids (some users of which have also presented cases of CHS) (Bick, Szostek & Mangan, 2014). All this would, in our opinion, presage an increase in possible cases of CHS, which should be taken into account by health professionals (Galicia, 2020). CHS can present with clinical entities requiring urgent action, such as pneumothorax or pneumomediastinum (Hernández Ramos, Parra Esquivel, López-Hernández & Burillo-Putze, 2019), and recently a series has been published in which CHS is even related to deaths (Nourbakhsh, Miller, Gofton, Jones & Adeagbo, 2019).

Special mention should be made of the use of cannabis by pregnant women and the possibility that they might develop CHS, which should be considered as the cause of vomiting in the anamnesis to prevent its misinterpretation as hyperemesis gravidarum. In addition, excessive use of prolonged hot showers during the first trimester of pregnancy has been linked to neural tube defects, esophageal atresia, omphalocele, and gastroschisis, as

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well as a higher risk of falls in pregnant women (Abreu Jáuregui, López Hernández, Mendoza Romero & Armas Pérez, 2020).

Regarding the treatment of CHS, only two clinical trials have been published to date, both in 2020, comparing haloperidol to ondansetron (Ruberto et al., 2021) and capsaicin against placebo (Dean et al., 2020), with approximately thirty patients in each. Both drugs have proven effective in controlling nausea, although new trials with a larger number of patients and other, a priori useful drugs such as droperidol are necessary (Lee, Greene & Wong, 2019).

In summary, we believe that greater diagnostic suspicion of CHS is necessary in patients seeking treatment for nausea in emergency departments or other health facilities. This would help to advance our knowledge of the true incidence of this syndrome in Spain, likely to be higher than existing figures, as a complication of chronic cannabis use.

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Desde el año 2012 sólo se admite la normativa APA.

Ante la preparación de un artículo de cara a su publicación se deben revisar y aplicar las normas extensas, que pueden ser consultadas en www.adicciones.es

Adicciones está editada por Socidrogalcohol, Sociedad Científica Española de Estudios sobre el Alcohol, el Alcoholismo y otras Toxicomanías. Adicciones publica artículos originales sobre el tratamiento, la prevención, estudios básicos y descriptivos en el campo de las adicciones de cualquier tipo, procedentes de distintas disciplinas (medicina, psicología, investigación básica, investigación social, etc.). Todos los artículos son seleccionados después de pasar un proceso de revisión anónimo hecho por expertos en cada tema. Adicciones publica 4 números al año. Adicciones tiene las secciones de editorial, artículos originales, informes breves, artículos de revisión y cartas al director. La revista se publica en español, aunque admite artículos en inglés. Cuando publica un artículo en inglés, puede exigir su traducción también al español, pero no es la norma.

Papel. La revista Adicciones está impresa en papel estucado fabricado con pastas libres de cloro (TCF).

Conflictos de intereses. La política de la revista es que en todos los artículos y editoriales conste expresamente la existencia o no de conflicto de intereses en el apartado correspondiente. Todos los conflictos de interés son importantes, pero especial cuidado hay que poner en el caso de haber recibido para el estudio financiación de la industria farmacéutica, alcoholera, tabaquera, etc. La revista Adicciones sigue en este tema las recomendaciones de ISAJE (International Society of Addiction Journal Editors). Tener conflicto de intereses no significa no poder publicar el artículo. En caso de duda sobre esta cuestión se debe contactar con el editor.

Autoría. Es muy importante que únicamente se consideren autores aquellos que han hecho sustanciales contribuciones: 1) a la concepción y diseño, adquisición de datos, o el análisis e interpretación de datos; 2) a la redacción del artículo o a su revisión crítica; y 3) que ha dado su aprobación de la versión que se publicará. Los autores deben asegurarse de que partes significativas del material aportado no ha sido publicado con anterioridad. En caso de que puedan tener dudas sobre el cumplimiento de esta norma, deberán presentar copias de lo publicado o de lo presentado para publicación a otras revistas antes de poder ser considerado el artículo para su revisión. En caso de dudas sobre alguno de los aspectos anteriores los autores deben consultar el acuerdo de Farmington al que está adherida la revista Adicciones (Anexo 1), las normas de "Sponsorship, authorship, and accountability" del International Committee of Medical Journal Editors (www.icmje.org/sponsor.htm) o las normas de publicación de la American Psychological Association, 6ª edición (2010) (www.apastyle.org). El editor de la revista puede dirigirse a los autores del artículo para que especifiquen cual ha sido la contribución de cada uno de ellos.

Preparación de manuscritos. Los autores deben seguir exclusivamente para la presentación de sus manuscritos las Normas de Publicación de la American Psychological Association (6ª edición, 2010; <http://www.apastyle.org>). Las excepciones a esta regla son mínimas y dependen sólo de las diferencias que puede haber en el uso del español y del inglés. Por ejemplo, los ingleses utilizan en la bibliografía el signo '&' antes del último autor, mientras que en español dicho signo se corresponde exactamente con la 'y' (por tanto los artículos en español utilizarán solo la 'y'); otra diferencia puede ser en los títulos de los artículos, puesto que en inglés se pone en mayúscula la primera letra de muchas de las palabras, mientras que en español sólo ponemos la primera...

NO existe un límite exacto de palabras para los trabajos que se presenten. Pero deberá cuidarse mucho que toda la información que se incluya sea estrictamente la necesaria.

Es importante que los artículos sean interesantes para la comunidad científica del campo de las adicciones. Se evitarán trabajos que se refieran a realidades muy concretas –a menos que precisamente en ello resida su interés–, o que sean básicamente descriptivos –a menos, nuevamente, que se trate de algo novedoso.

Artículos originales. Serán preferentemente trabajos de investigación clínicos o experimentales sobre el campo de las drogodependencias o las adicciones. Pero también pueden ser aceptados trabajos teóricos o de otro tipo.

Informes breves. En esta sección se considerarán los trabajos de investigación que por sus características especiales (series con número reducido de observaciones, casos clínicos, trabajos de investigación con objetivos y resultados muy concretos, estudios epidemiológicos descriptivos, primeros resultados de un estudio amplio, etc.) pueden ser publicados de forma abreviada y rápida.

Artículos de revisión. Presentarán la actualización de un tema de forma rigurosa y exhaustiva. Deberán regirse normalmente por metodologías sistematizadas. El contenido del artículo podrá llevar los apartados necesarios para la mejor comprensión de los lectores. En su parte final debe aparecer un apartado de discusión o conclusiones. La extensión preferiblemente no debería superar las 5.000 palabras, pero siempre que esté justificado, se admitirían revisiones más largas.

Cartas al Director. Tendrán normalmente un máximo de 800 palabras, 10 referencias y una tabla o figura. Pueden consistir en una presentación breve sobre algo novedoso, una investigación original, o la contestación o matización a un artículo publicado en la revista. Cuando sea éste el caso la carta tendrá que recibirse dentro de las 6 semanas subsiguientes a la publicación del artículo en el número de la revista

PRESENTACIÓN DE LOS TRABAJOS

Envío electrónico. La forma más rápida y preferente de enviar artículos para su revisión editorial es a través de www.adicciones.es. Allí encontrará todas las instrucciones a seguir y la forma de adjuntar el original. Todo el seguimiento del proceso de revisión y editorial se realizará a través de la web (a través de la plataforma de RECYT). Ésta es la única forma prevista para envío de artículos (pero si tiene alguna duda puede comunicarse con secretaria@adicciones.es). Será muy útil para facilitar el proceso de revisión que en el momento del envío del artículo proporcione a través de la misma plataforma información sobre por lo menos dos posibles revisores para su artículo (nombre, institución y correo electrónico). Estos revisores deberán ser expertos en el tema y no estar ligados a la investigación que se desarrolla en el trabajo presentado. Tampoco podrán pertenecer al actual Comité de Redacción o Editorial. La revista se reserva la decisión de utilizar o no dichos revisores propuestos. El editor señalará además normalmente otros revisores. Recordar que el proceso de revisión es anónimo para los autores. Caso de que no fuese posible por alguna razón o tuviese algún problema con el envío del artículo a través de la web, le agradeceremos que se ponga en contacto con secretaria@adicciones.es o al teléfono (+34) 971727434 o a Editor de Adicciones. Rambla, 15, 2ª, 3ª. 07003 Palma de Mallorca.

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Todas las hojas deberán ir numeradas correlativamente en la parte superior derecha. Cada parte del manuscrito empezará una página en el siguiente orden:

1. En la *primera página* del artículo se indicarán, en el orden que aquí se cita, los siguientes datos:

- Título del artículo, en minúsculas (en castellano e inglés) excepto la letra inicial.
- Nombre de los autores completo (no sólo iniciales), y uno o dos apellidos del/los autor/es (p. ej.: Miguel García o Miguel García Rodríguez o bien Miguel García-Rodríguez, teniendo en cuenta que la forma que hayan utilizado los autores es la que se enviará a las bases de datos) en minúsculas, excepto la letra inicial. Los distintos autores vendrán separados por punto y coma. Detrás del apellido de cada autor, sin espacio intermedio y en superíndice, deberá ir un asterisco de llamada (1 asterisco para el primero, 2 para el segundo, etc.). Estos asteriscos son necesarios para indicar en el siguiente punto la institución donde se ha realizado el trabajo.
- Precedidos por un asterisco o los que fuesen necesarios –según el punto anterior– se indicarán el nombre/s del centro/s donde se ha realizado el trabajo o donde trabajan los autores.

Al final de la primera página (no como 'nota al pie') se colocará este texto: "Enviar correspondencia a: ...", indicando el nombre, la dirección postal, correo electrónico u otra información mediante la cual el autor elegido podrá ser contactado. Este será

el autor al cual la secretaría se dirigirá durante el proceso de revisión, a menos que se acuerde mutuamente otra solución.

2. La *segunda hoja* del artículo incluirá un resumen del trabajo presentado, tanto en español como en inglés. Dicho resumen tendrá alrededor de 250 palabras. Siguiendo las normas de publicación internacional ya citadas, el resumen debe especificar los objetivos del estudio o investigación; la metodología fundamental utilizada; los principales resultados; y las conclusiones más importantes y/o novedosas. El resumen debe redactarse en uno o varios párrafos siguiendo las normas de publicación de la APA, sin atender a las divisiones de antecedentes, método, etc.

Después del resumen se incluirá un listado de alrededor de 5 Palabras clave en español y luego en inglés (Key words) en minúsculas y separadas por comas que, a ser posible, se adapten a las normalmente utilizadas en los índices al uso (ej., Index Medicus, Psychological Abstracts, Índice Médico Español).

3. La *tercera hoja* dará inicio al texto del artículo. Se recomienda la redacción del texto en impersonal. Conviene dividir claramente los trabajos en apartados, siguiendo, siempre que sea posible por las características del estudio, el esquema general siguiente: Introducción (no obstante la palabra introducción no se pondrá, pues se da por supuesta), Método, Resultados, Discusión, Reconocimientos, Conflicto de intereses y Referencias.

Introducción. Será breve y deberá proporcionar sólo la explicación necesaria para que el lector pueda comprender el texto que sigue a continuación. No debe contener tablas ni figuras, a menos que sean imprescindibles para la comprensión del texto. Debe incluir un último párrafo en el que se exponga de forma clara el o los objetivos del trabajo. Siempre que se pretenda publicar una observación muy infrecuente, debe precisarse en el texto el método de pesquisa bibliográfica, las palabras claves empleadas, los años de cobertura y la fecha de actualización.

Métodos. Se describirá claramente la metodología empleada (selección de la muestra, como se recogieron los datos, instrumentos de recogida de datos o de evaluación, temporalización,...). Se deben identificar los métodos, instrumentos de evaluación, tratamientos, fármacos utilizados, aparatos, sistema de evaluación, pruebas estadísticas si son novedosas, métodos nuevos, etc. Debe especificarse el tipo de estudio (descriptivo, epidemiológico, experimental, ensayo clínico, etc.), sistema de asignación de los sujetos a grupos, aleatorización, etc. Cuando haya un protocolo debe citarse. Cuando los experimentos son realizados con animales o el ensayo es experimental en humanos debe especificarse explícitamente que se han seguido las normas éticas deontológicas, de investigación y que se han cumplido los convenios internacionales de experimentación animal o humana. Debe especificarse el tipo de análisis estadístico que se va a utilizar, describirlo cuando éste sea nuevo o poco conocido, e indicar el paquete estadístico que se va a utilizar. Se valorará positivamente si se ha conseguido la aprobación del estudio por algún comité ético o se podrá exigir cuando el estudio realizado lo requiera.

Resultados. Los resultados deben presentarse en una secuencia lógica en el texto, tablas y figuras. Utilice sólo aquellas tablas y figuras estrictamente necesarias, que expresen claramente los resultados del estudio. No duplique los datos en tablas y figuras. No repita en el texto todos los datos de las tablas y figuras, sólo los más importantes. Enfátice y resuma sólo las observaciones más importantes. Adicciones adopta el sistema convencional del 5% como valor para la significación estadística y no acepta tener en cuenta las tendencias para valores menores.

Los ensayos clínicos aleatorizados deben adecuarse a las guías CONSORT (www.consort-statement.org) y los estudios con diseños no experimentales a las guías TREND (www.trend-statement.org/asp/trend.asp) para la mayor claridad de los lectores y revisores del trabajo. Igualmente, se presentarán los estadísticos del tamaño del efecto.

Discusión. Enfatizará los aspectos nuevos e importantes del estudio y las conclusiones que se derivan del mismo. No repita en detalle los resultados que ha presentado en la sección anterior ni en la introducción. Destaque lo más importante y controvertido y relacionelo con otros estudios relevantes sobre el tema. No haga suposiciones si no se ven apoyadas por los datos. Cuando sea apropiado pueden incluirse recomendaciones. Indique las implicaciones de sus hallazgos y sus limitaciones (estas preferiblemente formarán un párrafo al final del artículo).

Reconocimientos. Este apartado se situará al final del texto del artículo y justo antes del apartado de Referencias. Cuando se considere necesario se citará a las personas, centros o entidades que hayan colaborado o apoyado la realización del trabajo. Pueden incluirse todas aquellas personas que hayan ayudado en la preparación del artículo, pero no con la intensidad requerida para ser considerados autores. Si el trabajo ha sido financiado se indicará la entidad financiadora.

Conflicto de intereses. Todos los artículos, editoriales, comentarios, opiniones, reseñas de libros y cartas que se publican en la revista estarán acompañados por una declaración sobre los posibles o reales conflictos de interés o una declaración de que los autores no tienen conflictos de intereses que declarar.

Referencias. Seguirán de forma estricta las normas de la American Psychological Association [American Psychological Association (2010). Publication Manual of the American Psychological Association (6th ed.). Washington, DC. <http://www.apastyle.org>]

Tablas y figuras. Irán al final del texto, numeradas, y cada una en una página distinta, siguiendo el diseño propio de la APA.

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El resultado de la revisión del manuscrito será enviado al autor de correspondencia que viene en el artículo indicándole su aceptación, rechazo o la necesidad de someterse a una nueva revisión una vez tenidos en cuenta los comentarios de los revisores o del editor. El autor, si es el caso, deberá hacer los cambios señalados –cuando esté de acuerdo con ellos–, enviando:

- Una copia del manuscrito revisado.
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Una vez aceptado el artículo, se enviará a los autores las pruebas de imprenta para que las corrijan. Los autores son totalmente responsables de la versión final que se publique. Los autores pueden hacer el uso que crean pertinente para la difusión del artículo, siempre que quede clara toda la información necesaria acerca de la revista donde ha sido publicado.

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